LARGE-FLOWERED SHORT-STYLED GREVILLEA

(*Grevillea brachystylis* subsp. *grandis*)

NATIONAL RECOVERY PLAN

Department of Environment and Conservation
Kensington

Australian Government

GOVERNMENT OF WESTERN AUSTRALIA

Department of Environment and Conservation
Our environment, our future

FOREWORD

Interim Recovery Plans (IRPs) are developed within the framework laid down in Department of Conservation and Land Management (CALM) Policy Statements Nos. 44 and 50. Note: the Department of CALM formally became the Department of Environment and Conservation (DEC) in July 2006. DEC will continue to adhere to these Policy Statements until they are revised and reissued.

These plans 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.

DEC is committed to ensuring that Threatened taxa are conserved through the preparation and implementation of Recovery Plans (RPs) or IRPs by ensuring that conservation action commences as soon as possible and, in the case of Critically Endangered (CR) taxa, always within one year of endorsement of that rank by the Minister.

This plan results from a review of, and replaces IRP No120 Large Flowered Short-styled Grevillea (*Grevillea brachystylis* subsp. *grandis*) 2002-2007, prepared by Gillian Stack & Val English.

This plan will operate from September 2011 to August 2016 but will remain in force until withdrawn or replaced. It is intended that, if the taxon is still ranked as Critically Endangered (CR) in WA, this plan will be reviewed after five years and the need for further recovery actions assessed.

This plan was given regional approval on 21 August 2011 and was approved by the Director of Nature Conservation on 15 September 2011. The provision of funds identified in this plan is dependent on budgetary and other constraints affecting DEC, as well as the need to address other priorities.

This plan was prepared with financial support from the Australian Government to be adopted as a National Recovery Plan under the provisions of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Information in this plan was accurate at September 2011.

PLAN PREPARATION

This revised plan was prepared by Nick Casson[1].
[1] Senior Ecologist, DEC Species and Communities Branch, Locked Bag 104, Bentley Delivery Centre, WA 6983.

ACKNOWLEDGEMENTS

The following people provided assistance and advice during the revision of this plan:

Andrew Brown	Threatened Flora Coordinator, DEC Species and Communities Branch
Ben Lullfitz	Conservation Officer, DEC Blackwood District
Bob Dixon	Manager Biodiversity and Extension, Botanic Gardens and Parks Authority
Amanda Shade	Assistant Curator (Nursery), Botanic Gardens and Parks Authority
Luke Sweedman	Curator WA Seed Technology Centre, Botanic Gardens and Parks Authority
Andrew Crawford	Principal Technical Officer, DEC Science Division
Margaret Byrne	Senior Principal Research Scientist, DEC Science Division
Leonie Monks	Research Scientist, DEC Science Division
Andrew Webb	Botanist, DEC South West Region

Thanks also to the staff of the W.A. Herbarium for providing access to Herbarium databases and specimen information.

Cover photograph by Andrew Brown.

CITATION

This plan should be cited as: Department of Environment and Conservation (2011) *Grevillea brachystylis* subsp. *grandis*. Interim Recovery Plan 2011-2016. Interim Recovery Plan No. 317. Department of Environment and Conservation, Western Australia.

SUMMARY

Scientific Name:	*Grevillea brachystylis* subsp. *grandis*	**Common Name:**	Large-flowered short-styled grevillea
Family:	Proteaceae	**Flowering Period:**	June to December
DEC Region:	South West	**DEC District:**	Blackwood
Shire:	Busselton	**NRM Region:**	South West
Recovery Team:	South West Region Threatened Flora Recovery Team (SWRTFRT)	**IBRA Region:**	Swan Coastal Plain

Analysis of outputs and effectiveness of Interim Recovery Plan (IRP) 120 Large Flowered Short-styled Grevillea (*Grevillea brachystylis* subsp. *grandis*) 2002-2007, prepared by Gillian Stack & Val English

The criteria for success and failure in the previous plan were both met (the number of populations have increased while the number of individuals has decreased). The number of populations has increased over the term of the plan from 5 to 8 due to the discovery of additional occurrences. However, the total number of mature plants has declined from 272 in 2002 to 195 in 2011. Decline was mainly in the original populations; especially Population 2 which is one of the largest.

The decline in population sizes is due to a range of impacts to the mainly small remnants in which plants occur. Impacts include weed invasion, habitat degeneration, roadside disturbance and hydrological change.

All actions included in the previous plan are ongoing and are included in this revised plan. Notable achievements include:

Action 3) Seeds from several populations were collected and stored and germination rates tested.
Action 4) Three new populations and three new subpopulations were located during surveys by Blackwood District staff.
Action 6) Private property containing Subpopulation 3b is managed for conservation by the landholder.
Action 8) Staff from DEC's Blackwood District regularly monitored populations of the sub-species.
Action 11) A double-sided information sheet was printed and distributed.

In addition to the listed recovery actions, all land managers have been notified of the location and threatened status of the subspecies.

