

INTERIM RECOVERY PLAN NO. 100

VEIN-LEAF GREVILLEA
(*GREVILLEA PHANEROPHLEBIA*)

INTERIM RECOVERY PLAN

2001-2004

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Photograph: Alanna Chant

June 2001

Department of Conservation and Land Management
Western Australian Threatened Species and Communities Unit (WATSCU)
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FOREWORD

Interim Recovery Plans (IRPs) are developed within the framework laid down in Department of Conservation and Land Management (the Department) Policy Statements Nos. 44 and 50.

IRPs outline the recovery actions that are required to urgently address those threatening processes most affecting the ongoing survival of threatened taxa or ecological communities, and begin the recovery process.

The Department is committed to ensuring that Critically Endangered taxa are conserved through the preparation and implementation of Recovery Plans or Interim Recovery Plans and by ensuring that conservation action commences as soon as possible and always within one year of endorsement of that rank by the Minister.

This Interim Recovery Plan will operate from June 2001 to May 2004 but will remain in force until withdrawn or replaced. It is intended that, if the taxon is still ranked Critically Endangered, this IRP will be replaced by a full Recovery Plan after three years.

This IRP was approved by the Acting Director of Nature Conservation on 10 August 2001. The provision of funds identified in this Interim Recovery Plan is dependent on budgetary and other constraints affecting the Department, as well as the need to address other priorities.

Information in this IRP was accurate at June 2001.

SUMMARY

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|---------------------------------|---------------------------------|-----------------------------------|---|
| Scientific Name: | <i>Grevillea phanerophlebia</i> | Common Name: | Vein-leaf grevillea |
| Family: | Proteaceae | Flowering Period: | September |
| The Department's Region: | Midwest | The Department's District: | Geraldton |
| Shire: | Mingenew | Recovery Team: | Geraldton District Threatened Flora Recovery Team |

Illustrations and/or further information: Olde, P. and Marriott, N. (1995) *The Grevillea Book*. Vol. 2. Kangaroo Press, Kenthurst; Wrigley, J.W. and Fagg, M. (1989) *Banksias, Waratahs and Grevilleas: and all other plants in the Australian Proteaceae family*. Collins Publishers Australia, NSW.

Current status: *Grevillea phanerophlebia* was declared as Rare Flora in March 1999 and ranked in November 1999 as Critically Endangered (CR). It currently meets World Conservation Union (IUCN 2000) Red List Category 'CR' under criteria A2c, A3c, A4c, B1a+bi-v, B2a+bi-v, C1, C2ai, C2aii and D. It is only known from one population of two plants that are probably juveniles, and another population that contained no live plants at the time of writing this plan. The main threats are poor regeneration, weeds, rail maintenance activities, inappropriate fire regimes, chemical drift, drought, rabbits and recreational activities.

Critical habitat: The critical habitat for *Grevillea phanerophlebia* comprises the area of occupancy of the known populations; areas of similar habitat ie white or yellow sandy or gravelly loam in open scrub or heath, within 200 metres of known population; corridors of remnant vegetation that link populations; and additional occurrences of similar habitat that do not currently contain the species.

Habitat requirements: *Grevillea phanerophlebia* is confined to very small areas at Mingenev and Eradu in Western Australia. The species grows in white or yellow sandy or gravelly loam soil in open scrub or heath (Olde and Marriott 1995).

Existing Recovery Actions: The following recovery actions have been or are currently being implemented:

