INTERIM RECOVERY PLAN NO. 131

IRONSTONE GREVILLEA

(*GREVILLEA ELONGATA*)

INTERIM RECOVERY PLAN

2003-2008

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Photograph: L. Monks

March 2003

Department of Conservation and Land Management
Western Australian Threatened Species and Communities Unit (WATSCU)
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Natural Heritage Trust
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Government of Western Australia

DEPARTMENT OF Conservation AND LAND MANAGEMENT
Conserving the nature of WA

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 results from a review of IRP number 54 (Robyn Phillimore, G. Stack and V. English, 1999-2002) and replaces it. The revised IRP will operate from March 2003 to February 2008 but will remain in force until withdrawn or replaced.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 reviewed after five years and the need for a full Recovery Plan assessed.

This IRP was approved by the Director of Nature Conservation on 20 June, 2003. 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 March 2003.

SUMMARY

Scientific Name:	*Grevillea elongata*	**Common Name:**	Ironstone Grevillea
Family:	Proteaceae	**Flowering Period:**	September - November
Dept Region:	South West	**Dept District:**	Blackwood
Shire:	Busselton	**Recovery Team:**	South West Region Threatened Flora Recovery Team (SWRTFRT)

Illustrations and/or further information: A. Brown, C. Thomson-Dans and N. Marchant (Eds) (1998) *Western Australia's Threatened Flora*; P. M. Olde and N. R. Marriott (1995) *The Grevillea Book* 2: 142-143.

Current status: In 1996 *Grevillea elongata* was declared as Rare Flora under the Western Australian *Wildlife Conservation Act* 1950 and the species is now listed as Endangered (EN). It currently meets World Conservation Union (IUCN, 2000) Red List Category 'EN' under criterion C1 (IUCN 2000) due to the high level of fragmentation of populations, and a continuing decline in the quality of the habitat. *Grevillea elongata* is also listed as Endangered under the Commonwealth *Environmental Protection and Biodiversity Conservation* Act 1999 (EPBC Act). The main threats are inappropriate fire regimes; disease; chemical drift; road, rail and firebreak maintenance activities; weed invasion; and pine plantation maintenance.

An Interim Recovery Plan was developed for the species in 1999 (Phillimore *et al.* 1999). Information collected since that plan was completed has been incorporated into this plan and this document now replaces Phillimore *et al.* (1999).

Critical habitat: The critical habitat for *Grevillea elongata* comprises the area of occupancy of the known populations; similar habitat within 200 metres of known populations; corridors of remnant vegetation that link populations; the catchment area for the surface and groundwaters that maintain the wetland habitat; and additional nearby occurrences of similar habitat that do not currently contain the species but may have done so and may be suitable for translocations.

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

Given that this species is listed as Critically Endangered it is considered that all known habitat for wild and translocated populations is habitat critical.

Benefits to other species/ecological communities

Population 1 is located within an occurrence of a Threatened Ecological Community (TEC) listed as Endangered under the EPBC Act, and Critically Endangered in Western Australia. *Petrophile latericola* and *Grevillea maccutcheonii* which are listed as Critically Endangered under the *Wildlife Conservation Act* 1950 and Endangered under the EPBC Act also occur in the wider habitat of some populations of *Grevillea elongata*. Recovery actions implemented to improve the quality or security of the habitat of some populations of *Grevillea elongata* 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.

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. However, as *Grevillea elongata* is not listed under any international agreement, the implementation of other international environmental responsibilities is not affected by this plan.

Role and interests of indigenous people

There are no known indigenous communities interested or involved in the management of areas affected by this plan. Therefore no role has been identified for indigenous communities in the recovery of this species.

Social and economic impacts

Some populations of *Grevillea elongata* occur on private land and negotiations will continue with regard the future management of these populations. Recovery actions refer to continued liaison between stakeholders with regard these areas.

Evaluation of the Plan's Performance

The Department of Conservation and Land Management, in conjunction with the Recovery Team will evaluate the performance of this IRP. In addition to annual reporting on progress with listed actions and comparison against the criteria for success and failure, the plan is to be reviewed within five years of its implementation.

Habitat requirements: *Grevillea elongata* is endemic to Western Australia and is apparently confined to the Whicher Range area. It is found on 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 *Corymbia calophylla*, *Dryandra squarrosa* subsp. *argillacea*, *Calothamnus.* sp Whicher and *Xanthorrhoea* sp.