New recovery actions included in this plan are:

Action 2: Install or replace DRF markers (commenced under the previous plan)
Action 8: Undertake grazing control
Action 13: Map habitat critical to the survival of *Grevillea brachystylis* subsp. *grandis*

Illustrations and/or further information: Keighery, G. (2009) A new subspecies of Grevillea brachystylis (Proteaceae) from the Whicher Range. Western Australian Naturalist 27(1): 12-15.

Current status *Grevillea brachystylis* subsp. *grandis* was declared to be Rare Flora under the Western Australian *Wildlife Conservation Act 1950* in April 2002 and is currently ranked as Critically Endangered (CR) in WA under International Union for Conservation of Nature (IUCN 2001) Red List criteria A4c; B1ab(iii)+2ab(iii) due to the severe fragmentation of populations and continuing decline in the quality of habitat. The subspecies is listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as Critically Endangered, under the previous taxon name *Grevillea brachystylis* subsp. Busselton.The main threats are: competition from weeds, maintenance of road, drains and firebreaks, effects of agricultural encroachment and inappropriate fire regimes.

Description: *Grevillea brachystylis* subsp. *grandis* is an erect few branched non-lignotuberous shrub to 2 m tall. Branchlets are terete, up to 2 m long, and sparsely tomentose. Leaves are linear to obovate and 102 to 110 mm long. There are 4–7 red flowers in each axil.

Habitat requirements: The subspecies is currently known from a range of less than 10 km^2 south of Busselton. It grows on brown lateritic clay loam soils in Marri/Jarrah or rarely Mountain Marri woodland (Keighery 2009), mainly in areas infested with *Watsonia* meriana var. *bulbillifera* and *Juncus microcephalus.*

Habitat critical to the survival of the species, and important populations: As *Grevillea brachystylis* subsp. *grandis* is listed as Critically Endangered, it is considered that all known habitat for wild populations is habitat critical to the survival of the subspecies, and that all wild populations are important populations.

Benefits to other species or ecological communities: Recovery actions implemented to improve the quality or security of the habitat of *Grevillea brachystylis* subsp. *grandis* will also improve the health of associated native vegetation. No other listed species or ecological communities co-occur with this subspecies.

International obligations: This plan is fully consistent with the aims and recommendations of the Convention on Biological Diversity, ratified by Australia in June 1993, and will assist in implementing Australia's responsibilities under that Convention. The plan does not affect Australia's obligations under any other international agreements.

Indigenous Consultation: A search of the Department of Indigenous Affairs Aboriginal Heritage Sites Register did not reveal any sites of Aboriginal significance within or adjacent to populations of *Grevillea brachystylis* subsp. *grandis*. However, input and involvement has been sought through the South West Aboriginal Land and Sea Council (SWALSC) and Department of Indigenous Affairs to determine if there are any issues or interests. Indigenous opportunity for future involvement in the implementation of the recovery plan is included as an action in this plan.

Social and economic impact: The implementation of this plan may cause some economic impact through cost of implementing recovery actions. Recovery actions refer to continued negotiations between stakeholders with regard to these areas.

Affected interests: The protection of the species will have implications for Shire and private landholder operations.

Evaluation of the Plan's Performance: The DEC in conjunction with the South West Region Threatened Flora Recovery Team (SWRTFRT) will evaluate the performance of this plan. In addition to annual reporting on progress and evaluation against the criteria for success and failure, the plan will be reviewed following five years of implementation.

Existing Recovery Actions: The following recovery actions have been or are currently being implemented and have been considered in the preparation of this plan:

1. All relevant land managers have been notified of the location and threatened status of *Grevillea brachystylis* subsp. *grandis* and the associated legal responsibilities pertaining to its protection.
2. Declared Rare Flora (DRF) markers have been installed at Populations 1, 2, 4, 5, 7 and 8, and Subpopulations 3a and b and 6a, b and c.
3. The area on private property containing Subpopulation 3b is managed for conservation by the landholder.
4. Populations 7 and 8, and Subpopulations 6a, b and c were discovered between 2004 and 2007 by Blackwood District staff.
5. About 704 seeds collected from Populations 1, 2, 4 and 6 are stored in DEC's Threatened Flora Seed Centre. Some germination tests have been conducted.
6. Staff from DEC's Blackwood District regularly monitor populations of the subspecies.
7. The South West Region Threatened Flora Recovery Team (SWRTFRT) is overseeing the implementation of this plan and will include information on progress in its annual report to the Department's Corporate Executive and funding bodies.

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

Recovery Criteria

Criteria for success: The number of populations has increased and/or the number of mature individuals has increased by twenty percent or more over the term of the plan.
Criteria for failure: The number of populations has decreased and/or the number of mature individuals has decreased by twenty percent or more over the term of the plan.