1. All relevant land managers have been informed of the species' locations and the associated legal obligations.
2. Declared Rare Flora (DRF) markers have been installed at Population 2.
3. Dashboard stickers and posters, that illustrate DRF markers and note their purpose, and a contact telephone number to use if such a marker is encountered, have been produced and distributed.
4. Population 1 was fenced in May 2000 by the Department of Conservation and Land Management's (the Department's) District staff and the Mingenev Shire, in cooperation with the Mingenev Golf Club Committee.
5. Weed control was undertaken in June 2000 at Population 1. Follow up hand removal of broadleaf weeds was undertaken in spring 2000.
6. A buffer area outside of Population 1 was planted with native seedlings in July 2000.
7. In July 2000, the open area of the closed track at Population 1 was raked and treated with smoke vermiculite.
8. Botanic Garden and Parks Authority (BGPA) currently have 36 plants of *Grevillea phanerophlebia* in cultivation.
9. Two seeds have been collected from Population 1 and are being stored in the Department's TFSC at -18°C.
10. Staff from the Department's Geraldton District office regularly monitor the populations.
11. The Geraldton District Threatened Flora Recovery Team (GDTFRT) is overseeing the implementation of this IRP.

IRP Objective: The objective of this Interim Recovery Plan is to abate identified threats and maintain or enhance *in situ* populations to ensure the long-term preservation of the species in the wild.

Recovery criteria

Criteria for success: The number of individuals within populations and/or the number of populations have increased.

Criteria for failure: The number of individuals within populations and/or the number of populations have decreased.

Recovery actions

1. Coordinate recovery actions.
2. Clarify taxonomic status.
3. Undertake weed control.
4. Stimulate and monitor germination.
5. Collect seed and cutting material.
6. Continue habitat rehabilitation.
7. Propagate plants for translocation.
8. Undertake and monitor translocation.
9. Conduct further surveys.
10. Monitor populations.
11. Develop and implement a fire management strategy.
12. Promote awareness.
13. Obtain biological and ecological information.
14. Write a full Recovery Plan.

1. BACKGROUND

History

The type collection of *Grevillea phanerophlebia* was made in 1901 by L. Diels from near Mingenew. The first collection made from the species that is held at the Western Australian Herbarium was made in 1931 from near Mullewa.

Despite numerous surveys undertaken by Department of Conservation and Land Management staff near known populations and other suitable habitat, only one new population has been located. This population was discovered in 1994 by S. Patrick and consisted of two plants. Both plants have since died and this population (Population 2) now contains no live plants. *G. phanerophlebia* is under extreme risk of extinction with only two plants that are probably juveniles currently surviving *in situ* in Population 1, and no live plants in Population 2.

Description

Grevillea phanerophlebia is a low, spreading shrub to 1 m high by 2 m across. The bright green, glossy leaves are divided into three broadly linear segments, which are usually divided again. The ultimate segments end in a sharp point. The mid-vein is very apparent and the margins are slightly turned down. The overall leaf length is usually less than 25 mm. The slender, white flowers are produced in spring in delicate terminal or axillary racemes. Each flower is held on a long, thread-like stalk and the small perianth tube is tipped with a green, globular knob in bud. The linear segments fold back symmetrically to reveal the short style and cone-shaped stigma (Wrigley and Fagg 1989).

Grevillea phanerophlebia is similar to *G. manglesii* subsp. *dissectifolia* which differs in its glabrous leaf undersurface and its prominently rugose fruits (Olde and Marriott 1995).

Grevillea phanerophlebia may be a hybrid between *G. amplexans* and *G. biternata*. Variations have appeared in leaf shape, branchlet indumentum, hair posture on branchlets, leaf upper surface, hair posture on undersurface of leaves and fruit surface (pers. observation, B. Makinson¹).

Distribution and habitat

Grevillea phanerophlebia is confined to an area between Mullewa and Mingenew in Western Australia. The species grows in white or yellow sandy or gravelly loam soil in open scrub or heath (Olde and Marriott 1995). Associated species include *Waitzia nitida*, *Acacia saligna*, *Acacia acuminata*, *Allocasuarina campestris*, *Hakea erinacea*, *Mesomelaena* sp., *Austrostipa elegantissima*, *Aristida holathera*, *Bonamia rosea*, *Grevillea amplexans* and *Grevillea biternata*.

