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

Conservation Advice

Grevillea dryandroides subsp. *dryandroides*

phalanx grevillea

Conservation Status

Grevillea dryandroides subsp. *dryandroides* (phalanx grevillea) is listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act). The species is eligible for listing 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 geographic distribution is precarious for its survival due to its restricted extent of occurrence and area of occupancy, its observed continuing decline, its restricted number of locations, and its small population size.

It is listed as Declared Rare Flora and ranked as Critically Endangered under the Western Australian *Wildlife Conservation Act 1950*.

Description

The phalanx grevillea is a root suckering shrub to 50 cm tall. It usually forms colonies of less than five plants or is scattered singly amongst associated vegetation. The leaves are dull, yellow-green, each with leaf lobes 5–15 mm long. The inflorescence is 3–4 cm long, and pedicels are 1–1.5 mm long. Individual flowers are pink to orange-pink. The style is red or pink with a green tip. The perianth is 6–7 mm long and the pistil 17–18 mm long (Olde & Marriott 1993). Flowers occur from September to March (Brown et al., 1998).

Distribution

The phalanx grevillea is endemic to Western Australia. It was first collected from the Pithara area in 1931. Further collections were made from Ballidu, Pithara and Wubin between 1934 and 1996. The most recent surveys in these areas were undertaken in 1998/1999, where five populations are now known from a single area near Ballidu, containing 115 plants. Populations 1, 3 and 5 occur on Main Roads Western Australia road reserves and Westrail reserves; population 3 also occurs on Shire reserves, populations 2 and 4 occur on Shire reserves (Phillimore & Brown 2000).

Relevant Biology/Ecology

The phalanx grevillea is found in open heath on grey sandy loam and yellow gravelly sand, with shrubs of *Allocasuarina* and *Melaleuca*. Associated species include *Acacia resinimarginea*, *A. sessilispica, A. yorkrakinensis* subsp. *acrita*, *Allocasuarina campestris*, *Calytrix breviseta* subsp. *stipulosa*, *Chorizema rhynchotropis*, *Conospermum stoechadis* subsp. *sclerophyllum*, *Dampiera lavandulacea*, *Glischrocaryon aureum* var. *aureum*, *Hakea scoparia*, *H. meisneriana, Hibbertia huegelii*, *Jacksonia* sp., *Melaleuca conothamnoides, M. cordata*, *M. orbicularis, M. uncinata, Opercularia spermacocea*, *Petrophile incurvata, Stylidium* sp., *Synaphea* sp., *Thryptomene* sp., *Verticordia chrysantha*, *Verticordia* sp., and *Waitzia acuminata* (Phillimore & Brown 2000).

The species is pollinated by birds and regenerates from seed or suckers after fire or disturbance (Olde & Marriott 1995). Smoke trials undertaken by the Botanic Parks and Gardens Authority (BGPA) in 1995 on two adult plants supports the hypothesis that smoke stimulates germination, with up to 60 seedlings germinating in a 15 m radius around the plants. Otherwise the biology

and ecology of phalanx grevillea is poorly known. Some minor seed predation has been observed but not enough to prevent a large amount being stored in the soil (Phillimore & Brown 2000).

Threats

Table 1 – Threats

Threat factor	Threat type	Threat status	Evidence base
Invasive species (including threats from grazing, trampling, predation)			
Weed invasion	known	current	Weeds are a threat to all five populations. Weeds suppress early plant growth by competing for soil moisture, nutrients and light. They also exacerbate grazing pressure and increase the fire hazard due to their high fuel loads. Narrow, linear populations, such as road and rail reserves, are severely affected by weed seed blown in from adjacent cleared land (Lynch 1987; Saunders et al. 1987; Taylor 1987).
Competition	known	current	A local dodder species (*Cuscuta* sp.) is a threat to parts of populations 1 and 5 that occur on Westrail reserves, as the vine covers many adult plants. Dodder not only competes for light, nutrients and possibly pollinators but also physically restricts the host, therefore posing an immediate threat to the longevity of individual plants.
Habitat loss disturbance and modifications			
Road and track upgrade and maintenance	known	current	These activities threaten populations 1, 2, 3, and 5 that occur on road and rail reserves. Threats include maintenance of telephone cables located underneath part of population 3, grading of road reserves (1, 2, 5), spraying of chemicals, construction of drainage channels and mowing of roadside vegetation. These events often encourage weed invasion as well as causing damage to actual plants.
Trampling	known	current	Human activities including trampling by people, accidental mowing and construction of new graves threaten populations 3 and 4, which are located in Shire reserves.
Lack of population recruitment	known	current	Little or no seedling recruitment has been observed at all populations. Possible causes include seed and/or seedling predation and a lack of disturbance events to stimulate germination.