Recovery actions

1	Coordinate recovery actions	9	Obtain biological and ecological information
2	Replace DRF markers	10	Develop and implement a translocation proposal
3	Undertake weed control	11	Develop and implement a fire management strategy
4	Ensure long-term protection of habitat	12	Undertake surveys
5	Monitor populations	13	Map habitat critical to the survival of *Grevillea brachystylis* subsp. *grandis*
6	Collect seed and cutting material	14	Promote awareness
7	Undertake germination trials	15	Review this plan and prepare a revised plan if necessary
8	Investigate grazing and undertake control		

1. BACKGROUND

Analysis of outputs and effectiveness of Interim Recovery Plan (IRP) 120 Large Flowered Short-styled Grevillea (*Grevillea brachystylis* subsp. *grandis*) 2002-2007, prepared by Gillian Stack & Val English

The criteria for success and failure in the previous plan were both met (the number of populations have increased while the number of individuals has decreased). The number of populations has increased over the term of the plan from 5 to 8. However, the total number of mature plants has declined from 272 in 2002 to 195 in 2011. Decline was mainly in the original populations; especially Population 2 which is one of the largest.

The decline in population sizes is due to a range of impacts to the mainly small remnants on which plants occur. Impacts include weed invasion, habitat degeneration, roadside disturbance and hydrological change.

All actions included in the previous plan are ongoing and are included in this revised plan. Notable achievements include:

Action 3) Seeds from several populations were collected and stored and germination rates tested.
Action 4) Three new populations and three new subpopulations were located during surveys by Blackwood District staff.
Action 6) Private property containing Subpopulation 3b is managed for conservation by the landholder.
Action 8) Staff from DEC's Blackwood District regularly monitored populations of the sub-species.
Action 11) A double-sided information sheet was printed and distributed.

In addition to the listed recovery actions, all land managers have been notified of the location and threatened status of the subspecies.

New recovery actions included in this plan are:

Action 2: Install or replace DRF markers (commenced under the previous plan)
Action 8: Undertake grazing control
Action 13: Map habitat critical to the survival of *Grevillea brachystylis* subsp. *grandis*

History

Greg Keighery[1] made the first collection of *Grevillea brachystylis* subsp. *grandis* south of Busselton in 1985. Although this population has now been cleared, a further two populations containing a total of 160 mature plants were found nearby. The subspecies is currently known from 8 populations.

Description

Grevillea brachystylis subsp. *grandis* is an erect few branched non-lignotuberous shrub to 2 m tall. Branchlets are terete, up to 2 m long and sparsely tomentose. Leaves are linear to obovate and 102 to 110 mm long. There are 4–7 red flowers in each axil. It differs from the subsp. *brachystylis* in being erect to 2 m tall, and in having larger flowers, pedicels and leaves (Keighery 2009).

Distribution and habitat

Grevillea brachystylis subsp. *grandis* is currently known from a narrow geographic range of less than 10 km along the base of the Whicher Scarp, growing on brown lateritic clay loam soils in marri woodland, in areas that are often infested with weeds (Keighery 2009).

Table 1. Summary of population land vesting, purpose and manager

Pop. No. & Location	DEC District	Shire	Vesting	Purpose	Manager
1. SE of Busselton	Blackwood	Busselton	Shire	Road Reserve	Shire

[1] Greg Keighery, Senior Principal Research Scientist, DEC Science Division

2. SE of Busselton	Blackwood	Busselton	Shire	Road Reserve	Shire
3a. SE of Busselton	Blackwood	Busselton	Shire	Road Reserve	Shire
3b. SE of Busselton	Blackwood	Busselton	Freehold	Private Property	Landholder
4. SE of Busselton	Blackwood	Busselton	Shire	Road Reserve	Shire
5. SE of Busselton	Blackwood	Busselton	Shire	Road Reserve	Shire
6a. SE of Busselton	Blackwood	Busselton	Shire	Road Reserve	Shire
6b. SE of Busselton	Blackwood	Busselton	Shire	Road Reserve	Shire
6c. SE of Busselton	Blackwood	Busselton	Shire	Road Reserve	Shire
7. SE of Busselton	Blackwood	Busselton	Shire	Road Reserve	Shire
8. SE of Busselton	Blackwood	Busselton	Shire	Road Reserve	Shire

Populations in **bold text** are considered to be important populations

Biology and ecology

Grevillea brachystylis subsp. *grandis* is thought to germinate from seed following fires (Keighery 2009).

Population records, which mainly span 2000 to 2010, indicate that individuals may only live 10 to 20 years.

Threats

Grevillea brachystylis subsp. *grandis* was declared to be Rare Flora under the Western Australian *Wildlife Conservation Act 1950* in April 2002 and is currently ranked as Critically Endangered (CR) in WA under International Union for Conservation of Nature (IUCN 2001) Red List criteria A4c; B1ab(iii)+2ab(iii) due to the severe fragmentation of populations and continuing decline in the quality of habitat. The species is listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as Critically Endangered.The main threats are: competition from weeds, maintenance of road, drains and firebreaks, effects of agricultural encroachment, poor recruitment and inappropriate fire regimes.