Critical habitat

Critical habitat is habitat identified as being critical to the survival of a listed threatened species or listed threatened ecological community. Habitat is defined as the biophysical medium or media occupied (continuously, periodically or occasionally) by an organism or group of organisms or once occupied (continuously, periodically or occasionally) by an organism, or group of organisms, and into which organisms of that kind have the potential to be reintroduced (Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999).

The critical habitat for *Grevillea phanerophlebia* comprises:

- the area of occupancy of the known populations,
- areas of similar habitat ie. white or yellow sandy or gravelly loam soil in open scrub or heath, within 200 metres of known populations (these areas provide potential habitat for natural range extension),
- corridors of remnant vegetation that link populations (these areas are necessary to allow pollinators to move between populations and are usually road or rail verges),
- additional occurrences of similar habitat ie. areas of open scrub or heath on white or yellow sandy or gravelly loam soil, that do not currently contain the species (these areas represents possible translocation sites).

Biology and ecology

Very little is known about the biology and ecology of *Grevillea phanerophlebia*. It is likely that the species is a short lived disturbance opportunist and regenerates from seed after fire (Olde and Marriott 1995 and personal observations).

Despite being rare in the wild, *Grevillea phanerophlebia* has been in cultivation since the 1980s in New South Wales and Victoria (Olde and Marriott 1995).

¹ Bob Makinson, Curator, Australian National Herbarium

Threats

Grevillea phanerophlebia was originally listed as a Priority 1 species. In March 1999 it was declared as Rare Flora and ranked in November 1999 as Critically Endangered (CR). It currently meets World Conservation Union (IUCN 2000) Red List Category 'CR' under criteria A2c, A3c, A4c, B1a+bi-v, B2a+bi-v, C1, C2ai, C2aii and D as it is only known from one population of two plants that are probably juveniles, and another population that contained no live plants at the time of writing of this plan. The main threats are poor regeneration, weeds, rail maintenance activities, inappropriate fire regimes, chemical drift, drought, rabbits and recreational activities.

- **Poor regeneration**, probably due to lack of appropriate disturbance such as fire, threatens the populations. All mature *Grevillea phanerophlebia* plants have died with few young plants observed.
- **Weed invasion** is a threat to both 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.
- **Rail maintenance activities** threaten Population 2. Threats include actions such as grading of rail reserves and access tracks, spraying of chemicals, constructing drainage channels and mowing or completely removing the vegetation to improve visibility. These disturbance events also often encourage weed invasion into adjacent habitat, as well as causing damage to actual plants. Relevant land managers have been informed of the locations to prevent possible damage to the populations.
- **Inappropriate fire regimes** may affect the viability of populations. The fire response of *Grevillea phanerophlebia* is not known. Too frequent fire may result in the depletion of the soil seed bank if fires recur before regenerating or juvenile plants reach maturity and replenish the soil seed bank. Occasional fires may, however, be required for the species to propagate from soil-stored seed. As there are currently only two plants known, fire must be prevented from destroying them before a soil seed bank is likely to have been established. There may also be a soil seed bank accumulated from plants that have since died.
- **Chemical drift** from herbicide and fertiliser applications from the adjacent fairway at Population 1 may affect the species' growth and survival.
- **Drought** may directly impact on the species by causing the death of plants or poor seed set. Plants in Population 1 died during the extended dry period in the summer of 2000-2001.
- **Rabbits** (*Oryctolagus cuniculus*) have the potential to impact on Population 1. Grazing may impact on the establishment of seedlings thereby limiting natural recruitment. In addition, disturbance of soil by rabbit warren construction, and an increase in nutrient levels from their droppings may result in increased weed invasion. In recent years, the impact of rabbits has declined due to rabbit baiting by many landholders, and the introduction of the calici virus.
- **Recreational activities** are a potential threat to Population 1. Although the area is fenced there is still the potential for plants to be trampled by recreational users.

