

# THREATENED SPECIES SCIENTIFIC COMMITTEE

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

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

## Conservation Advice

### *Grevillea elongata*

ironstone grevillea

#### Conservation Status

*Grevillea elongata* (ironstone grevillea) is listed as Vulnerable 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 Vulnerable 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 Vulnerable category are its low population size and limited extent of occurrence, which is continuing to decline due to weeds, road and rail maintenance, pine plantation activities and grazing by rabbits, and/or stock.

*Grevillea elongata* is listed as Declared Rare Fauna and ranked as Endangered under the Western Australian *Wildlife Conservation Act 1950*.

#### Description

The ironstone grevillea is an upright shrub to 2 m tall by 2.5 m wide. The leaves are 2.5–5 cm long, smooth and finely divided. The flowerheads are terminal or axillary, either stalkless or with very short stalks and white and cream in colour. The obliquely-shaped fruit is 8 mm long, 3.5 mm wide and 4 mm deep (Olde & Marriott, 1994).

The species was once thought to be a form of kerosene bush (*G. paniculata*) which has leaves channelled on the upper surface, smaller floral bracts (1 mm long), a spherical flowerhead, longer flower stalks and deeply wrinkled fruits (Olde & Marriott, 1994).

#### Distribution

The ironstone grevillea is apparently confined to the Whicher Range area, south-east of Busselton in Western Australia.

Surveys between 1995 and 2004 found eight populations with an estimated 1500 mature individuals (WA DEC 2007). An estimated 670 plants occurred on road, drain and rail reserves (Parts of Populations 1 and 3; Populations 2 and 4), 360 on private property (Parts of Populations 1 and 3; Population 5), 400 in state forest (Population 6) and 100 in nature reserves (Part of Population 1 and Populations 7 and 8) (Stack & English 2003; WA DEC 2007).

The extent of occurrence is estimated at 22 km<sup>2</sup>. There are no data to indicate a past or future decline in the extent of occurrence. However the species is confined to ironstone soils which have a very restricted distribution as 90% of their area has been extensively cleared of native vegetation (WA DEC 2007).

The eight populations are largely confined to the threatened ecological community known as 'Shrublands on southern Swan Coastal Plain ironstones' which is listed as Endangered under the EPBC Act, and Critically Endangered in Western Australia (Gibson et al. 1994; English 1999; English & Blyth 1997).

*Petrophile latericola* and *Grevillea maccutcheonii* (listed as Endangered under the EPBC Act and Critically Endangered under the *Wildlife Conservation Act 1950*) also occur in the wider habitat of some populations of the ironstone grevillea (Stack & English 2003). It is also

associated *Banksia nivea* subsp. *uliginosa* (also listed as Endangered under the EPBC Act) (WA DEC 2007).

Recovery actions implemented to improve the quality or security of the habitat of some populations of the ironstone grevillea are likely to improve the status of the TEC in which this population is located, and also that of populations of other listed flora that occur in the wider habitat.

### Relevant Biology/Ecology

The ironstone grevillea is found on poorly drained soils ranging from red-brown gravelly clay over ironstone through light brown sandy clay over ironstone to grey sandy soils. It generally occurs in low, often very diverse heathland with *Calothamnus* sp. *Whicher*, *Corymbia calophylla*, *Dryandra squarrosa* subsp. *argillacea* and *Xanthorrhoea* sp. (Stack & English 2003).

Very little is known about the biology of the species. Many small beetles have been seen on the flowers and the species is believed to be insect-pollinated. Longevity of the seed and the plant's life span is unknown. Ironstone grevillea regenerates from seed after fire (Olde & Marriott, 1995).

Ironstone grevillea seedlings have germinated within a second rotation on a pine plantation (Population 6), but it does not occur on the fire breaks. Part of Population 6 occurs adjacent to native bushland, however, only three plants have germinated within the bush area, and these occur along the track edge of the pine plantation. It appears therefore, that the species responds well to substantial soil disturbance and that seed is long lived (Stack & English 2003).

