

Approved Conservation Advice
(s266B of the *Environment Protection and Biodiversity Conservation Act 1999*)

**Approved Conservation Advice for
Grevillea flexuosa (Zig Zag Grevillea)**

This Conservation Advice has been developed based on the best available information at the time this Conservation Advice was approved; this includes existing plans, records or management prescriptions for this species.

Description

Grevillea flexuosa, Family Proteaceae, also known as Zig Zag Grevillea or Tangled Grevillea, is a few-branched, scraggly hairless shrub to 2 m high and 2 m wide. Branches are long, trailing and tangled, with stems changing directions at the nodes (zig-zag). Leaves are greyish-green, up to 30 cm long on vegetative branches and deeply divided into 8–12 or more well-spaced leaflets (Brown et al., 1998). Leaves on flowering stems are smaller (5–10 cm) (Olde & Marriott, 1995; Makinson, 2000). The leaves are slightly prickly (Wrigley & Fagg, 2007). Flowers are 4 cm long, cream to yellow, with a strong, sweet scent and are arranged in cylindrical racemes or candle-like spikes (Olde & Marriott, 1995; Brown et al., 1998; Makinson, 2000; Wrigley & Fagg, 2007; Western Australian Herbarium, 2008). It has been recorded as flowering from May to October (Brown et al., 1998; Western Australian Herbarium, 2008).

Grevillea flexuosa is closely related to, and grows together with, *Grevillea synapheae*. It is distinguished from the latter by its larger fruits, with a thicker pericarp (1–2 mm thick), as the pericarp is less than 1 mm in *G. synapheae* (Olde & Marriott, 1995; Makison, 2000).

Conservation Status

Zig Zag Grevillea is listed as **vulnerable**. This species is eligible for listing as vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act) 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 species is also listed as rare (declared rare flora – extant) under the *Wildlife Conservation Act 1950* (Western Australia).

Distribution and Habitat

Zig Zag Grevillea is confined to a few locations near Stoneville and Toodyay (Olde & Marriott, 1995), Western Australia. It may also occur in the Katanning district between Kojonup and Wagin, but these collection sites have not been confirmed (Graham & Mitchell, 2001). This species occurs within the Swan (Western Australia) Natural Resource Management Region.

Zig Zag Grevillea was originally described from the Swan River Colony in 1839 (Hopper et al., 1990; Olde & Marriott, 1995; Brown et al., 1998). The species was previously considered extinct (Wrigley & Fagg, 2007) but was rediscovered in early 1990 in the Stoneville and Toodyay area, where it is known from 12 populations, with more than 2000 plants (Olde & Marriott, 1995; Brown et al., 1998; Western Australian Herbarium, 2008). Zig Zag Grevillea has been cultivated, including through successful grafting onto resistant rootstock including *Grevillea robusta* (Wrigley & Fagg, 2007).

The species grows on sands of granite ridgetop plateaus and associated breakaways (Olde & Marriott, 1995; Western Australian Herbarium, 2008), or lateritic sands and gravel (Western Australian Herbarium, 2008) on hilltops, slopes and in gullies (Brown et al., 1998). It grows

This Conservation Advice was approved by the Minister / Delegate of the Minister on: 1/10/2008

in heath vegetation, among medium trees, low trees, or tall (sclerophyll) shrubland (Western Australian Herbarium, 2008).

The distribution of this species is not known to overlap with any EPBC Act-listed threatened ecological communities.

Threats

The main potential threats to Zig Zag Grevillea include dieback from *Phytophthora cinnamomi* (O’Gara et al., 2005); broad-scale vegetation clearing; increasing fragmentation; grazing pressure; weeds; changed hydrology including salinisation (May & McKenzie, 2003); and changed fire regimes (NLWRA, 2002).

Research Priorities

Research priorities that would inform future regional and local priority actions include:

- Design and implement a monitoring program or, if appropriate, support and enhance existing programs.
- More precisely assess ecological requirements and the relative impacts of threatening processes.
- Undertake survey work in suitable habitat and potential habitat to locate any additional populations/occurrences/remnants.
- Undertake seed germination and/or vegetative propagation trials to determine the requirements for successful establishment.

Regional and Local Priority Actions

The following priority recovery and threat abatement actions can be done to support the recovery of Zig Zag Grevillea.

Habitat Loss, Disturbance and Modification

- Ensure infrastructure or development activities involving vegetation or substrate disturbance in areas where Zig Zag Grevillea occurs do not adversely impact on known populations.
- Monitor known populations to identify key threats.
- Manage any changes to hydrology that may result in changes to the water table levels, increased run-off, or salinity levels.
- Investigate formal conservation arrangements such as the use of covenants, conservation agreements or inclusion in reserve tenure.

Invasive Weeds

- Develop and implement weed management plans for land supporting Zig Zag Grevillea populations.

Fire

- Identify appropriate intensity and interval of fire to allow maturation of individuals and promote seed germination.
- Ensure that Prescribed Fire Plans (as outlined by DEC, 2008) do not adversely impact Zig Zag Grevillea.
- Provide maps of known occurrences to local and state Rural Fire Services and seek inclusion of mitigative measures in bush fire risk management plans, risk registers and/or operation maps.