Summary of population information and threats

| Pop. No. & Location | Land Status | Year/No. plants | Condition | Threats |
|---------------------|-----------------------|---|-----------|---|
| 1. S of Mingenew | Shire Reserve | 1992 1 (1) 1994 1 (2) 1998 1 2000 1 (1) [1 dead] 2/2001 1 (3) [1 dead] 5/2001 (2) [3 dead] | Poor | Poor regeneration, weeds, inappropriate fire, chemical drift, drought, rabbits, recreational activities |
| 2. Eradu | Westrail Rail Reserve | 1994 2 1999 0 2000 0 2001 0 | Extinct | Poor regeneration, weeds, rail maintenance, inappropriate fire, drought |

Numbers in brackets = number of seedlings.

Guide for decision-makers

Section 1 provides details of current and possible future threats. Developments in the immediate vicinity of any of the populations or within the defined critical habitat of *Grevillea phanerophlebia* require assessment. No developments should be approved unless the proponents can demonstrate that they will have no significant impact on the species, or its habitat or potential habitat.

2. RECOVERY OBJECTIVE AND CRITERIA

Objectives

The objective of this Interim Recovery Plan is to abate identified threats and maintain or enhance *in situ* populations to ensure the long-term preservation of the species in the wild.

Criteria for success: The number of individuals within populations and/or the number of populations have increased.

Criteria for failure: The number of individuals within populations and/or the number of populations have decreased.

3. RECOVERY ACTIONS

Existing recovery actions

Relevant land managers have been made aware of the Critically Endangered status of the species and its locations. The Shire of Mingenew and Westrail have been formally notified of the presence of *Grevillea phanerophlebia* populations on or adjacent to their land. This notification details the Declared Rare status of the taxon and the associated legal responsibilities.

Declared Rare Flora (DRF) markers have been installed at Population 2. These alert people working in the area to the presence of significant flora, helping to prevent accidental damage during maintenance operations. Awareness of the significance of these markers is being promoted to relevant bodies such as Shires. To this end, dashboard stickers and posters have been produced and distributed. These illustrate DRF markers, inform of their purpose and provide a contact telephone number to use if such a marker is encountered.

Population 1, including a buffer of habitat, was fenced in May 2000 by the Department's District staff and the Mingenew Shire, in cooperation with the Mingenew Golf Club Committee. The fence also closed a track and effectively prevents vehicles entering the area.

Weed control was undertaken at Population 1 in June 2000. This involved spraying with Fusilade following the appearance of weeds after the autumn rain. Follow up hand removal of broadleaf weeds was undertaken in spring 2000.

A buffer area adjacent to Population 1 was planted in July 2000. Seedlings of native species were obtained from the Department's Narrogin Nursery and planted by the Golf Club Ladies Committee and the Department's District staff. Broadleaf weeds were also removed from the buffer area by hand weeding. The seedlings planted died of drought during the following extended dry summer.

In July 2000, the track at Population 1 was raked and treated with smoke vermiculite. As yet no germination has been noted. However, smoke granules (vermiculite), a slow release method, was used rather than smoke water, so the factors that stimulate germination may be released into the soil over an extended period. Germination may therefore occur in future years.

Botanic Garden and Parks Authority (BGPA) currently have 36 plants of *Grevillea phanerophlebia* in cultivation. These plants originated from cuttings taken from two plants in 1998 (17 from one clone and 19 from the other). Seed was collected from one of the clones in 2000 and resulted in another four germinants. The strike rate for cuttings is generally good with between 50% and 83% success (pers. comm. A. Shade²).

Two seeds have been collected from Population 1 and are being stored in the Department's TFSC at -18°C. With so few seeds in storage, seed viability will not be tested (unpublished data, A. Cochrane³).

Staff from the Department's Geraldton District office regularly monitor the populations.

² Amanda Shade, Horticulturalist, Botanic Garden and Parks Authority

³ Anne Cochrane, Manager, The Department's Threatened Flora Seed Centre

The Geraldton District Threatened Flora Recovery Team (GDTFRT) is overseeing the implementation of this IRP and will include information on progress in its annual report to the Department's Corporate Executive and funding bodies.