Weed competition, particularly from *Pennisetum clandestinum, Cynodon dactylon* and *Watsonia* meriana var. *bulbillifera*, is a threat to some populations. Weed impact is greatest at Populations 1, 2 and 4, and Subpopulations 3a and 3b. Weeds suppress early plant growth by competing for soil moisture, nutrients and light. They can also exacerbate grazing pressure and increase the fire hazard due to the easy ignition of high fuel loads that are produced annually by many weed species.

Road, drain and firebreak maintenance threaten all populations. Threats include grading, chemical spraying, construction of drainage channels and the mowing of roadside vegetation. Several of these actions also encourage weed invasion. Grading has had mixed effects because it appears to have stimulated germination and/or resprouting at Population 2 but may also be enhancing weed invasion.

Inappropriate fire regimes may affect the viability of populations. *Grevillea brachystylis* subsp. *grandis* is thought to germinate from seed following fire and, if this is the case, occasional fires may be required to facilitate reproduction of this species. However, the seed bank would be depleted if fires recurred before regenerating or juvenile plants reached maturity.

Poor recruitment may be a threat. Generally low levels of germination are taking place due to an absence of germination triggers such as fire. Seed production also appears to be low (even allowing for small population sizes) and only small quantities of seed have been harvested;

Farming activities may also threaten roadside populations as a result of hydrological change (altered surface flow onto road verges) and herbicide and fertilizer drift.

The intent of this plan is to provide actions that will deal with immediate threats to *Grevillea brachystylis* subsp. *grandis*. Although climate change may have a long-term effect on the species, actions taken directly to prevent the impact of climate change are beyond the scope of this plan.

Table 2. Summary of population information and threats

Pop. No. & Location	Land Status	Year / No. of plants	Current Condition	Current and potential threats
1. SE of Busselton	Shire Road Reserve	1985 1 1996 0 2000 0 2002 14 2010 3 2010 27	Moderate	Weeds, little remaining habitat, road & fence maintenance, inappropriate fire
2. SE of Busselton	Shire Road Reserve	2000 64 (90) 2010 [31] 2010 [36]	Healthy	Weeds, road & drain maintenance inappropriate fire
3a. SE of Busselton	Shire Road Reserve	2001 50 2001 - 2001 70 2002 50 2010 7 2010 5	Moderate	Road maintenance, weeds, inappropriate fire.
3b. SE of Busselton	Freehold	2001 25 2002 0 2005 50 2010 0^ 2010 0^	No plants	Weeds, little remaining habitat, firebreak maintenance, inappropriate fire.
4. SE of Busselton	Shire Road Reserve	2002 6 2005 35 2010 29 2010 14	Moderate.	Weeds, little remaining habitat, road maintenance, inappropriate fire.
5. SE of Busselton	Shire Road Reserve	2002 1 2010 0 2010 0	No plants	Road maintenance, weeds, inappropriate fire.
6a. SE of Busselton	Shire Road Reserve	2004 1 2010 0 2010 0*	No plants	Weeds, little remaining habitat, road maintenance, inappropriate fire.
6b. SE of Busselton	Shire Road Reserve	2004 10 2010 11*	Moderate	Weeds, little remaining habitat, road maintenance, inappropriate fire
6c. SE of Busselton	Shire Road Reserve	2004 4 2007 190 2010 200 2010 87	Moderate	Weeds, little remaining habitat, road maintenance, inappropriate fire.
7. SE of Busselton	Shire Road Reserve	2007 2 2010 2 (7) 2011 4	Poor	Weeds, little remaining habitat, road maintenance, inappropriate fire.
8. SE of Busselton	Shire Road Reserve	2011 9	Moderate	Weeds, little remaining habitat, fence and powerline maintenance, inappropriate fire
Most recent total		157 mature		

Note: * = total for both subpopulations; ( ) = number of seedlings.

Guide for decision-makers

Section 1 provides details of current and possible future threats. Any on-ground works (i.e firebreaks, roadworks) in the immediate vicinity of *Grevillea brachystylis* subsp. *grandis* may have impacts on the species, its habitat or potential habitat.

Actions that result in any of the following may potentially result in a significant impact on the subspecies:

- damage to or destruction of occupied or potential habitat.
- alteration of the surface hydrology.
- a reduction in population size due to poor recruitment, threatening processes and other factors.
- a decrease in the number of pollinators.

This subspecies is protected under the *Environment Protection and Biodiversity Conservation Act 1999* and by the Western Australian *Wildlife Conservation Act 1950* and the above potential threats should be taken into

account when assessing proposals which may occur in the vicinity of the subspecies, under these Acts or the *Environmental Protection Act 1986*.

Management practices

DEC will continue to liaise with land managers to ensure that the above actions will not impact upon the subspecies. Where direct action is required, specific management actions will be implemented to address threats.

