

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

Grevillea curviloba subsp. *incurva*

narrow curved-leaf grevillea

Conservation Status

Grevillea curviloba subsp. *incurva* (narrow curved-leaf 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 due to the severe fragmentation of populations and a decline in the area and quality of habitat.

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

Description

The narrow curved-leaf grevillea grows as a vigorous, sprawling shrub to 2.5 m high and wide, with greyish-green leaves. The leaves are 1.8–5.2 cm long with 3–5 strongly incurved, weakly pungent, narrowly-linear lobes, 7–20 mm long. Inflorescences occur on short stalks and are 1–3 cm long by 3 cm wide. They usually occur in the leaf axils. Individual creamy white flowers are 7–10 mm long and 0.5 mm across. Flowering occurs September–October. This subspecies differs from *G. curviloba* subsp. *curviloba* in having prominently incurved, narrowly linear leaf lobes, 0.8–1.2 mm wide (Brown et al., 1998; Olde & Marriott 1995).

The habit of this subspecies ranges from prostrate to erect. There appears to be a continuum in the leaf morphology between the two subspecies and the taxonomy of the two subspecies may be reviewed (G. Keighery, pers. comm. cited in Phillipmore & English 2000).

The scientific name for the subspecies *incurva* is derived from the Latin '*incurvus*', meaning curved inwards. This refers to the narrow leaf lobes, which curve strongly inwards. The names *Grevillea biternata* and *G. tridentifera* have been incorrectly used for this subspecies (Olde & Marriott 1995).

Distribution

The narrow curved-leaf grevillea is thought to be confined to an area between Muchea and Badgingarra in Western Australia. Surveys conducted between 1990 and 2000 found 17 populations containing approximately 900 mature individuals and 200 juveniles. Twelve of the populations, contained around two thirds of the total population and were found on road and rail reserves (Populations 2, 4–13, 16). Around one third of the total number of mature individuals in 2000 occurred in one nature reserve near Muchea (Population 3). Another nature reserve near Eneabba contained five plants (Population 15). Two populations containing three plants were found on unallocated Crown Land near Eneabba and Ellenbrook (Populations 14 and 17) (CALM 2000). One cultivated population was found in 1978 in Perth on unknown land tenure.

Relevant Biology/Ecology

The narrow curved-leaf grevillea grows in open heath in winter-wet areas on sand over limestone, or over ironstone at sites with a high water table. It is associated with the EPBC Act listed threatened ecological communities 'Shrublands and Woodlands on Perth to Gingin

Ironstone' and the 'Shrublands and Woodlands on Muchea Limestone' ecological communities of the Swan Coastal Plain (English & Blyth 2000a, 2000b).

While the biology of many grevillea species is well researched, the biology of the narrow curved-leaf grevillea is poorly known. Like many other grevilleas, the subspecies regenerates from soil-stored seed, but has also been observed to resprout from root stock, after fire or loss of foliage by other means such as grazing and slashing. It is pollinated by insects, possibly native bees or wasps (Olde & Marriott 1995).

The narrow curved-leaf grevillea has been cultivated by the horticultural industry. It forms a dense attractive ground cover and is therefore planted extensively throughout the Perth metropolitan area, particularly in rehabilitation areas. According to Olde & Marriott (1995) it can be easily grown from cuttings, however, this was not the case when the Botanic Gardens and Parks Authority (BGPA) experimented with propagating the subspecies using this method (Phillimore & English 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	Weed invasion appears to be one of the greatest threats to the viability of all 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 the easy ignition of high fuel loads, which are produced annually by many grass weed species.
Rabbit warren construction and grazing	known	current	Rabbit warren construction on rail and road reserves at Populations 8 and 11 disturbs the soil around grevillea plants. Increased nutrient levels from rabbit droppings and the introduction of weeds also have the potential to impact on the habitat of the subspecies. Grazing by rabbits may have an impact on the establishment of seedlings thereby limiting natural recruitment.
Habitat loss disturbance and modifications			
Road, track and rail maintenance	known	current	Numerous road and rail populations have been damaged or destroyed by grading and burning. Other threats include actions such as road widening, spraying of chemicals, constructing drainage channels and mowing the roadside vegetation to improve visibility. These disturbance events also often encourage weed invasion into adjacent habitat, as well as causing damage to actual plants.
Agricultural chemical drift	potential	future	Drift from herbicide and fertiliser applications from adjacent farmland may affect the species' growth and survival in all populations.