Future recovery actions

Where populations occur on lands other than those managed by the Department, permission has been or will be sought from the appropriate land managers prior to recovery actions being undertaken.

1. Coordinate recovery actions

The GDTFRT will continue to oversee the implementation of recovery actions for *Grevillea phanerophlebia* and will include information on progress in their annual report to the Department's Corporate Executive and funding bodies.

Action: Coordinate recovery actions
Responsibility: The Department (Geraldton District) through the GDTFRT
Cost: \$800 per year.

2. Clarify taxonomic status

Grevillea phanerophlebia may be a hybrid of *G. amplexans* and *G. biternata*, as the few seedlings observed in the wild have variable leaf morphology. Research, including a taxonomic review and genetic analysis of closely related taxa, will be conducted to clarify the taxonomy of *Grevillea phanerophlebia*. This action has been given a very high priority. Should taxonomic and/or genetics research indicate that *G. phanerophlebia* is a hybrid, that is, it is not capable of self perpetuation or the progeny are not consistent within the agreed taxonomic limits for the taxon, a proposal to delete the taxon from the threatened flora list will be made to the Department's Threatened Species Scientific Committee and the implementation of this Interim Recovery Plan will be reviewed (particularly Recovery Actions 7, 8 and 12).

Action: Clarify taxonomic status
Responsibility: The Department (Science Division), through the GDTFRT
Cost: \$5,400 in first year.

3. Undertake weed control

Weeds are a threat to both populations. The following actions will be implemented:

1. Selection of appropriate herbicides after determining which weeds are present.
2. Controlling invasive weeds by hand removal or spot spraying around *Grevillea phanerophlebia* plants when weeds first emerge.
3. Scheduling weed control to include spraying at other threatened flora populations within the district.

The tolerance of associated native plant species to herbicides at the site of *Grevillea phanerophlebia* is not known and weed control programs will be undertaken in conjunction with research.

Action: Undertake weed control
Responsibility: The Department (Geraldton District) through the GDTFRT
Cost: \$600 per year.

4. Stimulate and monitor germination

Burning, smokewater and other disturbance methods may be effective in stimulating seed germination of *Grevillea phanerophlebia* and will be trialed around a number of dead plants and at Population 2. The time when flowering first occurs, seed is produced and the age at which senescence is reached will continue to be recorded. This will allow determination of the time interval between disturbance events that is most appropriate to maintain populations.

Action: Stimulate and monitor germination
Responsibility: The Department (Geraldton District) through the GDTFRT
Cost: \$3,600 in first and second years, \$900 in third year.

5. Collect seed and cutting material

Preservation of germplasm is essential to guard against extinction if wild populations are lost. Only two seeds have been collected, so more is needed. Seed and cutting collections are also needed to propagate plants for translocations.

Action: Collect seed and cutting material
Responsibility: The Department (Geraldton District) through the GDTFRT
Cost: \$3,700 in first and second years.

6. Continue habitat rehabilitation

As plants that were planted in the buffer area near Population 1 in July 2000 have died, further planting is required.

Action: Continue habitat rehabilitation
Responsibility: The Department (Geraldton District) through the GDTFRT
Cost: \$6,500 in first and second years.

7. Propagate plants for translocation

The propagation of plants in readiness for translocation will be essential if the taxonomic review and genetic analysis (see Recovery Action 2) indicate that *G. phanerophlebia* is taxonomically distinct and is not of hybrid origin. Seed and/or cuttings will be required for germination and propagation at the BGPA to be available for planting in the following year.

Action: Propagate plants for translocation
Responsibility: The Department (Geraldton District) and the BGPA through the GDTFRT
Cost: \$2,800 in the first and second years.