In addition to the recovery actions outlined in this plan the subspecies is included in the broader Regional Plan "Western Australian Wildlife Management Program 33 - Declared Rare and Poorly Known Flora in the Central Forest Region".

Habitat critical to the survival of the species, and important populations

As *Grevillea brachystylis* subsp. *grandis* is listed as Critically Endangered in WA and also under the EPBC Act, it is considered that all known remaining habitat that held or holds wild populations is habitat critical to the survival of the species, and that all populations, including those based on translocation, are important populations. Habitat that is critical to the survival of *Grevillea brachystylis* subsp. *grandis* comprises:

- the area of occupancy of known populations.
- areas of similar habitat surrounding known populations (these provide potential habitat for population expansion and provide habitat and a food source for pollinators).
- corridors of remnant vegetation that link populations.
- additional occurrences of similar habitat that do not currently contain the species but may have done so in the past (these represent possible translocation sites).
- the local catchment for the surface and/or groundwater that maintains the habitat of the subspecies.

Benefits to other species or ecological communities

Recovery actions implemented to improve the quality or security of the habitat of *Grevillea brachystylis* subsp. *grandis* will also improve the status of associated native vegetation. The subspecies occurs in the Pinjarra Plain near the foothills of the Whicher Scarp and much of this vegetation has been cleared (Webb et al 2009).

Grevillea brachystylis subsp. *grandis* does not co-occur with any known Threatened or Priority species, nor occur within or adjacent to any known Threatened or Priority Ecological Community (TEC/PEC).

International obligations

This plan is fully consistent with the aims and recommendations of the Convention on Biological Diversity, ratified by Australia in June 1993, and will assist in implementing Australia's responsibilities under that Convention. The plan does not affect Australia's obligations under any other international agreements.

Indigenous Consultation

A search of the Department of Indigenous Affairs Aboriginal Heritage Sites Register did not reveal any sites of Aboriginal significance within or adjacent to populations of *Grevillea brachystylis* subsp. *grandis*. However, input and involvement has been sought through the South West Aboriginal Land and Sea Council (SWALSC) and Department of Indigenous Affairs to determine if there are any issues or interests. Indigenous opportunity for future involvement in the implementation of the Recovery plan is included as an action in this plan.

Social and economic impacts

Implementation of this plan may impact development proposals for private land that contains a population of *Grevillea brachystylis* subsp. *grandis*. It may also impact on Shire Road maintenance and other activities in the vicinity of populations situated on Shire managed reserves. Costs associated with managing the populations

may include deterring access, weed control and fencing. Recovery actions refer to continued negotiations between stakeholders with regard to these areas

Affected interests

These include private landholder and Shire operations.

Evaluation of the Plan's Performance

The DEC in conjunction with the South West Region Threatened Flora Recovery Team (SWRTFRT) will evaluate the performance of this plan. In addition to annual reporting on progress and evaluation against the criteria for success and failure, the plan will be reviewed following five years of implementation.

2. RECOVERY OBJECTIVE AND CRITERIA

Objective

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

Criteria for success: The number of populations has increased and/or the number of mature individuals has increased by twenty percent or more over the term of the plan.
Criteria for failure: The number of populations has decreased and/or the number of mature individuals has decreased by twenty percent or more over the term of the plan.

3. RECOVERY ACTIONS

Existing recovery actions

Most landmanagers have been notified of the location and threatened status of the species. The notification has details of the Declared Rare status of *Caladenia procera* and the legal responsibility to protect it under the *Wildlife Conservation Act 1950*.

Declared Rare Flora (DRF) markers have been installed at Populations 1, 2, 4, 5, 7 and 8, and Subpopulations 3a and b and 6a, b and c. These markers alert maintenance workers to the presence of the population and help to ensure that the habitat is not accidentally damaged.

Dashboard stickers and posters describing the significance of DRF markers have been produced and distributed to relevant Shires and other organisations.

The area on private property containing Subpopulation 3b has been managed for conservation by the landholders who have fenced its habitat.

Populations 7 and 8, and Subpopulations 6a, b and c were discovered between 2004 and 2007 by Blackwood District staff.

About 222 seeds were collected from Populations 2 and 3 in 2002, 143 from Population 6 in 2009, 100 from Populations 1 and 4 in 2010, 238 from population 6 in 2010, and an unprocessed amount from Population 1 in 2010. Seeds are stored in DEC's Threatened Flora Seed Centre (TFSC) at –18°C. Germination rates from TFSC viability trials were 20% from population 2 and 100% from Population 3. There are no records of any plants in cultivation.

Staff from DEC's Blackwood District regularly monitor populations of *Grevillea brachystylis* subsp. *grandis*.