Susceptibility of ironstone grevillea to the plant pathogen that causes dieback, *Phytophthora cinnamomi*, is unclear, but in general members of the family Proteaceae are highly susceptible. The occurrence of waterlogged soils in the habitat, and earth moving activity associated with maintenance of roads, firebreaks and pine plantations may predispose the species to the disease. Testing by Western Australian Department of Conservation and Land Management Science Division indicated that ironstone grevillea germinants were not susceptible to *P. cinnamomi* under laboratory conditions (C. Crane, pers. comm., cited in Stack & English 2003). Testing of ironstone grevillea for *P. cinnamomi* in the field however, proved positive on two occasions (part of Population 6). The species therefore may be able to resist the disease when healthy but succumbs when under stress in the field. Further testing of cinnamon fungus susceptibility is required (Stack & English 2003).

### 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 serious threat to Populations 1, 2, 3, 4 and 5. Populations 3 and 4 are very narrow linear populations immediately adjacent to cleared paddocks, and have been shown to be heavily infested with both grasses and broadleaved weeds. Population 2 is a broader linear population, invaded mostly by bulbil watsonia ( <i>Watsonia meriana</i> var. <i>bulbillifera</i> ), with fewer grasses. 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.
Rabbits	known	current	Grazing by rabbit has impacted on many ironstone grevillea populations. In addition to grazing, rabbits also impact on populations by encouraging invasion of weeds through soil digging, addition of nutrients to soil, and introduction of weed seeds. The high level of palatable weeds near these populations attract herbivorous animals, which are often unselective in their grazing.
Habitat loss disturbance and modifications			
Road, rail and firebreak upgrade and maintenance activities	known	current	All road verge and rail reserve populations of the ironstone grevillea are threatened by grading road verges, constructing drainage channels and mowing roadside vegetation to improve visibility threaten plants and habitat. These disturbance events also often encourage weed invasion.
Grazing by stock	known	current	Domestic stock are known to graze on ironstone grevillea, this can cause damage to the populations where it occurs. Stock can also trample young plants and alter soil structure and soil surface microtopography.
Plantation activities	potential	future	Activities that may threaten Population 6 include fertiliser application, firebreak maintenance, tree harvesting and site preparation. In addition, competition for light, soil moisture and growing space will increase as the pine plantation matures.
Mining	potential	future	Mineral sands exploration and activity occur in the region and may pose risk to all populations in the future. Parts of populations 1 occur on private property owned by a mining company, however, the populations are currently managed for conservation.
Chemical drift	potential	future	Drift from herbicide and fertiliser applications from nearby farmland may affect the species' growth and survival.
Fire			
Fire frequency	potential	future	Too frequent fires would adversely affect the viability of populations, as seeds of ironstone 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, occasional fires may be needed for reproduction of this species.
Disease			
Disease	potential	future	<i>Phytophthora cinnamomi</i> is a moderate threat to all populations, causing the roots of infected plants to rot and resulting in death through drought stress. The ironstone grevillea may be susceptible to cinnamon fungus when under stress. Populations occur in harsh environments within a pine

			plantation and on seasonally waterlogged ironstone soils and most of the habitat in which it grows is severely affected by dieback disease.
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## **Conservation Actions**

### **Conservation and Management priorities**

#### Invasive species

- Identify and remove new weeds and undertake weed control in the local area, using appropriate methods such as hand weeding or targeted application of herbicide during the appropriate season to minimise the effect of herbicide on the species and the surrounding native vegetation. Consider the possible disturbance/overspray threats associated with the control method.
- Manage sites using appropriate methods such as 1080 oats or warren ripping, in consultation with relevant landholders, to control and reduce the spread of rabbits.

#### Habitat loss, disturbance and modifications

- Protect the species from further loss of habitat as a result of mineral extraction, transport corridor upgrades, etc.
- Continue to liaise with managers and owners of land on which populations of ironstone grevillea occur, and with managers of adjacent land, to help prevent accidental damage or destruction of the plants.
- Install and/or maintain Declared Rare Flora (DRF) markers<sup>1</sup> at all road and rail reserve populations, and Population 6 in the pine plantation. Continue distribution of dashboard stickers which illustrate DRF markers and inform of their purpose.
- Prevent habitat disturbance. Control access routes by installing gates to suitably constrain stock and vehicle access to known sites on public land and manage access on private land and other land tenure. Provide information about the species on gates on public land to raise awareness and prevent damage.
- Ensure land managers are aware of the species' occurrence and provide protection measures against key and potential threats, including spray drift.
- If livestock grazing occurs in the area, ensure land owners/managers use an appropriate management regime and density that does not detrimentally affect this species to allow regeneration from seedlings and manage total grazing pressure at important sites through exclusion fencing or other barriers.
- Cull pines surrounding population 6 to a distance of 10 m to reduce competition with ironstone grevillea plants.
- Organise with the plantation owners to provide markers around population 6 to avoid accidental destruction.