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

1. All appropriate land managers have been informed of the location and threatened status of the species.
2. Declared Rare Flora (DRF) markers have been installed at all road and rail reserve populations.
3. Dashboard stickers and posters describing the significance of DRF markers have been produced and distributed.
4. An area of private property containing Population 7 was fenced in 1996 and purchased in 1998.
5. An area of private property containing Subpopulation 1e was fenced and purchased in 1999.
6. Seed was collected in 1995 and 1998, and stored in the Department's Threatened Flora Seed Centre (TFSC). Germinants produced through viability testing are being propagated by the Botanic Gardens and Parks Authority.
7. The Botanic Garden and Parks Authority currently have forty plants of *Grevillea elongata* grown from four clones.
8. Weed control research has been conducted at Population 2 by staff of the Department's Science Division.
9. Control of Bridal Creeper near Population 3 occurred in 1998.
10. Phosphite control of dieback disease has been undertaken in the habitat of Populations 1a to 1e, 2a to 2d and 7e.
11. The removal of pines to a 10m radius around Population 6 is ongoing.
12. A fire response strategy has been prepared and incorporated into the Blackwood District's Fire Control Working Plan.
13. Staff from the Department's Blackwood District regularly monitor all populations.
14. The South West Region Threatened Flora Recovery Team 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 by ten percent or more.

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

Recovery actions

1. Coordinate recovery actions
2. Map critical habitat
3. Undertake weed control
4. Implement fire response strategy
5. Cull pines
6. Maintain disease hygiene
7. Continue *Phytophthora* control
8. Liaise with land managers
9. Monitor populations
10. Conduct further surveys
11. Collect seed and cutting material
12. Investigate need for translocation
13. Obtain biological and ecological information
14. Promote awareness
15. Review the need for a full Recovery Plan

1. BACKGROUND

History

The first collection of *Grevillea elongata*, housed at the Western Australian Herbarium, was made in 1950 by R. Royce. Further collections have since been made and there is currently a total of over 1,300 plants known from seven confirmed and one unconfirmed population.

An area of private land that contains Population 7 was purchased by the Department of Conservation and Land Management (the Department) in 1998. A second parcel of private land that contains over 100 healthy plants in Population 1e was purchased the following year. These areas have been fenced from stock and are now Nature Reserves.

An Interim Recovery Plan (IRP) was developed for the species in 1999 (Phillimore *et al.* 1999). Information collected since that plan was completed has been incorporated into this plan and this document now replaces Phillimore *et al*. (1999). This IRP will be implemented in conjunction with the IRP for the 'Shrublands on southern Swan Coastal Plain Ironstones' (English 1999), in which the species generally occurs, and with the plans for *Petrophile latericola* and *Grevillea maccutcheonii* that occur in the wider habitat of some populations.

Description

Grevillea elongata is a tall upright shrub to 2 m tall by 2.5 m wide with terete erect branchlets. The leaves are 2.5-5 cm long, glabrous and finely divaricate. The inflorescences are terminal or axillary, sessile or shortly pedunculate and white and cream in colour. The fruit is obliquely shaped, 8 mm long, 3.5 mm wide and 4 mm deep. The species was once thought to be a form of kerosene bush (*G. paniculata*) which has leaves channeled on the upper surface, smaller floral bracts (1 mm long), a globose conflorescence with shorter floral rachis (5 mm long), longer pedicels and deeply wrinkled fruits (Olde and Marriott, 1994).

Distribution and habitat

Grevillea elongata is endemic to Western Australia and is apparently confined to the Whicher Range area. The species 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 is largely confined to the threatened ecological community known as 'shrubland association on southern Swan Coastal Plain ironstones' ('Southern Ironstone') (Gibson *et al.* 1994; English 1999; English and Blyth 1997). *G. elongata* occurs in association with *Corymbia calophylla*, *Dryandra squarrosa* subsp. *argillacea*, *Calothamnus* sp. Whicher and *Xanthorrhoea* sp.

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 (*Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act)).

The critical habitat for *G. elongata* comprises:

- the area of occupancy of known populations;
- areas of similar habitat within 200 metres of known populations, i.e. shrubland on poorly drained soils in association with ironstone (these provide potential habitat for natural range extension);
- corridors of remnant vegetation that link populations (these are necessary to allow pollinators to move between populations and are usually road and rail verges);
- the local catchment area (the species occurs on seasonally wet soils which are dependent on the maintenance of local surface and ground water hydrology); and
- 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).

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

Given that this species is listed as Critically Endangered it is considered that all known habitat for wild and translocated populations is habitat critical.