The South West Region Threatened Flora Recovery Team (SWRTFRT) is overseeing the implementation of this Plan and has included information on progress in its annual report to DEC's Corporate Executive and funding bodies

Future recovery actions

Where recovery actions occur on lands other than those managed by DEC, permission has been or will be sought from land managers prior to recovery activities being undertaken. The following recovery actions are generally in order of descending priority, influenced by their timing over the life of the plan. However this should not constrain addressing any of the actions if funding is available and other opportunities arise.

1. Coordinate recovery actions

The SWRTFRT will oversee the implementation of the recovery actions for *Grevillea brachystylis* subsp. *grandis* and will include information on progress in their annual report to DEC's Corporate Executive and funding bodies.

Action: Coordinate recovery actions
Responsibility: DEC (Blackwood District) through the SWRTFRT
Cost: $3,000 per year

2. Replace DRF markers

At many populations the yellow coating is wearing off DRF markers and the risk of them being missed has increased.

Action: Replace DRF markers
Responsibility: DEC (Blackwood District) through the SWRTFRT
Cost: $1,500 in years 1 & 2

3. Undertake weed control

Weeds including *Pennisetum clandestinum, Cynodon dactylon* and *Watsonia meriana* var. *bulbillifera* are a major threat to all populations. Weed control will be undertaken in consultation with the land managers. It will be necessary to monitor the success of the treatment on weeds and any adverse effects on *Grevillea brachystylis* subsp. *grandis* and associated native plant species.

Action: Undertake weed control
Responsibility: DEC (Blackwood District, Science Division) through the SWRTFRT
Cost: $6,000 per year, as required

4. Ensure long-term protection of habitat

Staff from DEC's Blackwood District will continue to liaise with land managers and landowners to ensure that populations are not accidentally damaged or destroyed. In addition, ways and means of improving the security of populations and their habitat will be investigated.

Action: Ensure long-term protection of habitat
Responsibility: DEC (Blackwood District) through the SWRTFRT
Cost: $3,000 per year

5. Monitor populations

Annual monitoring and recording of factors such as habitat degradation (including weed invasion and plant diseases), population stability (expansion or decline), pollination activity, seed production, recruitment, longevity and predation is essential.

Action: Monitor populations
Responsibility: DEC (Blackwood District) through the SWRTFRT
Cost: $4,000 per year

6. Collect seed and cutting material

Preservation of germplasm is essential to guard against extinction if wild populations are lost. Such collections are also needed to propagate plants for translocations. Further collection of seed is required from all populations to maximise the genetic diversity of the *ex situ* material. Cuttings need to be obtained to establish a living collection at the Botanic Gardens and Parks Authority (BGPA). These could be used to provide seed stock as the number of seeds held is very small.

Action: Collect seed and cutting material
Responsibility: DEC (Blackwood District), and the BGPA through the SWRTFRT
Cost: $9000 for the first two years and $2,000 in subsequent years

7. Undertake germination trials

Soil disturbance or fire may be the most effective means of germinating *Grevillea brachystylis* subsp. *grandis* seed in the soil in the wild. Different techniques should be investigated (i.e. soil disturbance, fire, smoke water), to determine the most appropriate method. These trials can be conducted near existing populations in areas newly cleared of weeds, and/or in areas where *Grevillea brachystylis* subsp. *grandis* was known to occur previously. Any disturbance (including fire) trials will need to be undertaken in conjunction with weed control.

Action: Undertake trials to stimulate the germination of soil-stored seed
Responsibility: DEC (Science Division, and Blackwood District) through the SWRTFRT
Cost: $7,000 in years 1 and 3, $2,000 in years 2, 4 and 5

8. Investigate grazing and undertake control

Grazing of seedlings and plants has not yet been investigated and this should be undertaken in order to determine any impact. If grazing is found to be impacting on the conservation of the subspecies then some control such as fencing should be undertaken.

Action: Investigate grazing and undertake control
Responsibility: DEC (Blackwood District) through the SWRTFRT
Cost: $5,000 per year

9. Obtain biological and ecological information

Improved knowledge of the biology and ecology of *Grevillea brachystylis* subsp. *grandis* will provide a better scientific basis for management of the wild populations. An understanding of the following is necessary for effective management:

1. Soil seed bank dynamics and the role of various disturbances (including fire), competition, rainfall and grazing in germination and recruitment.
2. The pollination biology of the species and the requirements of pollinators.
3. The reproductive strategies, phenology and seasonal growth of the species.
4. The population genetic structure, levels of genetic diversity and minimum viable population size.

Action: Obtain biological and ecological information
Responsibility: DEC (Science Division, and Blackwood District) through the SWRTFRT
Cost: $10,000 per year for the first three years

10. Develop and implement a translocation proposal

As the number of extant plants is low and populations are not secure from threats, translocation may be an option. Information on the translocation of threatened plants and animals in the wild is provided in DEC's Policy Statement No. 29 *Translocation of Threatened Flora and Fauna* (CALM 1995). Translocations should meet the

standards set in the Australian Network for Plant Conservation translocation guidelines (Vallee et al 2004). All translocation proposals require endorsement by DEC's Director of Nature Conservation.