8. Undertake and monitor translocation

Although translocations are generally undertaken under full Recovery Plans, if the results of Recovery Action 2 indicate that *Grevillea phanerophlebia* is taxonomically distinct and is not of hybrid origin, then a translocation will be required within the time frame of this IRP. This will be coordinated by the GDTFRT. Information on the translocation of threatened animals and plants in the wild is provided in the Department's Policy Statement No. 29 *Translocation of Threatened Flora and Fauna*. All translocation proposals require endorsement by the Director of Nature Conservation.

Monitoring of the translocation is essential and will be undertaken according to the timetable that will be developed for the Translocation Proposal.

Action: Undertake and monitor translocation
Responsibility: The Department (Geraldton District, Science Division) through the GDTFRT
Cost: \$13,300 in first year and \$6,200 in subsequent years.

9. Conduct further surveys

Community-based groups and individuals will be encouraged to be involved in further surveys supervised by the Department's staff during the species' flowering period (September).

Action: Conduct further surveys
Responsibility: The Department (Geraldton District) through the GDTFRT
Cost: \$4,200 per year.

10. Monitor populations

Annual monitoring of factors such as habitat degradation; the impacts of grazing, drought, and salinity; population stability (expansion or decline), weed invasion, pollinator activity, seed production, recruitment, longevity and predation is essential. If grazing occurs, particularly on the seedlings, plants may need to be individually caged. During very dry years it may be necessary to water the remaining plants to ensure they survive long enough to produce a soil seed bank

Action: Monitor populations
Responsibility: The Department (Geraldton District) through the GDTFRT
Cost: \$2,200 per year.

11. Develop and implement a fire management strategy

The fire response of *Grevillea phanerophlebia* is not known but occasional disturbances such as fire may be required to stimulate germination. Too frequent fire, however, may prevent the accumulation of sufficient soil stored seed to allow regeneration of the populations. A fire management strategy will be developed to determine fire control measures and appropriate timing and frequency of fire.

Action: Develop and implement a fire management strategy
Responsibility: The Department (Geraldton District) through the GDTFRT
Cost: \$2,500 in first year and \$1,000 in subsequent years.

12. Promote awareness

The importance of biodiversity conservation and significance of the conservation of the Critically Endangered *Grevillea phanerophlebia* will be promoted to the public if the results of Recovery Action 2 indicate that *G. phanerophlebia* is taxonomically distinct and is not of hybrid origin. Awareness will be encouraged in the community by a publicity campaign through the local print and electronic media and poster displays. Formal links with local naturalist groups and interested individuals will also be encouraged. An information sheet, which includes a description of the plant, its habitat type, threats, management actions and photos will be produced.

Action: Promote awareness
Responsibility: The Department (Geraldton District, Strategic Development and Corporate Affairs) through the GDTFRT
Cost: \$1600 in first year and \$900 in subsequent years.

13. Obtain biological and ecological information

Increased knowledge of the biology and ecology of the species will provide a scientific basis for management of *Grevillea phanerophlebia* in the wild. Investigations will include:

1. Study of the soil seed bank dynamics and the role of various factors including disturbance (such as fire), competition, rainfall and grazing in recruitment and seedling survival.
2. Determination of reproductive strategies, phenology and seasonal growth.
3. Investigation of the mating system and pollination biology.
4. Investigation of population genetic structure, levels of genetic diversity and minimum viable population size.

Action: Obtain biological and ecological information
Responsibility: The Department (Science Division, Geraldton District) through the GDTFRT
Cost: \$18,800 per year.

14. Write a full Recovery Plan

At the end of the second-year of implementation of this IRP, the need for further recovery will be assessed. If *Grevillea phanerophlebia* is still ranked Critically Endangered at that time a full Recovery Plan will be developed that prescribes actions required for the long-term recovery of the species.

Action: Write a full Recovery Plan
Responsibility: The Department (WATSCU, Geraldton District) through the GDTFRT
Cost: \$20,700 once in the final year.

4. TERM OF PLAN

This Interim Recovery Plan will operate from June 2001 to May 2004 but will remain in force until withdrawn or replaced. It is intended that, if the taxon is still ranked Critically Endangered, this IRP will be replaced by a full Recovery Plan after three years.