Benefits to other species/ecological communities

Population 1 is located within an occurrence of a Threatened Ecological Community (TEC) listed as Endangered under the EPBC Act, and Critically Endangered in Western Australia. *Petrophile latericola* and *Grevillea maccutcheonii* (listed as Critically Endangered under the *Wildlife Conservation Act* 1950 and Endangered under the EPBC Act) also occur in the wider habitat of some populations of *Grevillea elongata*. Recovery actions implemented to improve the quality or security of the habitat of some populations of *Grevillea elongata* 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.

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. However, as *Grevillea elongata* is not listed under any international agreement, the implementation of other international environmental responsibilities is not affected by this plan.

Role and interests of indigenous people

There are no known indigenous communities interested or involved in the management of areas affected by this plan. Therefore no role has been identified for indigenous communities in the recovery of this species.

Social and economic impacts

Some populations of *Grevillea elongata* occur on private land and negotiations will continue with regard the future management of these populations. Recovery actions refer to continued liaison between stakeholders with regard these areas.

Evaluation of the Plan's Performance

The Department of Conservation and Land Management, in conjunction with the Recovery Team will evaluate the performance of this IRP. In addition to annual reporting on progress with listed actions and comparison against the criteria for success and failure, the plan is to be reviewed within five years of its implementation.

Habitat requirements: *Grevillea elongata* is endemic to Western Australia and is apparently confined to the Whicher Range area. It is found on 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 *Corymbia calophylla*, *Dryandra squarrosa* subsp. *argillacea*, *Calothamnus.* sp Whicher and *Xanthorrhoea* sp.

Biology and ecology

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. Seed is probably dehisced soon after maturity, and this is typical for grevilleas. Longevity of the seed is unknown, as is the plant's life span. *Grevillea elongata* regenerates from seed after fire (Olde and Marriott, 1995).

Grevillea elongata seedlings have germinated within a second rotation on a pine plantation (Population 6), but it does not occur on the fire breaks. Subpopulations 6b and 6c occur 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.

Susceptibility of *Grevillea elongata* 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 The Department's Science Division indicates

that *Grevillea elongata* germinants were not susceptible to *P. cinnamomi* under laboratory conditions ([1]C. Crane, personal communication). Testing of *G. elongata* for *P. cinnamomi* in the field however, has proved positive on two occasions (Subpopulations 6a and 6b). It may be, therefore, that the species is able to resist the disease when healthy but succumbs when under stress in the field. Further testing of *Phytophthora cinnamomi* susceptibility is required.

Threats

Grevillea elongata was declared as Rare Flora in 1996 under the Western Australian *Wildlife Conservation Act* 1950. It is listed as Endangered under both the Western Australian legislation and under the EPBC Act. It currently meets World Conservation Union (IUCN, 2000) Red List Category 'EN' under criteria C1 (IUCN 2000) due to the high level of fragmentation of populations, and a continuing decline in the quality of the habitat. The rarity of *G. elongata* is probably mainly due to clearing for agricultural purposes, particularly on heavier soils, that has occurred in the Busselton area. Over 90% of the highly restricted 'Southern Ironstone' community with which the species is generally associated, has been cleared (Tille and Lantzke 1990a, 1990b). The main threats are weed competition, inappropriate fire regimes, road, rail and firebreak maintenance activities, disease, pine plantation activities, mining, grazing and chemical drift.

- **Weed competition** is 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 are already badly weed infested. They are threatened by both grasses and broadleaved weeds. Population 2 is a broader linear population, invaded mostly by Watsonia, 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.

- **Inappropriate fire regimes** would adversely affect the viability of populations, as seeds of *Grevillea elongata* probably germinate following fire. If this is the case, the soil seed bank would rapidly be depleted if fires recurred before regenerating or juvenile plants reached maturity and replenished the soil seed bank. However, it is likely that occasional fires are needed for reproduction of this species.

- **Road, rail and firebreak maintenance activities** threaten plants and habitat at all road verge and rail reserve populations of *Grevillea elongata*. These include actions such as grading the road verge, constructing drainage channels and mowing the roadside vegetation to improve visibility. These disturbance events also often encourage weed invasion.

- **Dieback disease** is a moderate threat to all populations. *Phytophthora cinnamomi* causes the roots of infected plants to rot and results in death through drought stress. *Grevillea elongata* may be susceptible to *P. cinnamomi* 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.