Action: Develop and implement a translocation proposal.
Responsibility: DEC (Blackwood District, and Science Division) through the SWRTFRT
Cost: $10,000 per year

11. Develop and implement a fire management strategy

It is thought that fire kills adult plants of the subspecies and recruitment is largely from seed. However, frequent fire may prevent the accumulation of sufficient soil-stored seed for recruitment to occur. Fire will therefore be prevented from occurring in the area of populations, except where it is being used experimentally as a recovery tool. A fire management strategy will be developed to determine fire control measures and appropriate fire parameters such as frequency, intensity and season.

Action: Develop and implement a fire management strategy
Responsibility: DEC (Blackwood District) through the SWRTFRT
Cost: $3,000 in first year and $1,000 in subsequent years

12. Undertake surveys

It is recommended that areas of potential habitat be surveyed for the presence of the subspecies during its flowering period between June and December with specific focus on secure land tenures. Community volunteers will be invited to be involved in surveys supervised by Departmental staff. All surveyed areas will be recorded and the presence or absence of the species documented to increase survey efficiency and reduce duplicate surveys.

Action: Undertake further surveys
Responsibility: DEC (Blackwood District) through the SWRTFRT
Cost: $2,000 per year

13. Map habitat critical to the survival of *Grevillea brachystylis* subsp. *grandis*

Spatial data relating to habitat critical to the survival of *Grevillea brachystylis* subsp. *grandis* needs to be determined. Although this is alluded to in Section 1, it has not yet been fully mapped and will be addressed under this action. If additional populations are located, then habitat critical to their survival will also be determined and mapped.

Action: Map habitat critical to the survival of *Grevillea brachystylis* subsp. *grandis*
Responsibility: DEC (SCB, Blackwood District) through the SWRTFRT
Cost: $2,000 in year 1

14. Promote awareness

The importance of biodiversity conservation and the need for the long-term protection of wild populations of this subspecies will be promoted to the community through poster displays and the local print and electronic media. 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, threats, recovery actions and photos will be produced.

Action: Promote awareness
Responsibility: DEC (Blackwood District) through the SWRTFRT
Cost: $4,000 in first year, $2,000 in subsequent years

15. Review this plan and prepare a revised plan if necessary

If *Grevillea brachystylis* subsp. *grandis* is still ranked as Critically Endangered at the end of the five-year term of this plan, the need for further recovery actions, or a review of this plan will be assessed and a revised plan prepared if necessary.

Action: Review this plan and prepare a revised plan if necessary
Responsibility: DEC (SCB – WATSCU, Blackwood District) through the SWRTFRT
Cost: $6,000 in year 5

Table 4. Summary of Recovery Actions

Recovery Action	Priority	Responsibility	Completion Date
Coordinate recovery actions	High	DEC (Blackwood District) through the SWRTFRT	Ongoing
Replace DRF markers	High	DEC (Blackwood District) through the SWRTFRT	Near complete/ongoing maintenance
Undertake weed control	High	DEC (Blackwood District, Science Division) through the SWRTFRT	Ongoing
Ensure long-term protection of habitat	High	DEC (Blackwood District) through the SWRTFRT	Ongoing
Monitor populations	High	DEC (Blackwood District) through the SWRTFRT	Ongoing
Collect seed and cutting material	High (with provisos)	DEC (Blackwood District), and the BGPA through the SWRTFRT	Ongoing
Undertake germination trials	High	DEC (Science Division and Blackwood District) through the SWRTFRT	Ongoing
Investigate grazing and undertake control	Medium	DEC (Blackwood District) through the SWRTFRT	Ongoing.
Obtain biological and ecological information	High	DEC (Science Division, and Blackwood District) through the SWRTFRT	Ongoing
Develop and implement a translocation proposal	Medium/High	DEC (Blackwood District, and Science Division) through the SWRTFRT	Ongoing
Develop and implement a fire management strategy	High	DEC (Blackwood District) through the SWRTFRT	Ongoing
Undertake surveys	High	DEC (Blackwood District) through the SWRTFRT	Ongoing
Map habitat critical to the survival of *Grevillea brachystylis subsp. grandis*	High	DEC (SCB, Blackwood District) through the SWRTFRT	Ongoing
Promote awareness	Medium	DEC (Blackwood District) through the SWRTFRT	Ongoing
Review this plan and prepare a revised plan if necessary	Medium	DEC (SCB – WATSCU, Blackwood District) through the SWRTFRT	Recurrent

Note: Completion dates are dependent on sufficient budget to undertake recovery actions.

4. TERM OF PLAN

Western Australia
This plan will operate from September 2011 to August 2016 but will remain in force until withdrawn or replaced. If the subspecies is still ranked Critically Endangered after five years, the need for further recovery actions and the need for a full Recovery Plan will be assessed.

Commonwealth
In accordance with the provisions of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) this adopted recovery plan will remain in force until revoked.