#### Fire

- The species responds to fire by being a post-fire obligate seeder, as fire kills the standing plants and the population relies upon post-fire seedling recruitment for its persistence. Implement and/or continue using an appropriate fire management regime

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<sup>1</sup> 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).

based on fire frequencies that promote seedbank accumulation and fire season and intensity that promote germination and seedling establishment.

- Ensure that the species has been incorporated into the Blackwood District's Fire Control Working Plan, and update when necessary. Inform other fire fighting agencies of appropriate responses to fire threatening these sites.
- Prevent frequent fire from occurring in areas where populations occur, except where being used experimentally as a recovery tool. 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.
- Late autumn, winter and spring ignitions should be avoided, as these may have a highly detrimental effect upon the long-term viability and sustainability of the species and is likely to have a deleterious impact on other native species that provide the natural community context for the species.
- 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.

#### Disease

- Continue biannual spraying program using phosphate at Populations 1, 2 and 7 to control *Phytophthora cinnamomi*.
- Implement and/or continue suitable hygiene protocols (DPaW 2014) to protect known populations from any further outbreaks of cinnamon fungus. These should be adhered to for activities such as installation and maintenance of road/rail reserves, firebreaks, and pine plantations, and walking into populations in wet soil conditions.

#### Breeding, propagation and other ex situ recovery action

- Preserve germplasm by continuing to collect seed and cutting material to guard against extinction if wild populations are lost, to propagate plants for translocations and to enhance the living collection of genetic material at the Botanic Garden and Parks Authority.

#### Stakeholder Engagement

- Continue liaising with Busselton Shire and Westrail land managers, and landowners of land adjacent to where populations occur.
- Ensure location of Population 6 has been incorporated onto plantation maps by the Forest Products Commission and updated if necessary.
- Develop information and identification that could be provided to the local council and plantation workers to raise awareness of the species.

#### Survey and Monitoring priorities

- Undertake survey work in suitable habitat and potential habitat to locate any additional populations/occurrences/remnants and to more precisely assess population size and distribution.
- Design and implement a monitoring program or, if appropriate, support and enhance existing programs for the impact and spread of disease and assess the need for disease control.
- Monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary. Following all weed control applications, report on the

method, timing and success of the treatment, and monitor the effect on ironstone grevillea and its habitat. Monitor regeneration of ironstone grevillea plants occurring in pine plantations following pine tree culling around subpopulations.

- Continue annual monitoring of habitat degradation (including weed invasion, plant diseases such as cinnamon fungus, and salinity), population stability (expansion or decline), pollination activity, seed production, recruitment, longevity and predation.
- Continue to encourage volunteers from the local community, Wildflower Societies, Naturalist Clubs and other community-based groups to undertake surveys for the ironstone grevillea.
- Continue to conduct surveys during the species' flowering period (September to November). Include targeted survey of the area where Population 8 is thought to occur, as it is currently known only from a herbarium specimen collected in 1983. The location is not described exactly, and only approximate geographical coordinates are given.

### **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.
- Assess the species' ecological requirements relevant to the persistence of the species including:
  - Soil seed bank dynamics and the role of various disturbances (including fire), competition, rainfall and grazing in germination and recruitment.
  - Pollination biology of the species.
  - Reproductive strategies, phenology and seasonal growth of the species.
  - Population genetic structure, levels of genetic diversity and minimum viable population size.
  - Impact of dieback disease and control techniques on the ironstone grevillea and its habitat.
- Undertake seed germination trials to determine dormancy mechanisms and the requirements for successful establishment.
- Research the effects of public access where this is likely and the effects are unknown.
- Evaluate the usefulness of citizen science monitoring programs where they exist.
- Subject to the outcomes of surveying Investigate the feasibility and benefits of conducting an experimental translocation on the ironstone grevillea, in order to examine variables that may be affecting the success of other ironstone species being translocated (*Brachysema papilio*, *Darwinia* sp. Williamson, *Grevillea maccutcheonii*, *Lambertia echinata* subsp. *occidentalis* and *Petrophile latericola*). Examine variables such as comparison of cuttings and seedlings as a source of propagation material, age of translocates, and watering regimes.

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