Trampling, Browsing or Grazing

- Prevent grazing pressure at known sites through exclusion fencing or other barriers.
- Manage known sites to ensure appropriate grazing regimes occur.

This Conservation Advice was approved by the Minister / Delegate of the Minister on: 1/10/2008

Diseases, Fungi and Parasites

- Implement suitable hygiene protocols to protect known sites from outbreaks of dieback caused by *Phytophthora cinnamomi*.

Conservation Information

- Raise awareness of Zig Zag Grevillea within the local community.

Enable Recovery of Additional Sites and/or Populations

- Undertake appropriate seed collection and storage.
- Investigate options for linking, enhancing or establishing additional populations.
- Implement national translocation protocols (Vallee et al., 2004) if establishing additional populations is considered necessary and feasible.

This list does not necessarily encompass all actions that may be of benefit to Zig Zag Grevillea, but highlights those that are considered to be of highest priority at the time of preparing the conservation advice.

Existing Plans/Management Prescriptions that are Relevant to the Species

- Threat Abatement Plan for Dieback Caused by the Root-Rot Fungus *Phytophthora cinnamomi* (EA, 2001),
- There are several management and threat abatement plans addressing the problem of *Phytophthora cinnamomi* in Western Australia (Dieback Working Group, 2000; CALM, 2003),
- Regional Forest Agreement for the South-West Forest Region of WA (DAFF, 1999), and
- Any Prescribed Fire Plan (DEC, 2008) relevant to the distribution of the Zig Zag Grevillea.

These prescriptions were current at the time of publishing; please refer to the relevant agency's website for any updated versions.

Information Sources:

Brown, A, Thomson-Dans, C, Marchant, N (Eds) 1998, *Western Australia's Threatened Flora*, Western Australian Department of Conservation and Land Management, Como.

Department of Conservation and Land Management (CALM) WA, 2003, *Phytophthora cinnamomi and Disease caused by it, Volume 1—Management Guidelines*, CALM, viewed 14 May 2008,

<<http://www.naturebase.net/pdf/projects/dieback/DBmanual2003.pdf>>.

Department of Agriculture, Fisheries and Forestry (DAFF) (Commonwealth) 1999, *The Regional Forest Agreement for the South-West Forest Region of Western Australia*, Agreement signed between the Commonwealth and the Western Australian Governments, viewed 14 May 2008,

<http://www.daff.gov.au/data/assets/pdf_file/0003/49683/wa_rfa.pdf>.

Department of Environment and Conservation (DEC) WA 2008, *Prescribed Fire Plan*, DEC, viewed 14 May 2008, <<https://www.naturebase.net/content/view/2288/1141/>>.

Dieback Working Group 2000, *Managing Phytophthora: Dieback Guidelines for Local Government*, viewed 14 May 2008, <http://www.naturebase.net/component/option.com_docman/task.doc_download/Itemid.1373/gid.313/>.

Environment Australia (EA) 2001, *Threat Abatement Plan For Dieback caused by the root-rot fungus Phytophthora cinnamomi*, Environment Australia, viewed 14 May 2008,

<<http://www.environment.gov.au/biodiversity/threatened/publications/tap/phytophthora/pubs/phytophthora.pdf>>.

Graham, M & Mitchell, M 2001, *Declared Rare Flora in the Katanning District*, Western Australian Department of Conservation and Land Management, Perth.

Hopper, SD, van Leeuwen, S, Brown, AP & Patrick, SJ 1990, *Western Australia's Endangered Flora and other plants under consideration for declaration*, Western Australian Department of Conservation and Land Management, Perth.

This Conservation Advice was approved by the Minister / Delegate of the Minister on:
1/10/2008

Makinson, RO 2000, 'Proteaceae 2 – Grevillea', In: *Flora of Australia*, vol. 17A, Australian Biological Resources Study, Canberra/Commonwealth Scientific and Industrial Research Organisation, Melbourne.

May, JE, and McKenzie, NL 2003, *A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions 2002*, Western Australian Department of Conservation and Land Management, Perth.

National Land and Water Resources Audit (NLWRA) 2002, *Australian Terrestrial Biodiversity Assessment 2002*, National Land and Water Resources Audit, Canberra.

O'Gara, E, Howard, K, Wilson, B 2005, *Management of Phytophthora cinnamomi for Biodiversity Conservation in Australia: Part 2 – National Best Practice Guidelines*, A report funded by the Australian Government Department of the Environment and Heritage by the Centre for Phytophthora Science and Management, Murdoch University, Perth.

Olde, PM & Marriott, NR 1995, *The Grevillea Book Volume 2*, Kangaroo Press, Kenthurst.

Vallee, L, Hogbin, T, Monks, L, Makinson, B, Matthes, M & Rossetto, M 2004, *Guidelines for the Translocation of Threatened Plants in Australia* (2nd ed.), Australian Network for Plant Conservation, Canberra.

Western Australian Herbarium 2008, *FloraBase — The Western Australian Flora*, Western Australian Department of Environment and Conservation, viewed 14 May 2008, <<http://florabase.dec.wa.gov.au/>>.

Wrigley, JW & Fagg, M 2007, *Australian Native Plants: Cultivation, Use in Landscaping and Propagation*, Reed New Holland, Sydney.