Fire			
Fire frequency	potential	future	Seed of phalanx grevillea probably germinate following fire and occasional fires are apparently needed for recruitment. Too frequent fire may rapidly deplete the soil seed bank if fire occurs before plants have reached maturity. It could also deplete starch or nutrients stored in the roots and so affect the plants' capacity to resprout.

Conservation Actions

Conservation and Management priorities

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

- Manage sites by hand removal to control and reduce the spread of invasive species particularly dodder.
- Identify and undertake weed control in the local area to prevent weeds becoming a threat to the species, using appropriate methods appropriate methods such as hand removal and spot spraying during the appropriate season to minimise the effect of herbicide on the species and the surrounding native vegetation.
- Schedule weed control to include spraying at other threatened flora populations within the Merredin district.
- The tolerance of associated native plant species to herbicides at the site of phalanx grevillea is not known and weed control programs should be undertaken in conjunction with research.

Habitat loss disturbance and modifications

- Protect the species from further loss of habitat as a result of transport corridor upgrades, expansion of developed areas, etc.
- Prevent habitat disturbance. Control access routes by installing fencing and gates to suitably constrain public access to known sites on public land to ensure populations are not damaged by firebreak grading, telephone cable maintenance, construction of drainage channels, mowing of roadside vegetation, weedicide activities and trampling.
- Continue to liaise with Westrail, Main Roads WA, the Shire and adjacent landowners to ensure that populations are not accidentally damaged or destroyed.
- Inform adjacent landowners of location of populations to prevent possible damage due to grazing, crop maintenance, firebreak maintenance or other activities that may threaten the populations.
- Maintain Declared Rare Flora (DRF) markers[1] at Populations 1 and 5. Continue producing and distributing dashboard stickers and posters that illustrate DRF markers, inform of their purpose and provide a contact telephone number to use if such a marker is encountered.

Breeding, propagation and other ex situ recovery action

[1] DRF markers are used in Western Australia and are two standardised yellow markers at either end of a site, which are bent to face towards each other, indicating that DRF plants may occur anywhere between the markers, from the road's running surface to the fence. They alert people working in the vicinity to the presence of DRF, and the need to avoid work that may damage vegetation in the area (DEC 2013).

- Continue collecting seed and cuttings for propagation for potential translocation and to add to living collection of genetic material at BGPA.
- Continue smoke trials on adult plants and assess germination success of nearby seeds.
- Monitor any translocations of seedlings during the flowering period.

Fire

- Develop a fire management strategy to determine fire control measures and an appropriate fire frequency and season.
- Too frequent fire may prevent the accumulation of sufficient soil stored seed to allow regeneration. Fire should therefore be excluded from the area at least in the short term.
- Protect the species from further loss of habitat as a result of mineral extraction, transport corridor upgrades, etc.
- Provide maps of known occurrences to local and state Rural Fire Services and seek inclusion of mitigation measures in bush fire risk management plan/s, risk register and/or operation maps.

Stakeholder Engagement

- Continue liaising with local shires and private property owners and ensure they are notified of the presence of populations of the phalanx grevillea on their lands. Notifications detail the Declared Rare status of the taxon and the associated legal responsibilities.
- Raise awareness of the species with local farmers and residents in the Wongan-Ballidu Shire by providing information about the threatened species and a contact name and number, to assist in the potential discovery of new populations. Continue developing information posters which provide a description of the species, and information about threats and recovery actions.
- Implement or continue with formal links with local naturalist groups and interested individuals.

Survey and Monitoring priorities

- More precisely assess population size, distribution, ecological requirements and the relative impacts of threatening processes by monitoring weed invasion, habitat degradation, salinity levels and population stability (expansion or decline), pollinator activity, seed production, recruitment from seedlings and the plant's longevity.
- Monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary.
- Undertake survey work in suitable habitat and potential habitat to locate any additional populations/occurrences/remnants.
- Conduct further surveys, supervised by DPAW staff and with assistance from local naturalists and wildflower society members, during the species' flowering period (September to October, February to March). Likely survey sites include the Wubin and Pithara areas where historical collections of the subspecies were made.
- Survey sites with suitable habitat for potential translocations.

Information and research priorities

- Study the soil seed bank dynamics and the role of various factors including disturbance, competition, rainfall and grazing on seedling recruitment and survival.
- Determine of the plant's reproductive strategies, phenology and seasonal growth.
- Investigate of the plant's mating system and pollination biology.
- Investigate of population genetic structure, levels of genetic diversity and minimum viable population size.
- Investigate the impact of increased salinity levels on the habitat.
- Further investigate fire requirements. Research the species' response to fire using observational methods and laboratory experiments that have minimal impacts on the species population and its habitat.
- Investigate options for linking, enhancing or establishing additional populations.
- Undertake seed germination trials to determine seed dormancy mechanisms and the requirements for successful establishment.
- Research the effects of public access where this is likely and the effects are unknown.
- Investigate the outcomes of citizen science monitoring programs where they exist

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