5. ACKNOWLEDGMENTS

The following people have provided assistance and advice in the preparation of this Interim Recovery Plan:

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|---------------|---|
| Anne Cochrane | Manager, the Department's Threatened Flora Seed Centre |
| Greg Keighery | Senior Research Scientist, Science Division of the Department |
| Amanda Shade | Horticulturist, Botanic Garden and Parks Authority |

Thanks also to staff of the WA Herbarium for providing access to Herbarium databases and specimen information, and The Department's Wildlife Branch for assistance.

6. REFERENCES

- Department of Conservation and Land Management (1992) Policy Statement No. 44 *Wildlife Management Programs*. Department of Conservation and Land Management, Western Australia.
- Department of Conservation and Land Management (1994) Policy Statement No. 50 *Setting Priorities for the Conservation of Western Australia's Threatened Flora and Fauna*. Department of Conservation and Land Management, Western Australia.
- Department of Conservation and Land Management (1995) Policy Statement No. 29 *Translocation of Threatened Flora and Fauna*. Department of Conservation and Land Management, Western Australia.
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- Olde, P. and Marriott, N. (1995) *The Grevillea Book*. Vol. 2. Kangaroo Press, Kenthurst.
- Western Australian Herbarium (1998) FloraBase – Information on the Western Australian Flora. Department of Conservation and Land Management, Western Australia. <http://www.calm.wa.gov.au/science/>
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7. TAXONOMIC DESCRIPTION

Olde, P. and Marriott, N. (1995) *The Grevillea Book*. Vol. 2. Kangaroo Press, Kenthurst.

***Grevillea phanerophlebia* L.Diels** is a spreading, sprawling **shrub** to 1.5 m. **Branchlets** terete, either glabrous or sprinkled with silky hairs. **Leaves** 2-4.5 cm long, 3-5 cm wide, spreading to patent, sometimes deflexed c. 2-3 mm from base, rigid, ± sessile, flat, ovate to obovate-cuneate in outline, sometimes fan-shaped, bipinnatifid or with primary division in (usually 3) deeply cleft lobes; primary lobes usually deeply trifid or bifid excepting sometimes central lobe, the sinuses broad; leaf lobes 4-32 mm long, 2-3.5 mm wide, usually ascending, narrowly triangular to sublinear, extremely pungent; upper surface flat, shiny, glabrous, midvein and secondary veins coarse, yellow when alive; margins shortly recurved; lower surface sparsely silky or spreading tomentose with prominent rounded venation. **Conflorescence** erect, axillary, pedunculate, occasionally terminal, simple or few-branched; unit conflorescence 1.5 cm long, 2 cm wide, open, ± globose to dome-shaped; peduncle silky; rachis glabrous to silky; bracts 0.5 mm long, ovate, glabrous, ciliate, falling very early. **Flower colour**: white with a creamy yellow limb. **Flowers** regular, ascending, glabrous; pedicels 6-8 mm long; torus c. 0.5 mm across, straight; nectary semi-circular, the margin lipped; **perianth** 2.5-3 mm long, 0.5-0.7 mm wide, oblong-obovoid below curve, ellipsoidal just before anthesis, the tepals separated and bowed out before anthesis, afterwards all free to base and independently rolled down; limb erect, globular, wider than perianth; **pistil** 3.5-3.9 mm long, glabrous; stipe 1.3-1.4 mm long, filamentous, kinked; ovary globose; style constricted above ovary, dilated above, constricted below style end; pollen presenter erect, conical to truncate-conical, the base oblique. **Fruit** 8-9 mm long, 5 mm wide, oblique, oblong-ellipsoidal, faintly rugose; pericarp c. 0.5 mm thick. **Seed** 5.5-6 mm long, 2.5 mm wide, obovoid-ellipsoidal, appearing fused from 2 ovules; outer face strongly convex, smooth; inner face convex with a broad waxy to membranous margin.