The recovery plan must be reviewed at intervals of not longer than 5 years.

5. 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.
DEC (2011). Records held in DEC's Declared Rare Flora Database and rare flora file. WA Department of Environment and Conservation.
Government of Australia (1999) Environment Protection and Biodiversity Conservation Act.
Keighery, G. (2009) A new subspecies of Grevillea brachystylis (Proteaceae) from the Whicher Range. Western Australian Naturalist 27(1): 12-15.
Krauss, S. and Alacs, E. 2003 Population genetic analysis of the DRF *Dryandra nivea* subsp. *uliginosa* and *Grevillea brachystylis* subsp. *australis*. BGPA Genetics Laboratory report No.20. Commissioned by BHP Billiton Titanium Minerals Pty Ltd
Smith, M.G. (2010). Declared Rare and Priority Flora List for Western Australia, 25 March 2010. Dept of Environment and Conservation. Como, W.A.
Stack, G & English, V (2002) *Grevillea brachystylis* subsp *grandis* MS. Interim Recovery Plan No. 120. Department of Conservation and Land Management, Western Australia.
TSSC (2006). Threatened Species Scientific Committee listing advice for Grevillea brachystylis subsp. Busselton (G.J.Keighery s.n. 28/8/1985) (Large-flowered Short-styled Grevillea).
Vallee, L., Hogbin T., Monks L., Makinson B., Matthes M. and Rossetto M. (2004) Guidelines for the Translocation of Threatened Australian Plants. Second Edition. *The Australian Network for Plant Conservation*. Canberra, Australia.
Webb, A., Keighery, B., Keighery, G., Longman, V., Black, A. And O'Connor, A. The flora and vegetation of the Busselton Plain (Swan Coastal Plain). A report for the Department of Conservation and Environment as part of the Swan Bioplan Project.
Western Australian Herbarium (1998 *FloraBase − The Western Australian Flora*. Department of Environment and Conservation. http://florabase.dec.wa.gov.au/.
World Conservation Union (2000) IUCN red list categories prepared by the IUCN Species Survival Commission, as approved by the 51st meeting of the IUCN Council. Gland, Switzerland.

6. TAXONOMIC DESCRIPTION

A new Subspecies of *Grevillea brachystylis* (Proteaceae) from the Whicher Range (Keighery 2009).

Continuing studies of this complex have elucidated a third subspecies confined to the base of the Whicher Escarpment which forms the interface between the Blackwood Plateau and the Swan Coastal Plain. This rare form is both spatially disjunct from the type form of G. *brachystylis* subsp. *brachystylis* and differs from it in being erect to 2 metres tall, although normally less. The plant lacks a lignotuber and has 1 - 3 stems per plant, which are much more robust than the type form. Flowers, pedicels and leaves are all much larger.

SUMMARY OF RECOVERY ACTIONS AND INDICATIVE COSTS

	Year 1			Year 2			Year 3			Year 4			Year 5		
Recovery Action	**DEC**	**Other**	**Ext.**	**DEC**	**Other**	**Ext.**	**DEC**	**Other**	**Ext.**	**DEC**	**Other**	**Ext.**	**DEC**	**Other**	**Ext.**
Coordinate recovery actions	3000			3000			3000			3000			3000		
Replace DRF markers	1500		1500												
Undertake weed control	3000		3000	3000		3000	3000		3000	3000		3000	3000		3000
Ensure long-term protection of habitat	3000			3000			3000			3000			3000		
Monitor populations	4000			4000			4000			4000			4000		
Collect seed and cutting material	9000			9000			2000			2000			2000		
Undertake germination trials	5000		2000	1000		1000	5000		2000	1000		1000	1000		1000
Investigate grazing and undertake control	2500		2500	2500		2500	2500		2500	2500		2500	2500		2500
Obtain biological and ecological information	5000		5000	5000		5000	5000		5000	5000		5000	5000		5000
Develop and implement a translocation proposal	5000		5000	5000		5000	5000		5000	5000		5000	5000		5000
Develop and implement a fire management strategy	2,000		1,000	1000			1000			1000			1000		
Undertake surveys	1,000		1000	1,000		1,000	1,000		1000	1,000		1,000	1,000		1000
Map habitat critical to the survival of *Grevillea brachystylis subsp. grandis*	2,000														
Promote awareness	2000		2000	2000			2000			2000			2000		
Review this plan and prepare a revised plan if necessary													3000		3000
Total	48000	0	23000	39500	0	17500	36500	0	18500	32500	0	17500	35500	0	20500
Yearly Total	**71,000**			**57,000**			**55,000**			**50,000**			**56,000**		

Ext. = External Funding (funding to be sought), Other = funds contributed by other agencies, volunteer input and BGPA in-kind contribution. Note: Completion dates are dependent on sufficient budget to undertake recovery actions.

Total DEC: $192,000
Total Other: $0
Total External Funding: $97,000
Total Costs: **$289,000**