Fire			
Fire frequency	potential	future	Too frequent fires may affect the viability of populations, as seeds of narrow curved-leaf grevillea probably germinate following fire. If this is the case, the soil seed bank would rapidly be depleted if fires recurred before regenerating or juvenile plants reached maturity and replenished the soil seed bank. However, it is likely that occasional fires are needed for reproduction of this subspecies.
Disease			
Dieback disease	potential	future	Dieback (<i>Phytophthora</i> spp.) is a possible threat to the narrow curved-leaf grevillea. The pathogen causes roots to rot and results in the plant dying of drought stress. Narrow curved-leaf grevillea populations are inundated over the winter months. These conditions are likely to be favourable for the establishment and spread of <i>Phytophthora</i> species. Although testing by CALM Science staff found that narrow curved-leaf grevillea is not susceptible to this pathogen (C. Crane, pers comm. cited in Phillimore & English 2000), the habitat may be susceptible and the pathogen has the potential to indirectly impact on the subspecies. The spread or amplification of the disease into the area should therefore be prevented.

Conservation Actions

Conservation and Management priorities

Invasive species

- Manage sites by monitoring habitat disturbance, and if necessary use baiting or alternative methods to control and reduce the spread of rabbits, particularly at Populations 8 and 11.
- Identify and remove new weeds and undertake weed control in the local area to prevent weeds from becoming a threat to the species. Use appropriate methods such as hand removal or spot spraying around narrow curved-leaf grevillea plants when weeds first emerge, to minimise possible disturbance/overspray threats. Schedule weed control with regard to weed management operations at other threatened flora populations within the districts.

Habitat loss disturbance and modifications

- Protect the species from further loss of habitat as a result of transport corridor upgrades, changes in land use, mineral exploration, etc.
- Continue to ensure land managers (local shires, Main Roads Western Australia and Westrail) are aware of the species' occurrence and provide protection measures against key and potential threats to ensure the populations are not damaged or destroyed accidentally.

- Install and/or maintain Declared Rare Flora (DRF) markers¹ at all road and rail reserve populations. 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.

Fire

- Implement an appropriate fire management regime involving fire frequencies that promote persistence of established plants and opportunities for vegetative or seedling recruitment.
- Any use of prescribed or experimental fires must be justified, in an adaptive management framework involving objectives of both learning and management. Prescribed fire operations should be integrated into an experimental design and a monitoring program.
- 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.
- Develop and/or implement a fire management strategy that defines fire control measures, and fire frequency and timing in consultation with relevant authorities and land managers.

Disease

- Implement suitable hygiene protocols to protect known populations from any outbreaks of *Phytophthora* species (DPaW 2014). These should be adhered to wherever possible for activities such as installation and maintenance of firebreaks and walking into the population in wet soil conditions.

Breeding, propagation and other exsitu recovery action

- Continue collecting seed and cuttings as required. Establish and maintain a living collection of genetic material at the BGPA. Test germinability of stored seed to inform management of the collection.
- Propagate plants for potential translocation.
- Develop a translocation proposal. Information on the translocation of threatened animals and plants in the wild is provided in CALM Policy Statement No. 29 *Translocation of Threatened Flora and Fauna*. All translocation proposals require endorsement by the Director of Nature Conservation WA.
- If Population 13 does not naturally regenerate in the reserve adjacent to the population, undertake a translocation, to increase the number of extant plants secure from threats such as weed invasion and clearing.

Stakeholder Engagement

- Continue to liaise with the relevant stakeholders are e.g. shire councils, Main Roads WA, Westrail, and private landowners adjacent to land where populations occur to ensure populations are not damaged or destroyed accidentally.
- Encourage and/or maintain formal links with local naturalist groups and interested individuals.
- Promote awareness by continuing production and distribution of information sheets/fliers with information on the narrow curved-leaf grevillea to residents in the Muchea and Eneabba areas, including a contact if they locate the subspecies.

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).

Survey and Monitoring priorities

- Monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary.
- Monitor weed invasion, habitat degradation (including the impact of dieback), population stability (expansion or decline), pollinator activity, seed production, recruitment, and longevity. Inspect populations annually.
- Undertake surveys during the flowering period (September to October) in suitable habitat and potential habitat to locate any additional populations/occurrences/remnants.
- Encourage local volunteers such as members of naturalists clubs and wildflower societies to be involved in surveys supervised by CALM staff.

Information and research priorities

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

References cited in the advice

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