- **Plantation activities** impact on Population 6. Activities that may threaten this population 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** is not currently a direct threat to populations of *G. elongata*, however, minerals sands exploration and activity continues to occur in the region and may pose risk to populations in the future. Populations 1c and 1d occur on private property owned by a mining company, however, the populations are currently managed for conservation.

- **Grazing** by rabbits, kangaroos or stock has impacted on many *G. elongata* 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.

[1] Colin Crane – *Phytophthora* researcher, the Department's Science Division

- **Chemical drift** from herbicide and fertiliser applications from nearby farmland may affect the species' growth and survival.

Summary of population information and threats

Pop. No. & Location	Land Status	Year/No. plants	Condition	Threats
1a. SE Busselton	Shire Road Reserve	1997 50+	Healthy	Weeds, road maintenance, fire
1b. SE Busselton	Rail Reserve	1997 100+	Healthy	Weeds, rail maintenance, fire
1c. SE Busselton	Private Property	1995 160	Healthy	Fire, mining
1d. SE Busselton	Private Property	1995 160	Healthy	Fire, mining
1e. SE Busselton	Nature Reserve	1995 100 1998 100+ 1999 100	Healthy	Weeds, disease, grazing
2a. SE Busselton	Shire Road Reserve	1997 100+	Healthy	Weeds, road maintenance, fire
2b. SE Busselton	Rail Reserve	1997 100+	Healthy	Weeds, rail maintenance, fire
2c. SE Busselton	Shire Road Reserve	1997 100+	Moderate	Weeds, road maintenance
2d. SE Busselton	Rail Reserve	1997 100+	Moderate	Weeds, rail maintenance
3a. SE Busselton	Shire Road Reserve	1997 60+ 1998 60 2002 40+ (10)*	Healthy	Weeds, road maintenance
3b. SE Busselton	Drain Reserve	1995 40 2002 *	Healthy	Weeds
3c. SE Busselton	Private Property	2002 20+ (2)	Healthy	Grazing
4. SE Busselton	Shire Road Reserve	1996 44 1997 44	Moderate	Weeds, road maintenance
5. SE Busselton	Private Property	1997 3	Poor	Weeds,grazing
6a. SE Busselton	State Forest	1997 12 1999 15 2001 400+*	Mod/Poor	Plantation operations, fire, dieback
6b. SE Busselton	State Forest	1997 160 1999 97 2001 *	Poor	Plantation operations, fire, dieback
6c. SE Busselton	State Forest	1997 40 1999 25 2001 *	Moderate	Plantation operations, fire
7. SE Busselton	Nature Reserve	1999 2	Healthy	Fire
#8. S of Duranilling	To be determined	1983 infrequent	To be determined	To be determined

Numbers in brackets = number of juveniles. * = total for subpopulations combined. #Population requires confirmation of status.

Guide for decision-makers

Section 1 provides details of current and possible future threats. Any on-ground works (clearing, firebreaks, roadworks etc) in the immediate vicinity of *Grevillea elongata* will require assessment. On-ground works should not be approved unless the proponent can demonstrate that they will not have an impact on the species, its habitat or potential habitat, or on the local hydrology.

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

3. RECOVERY ACTIONS

Existing recovery actions

All appropriate people have been made aware of the existence of this species and its locations. Busselton Shire and Westrail have been notified about populations of *Grevillea elongata* that occur on lands that they manage, and adjacent landowners have also been informed of the locations of the populations. These notifications detailed the Declared Rare status of the species and the associated legal obligations.

Declared Rare Flora (DRF) markers have been installed at all road and rail reserve populations, and Population 6 in the pine plantation. The markers alert people working in the vicinity to the presence of DRF, and the need to avoid work that may damage vegetation in the area. Awareness of the significance of these markers is being promoted to relevant bodies such as Shires, MRWA and Westrail. To this end, posters, dashboard stickers and can holders have been produced and distributed. These illustrate DRF markers and inform of their purpose. The location of Population 6 has also been incorporated onto plantation maps by the Forest Products Commission.

Population 7a was fenced in 1996 and the site purchased in 1999. This property also contains another Critically Endangered plant, *Grevillea maccutcheonii*. An additional area of approximately 25 hectares was purchased by the Department with assistance from Environment Australia in 1999. This fenced area contains Population 1e of *Grevillea elongata* as well as an occurrence of the 'Southern Ironstone' community. A newly discovered occurrence of the critically endangered Southern Ironstone community is currently in the process of being purchased by the Department for conservation. This occurrence also contains a newly located population of this species.

Approximately 1800 seeds have been collected and stored in the Department's Threatened Flora Seed Centre (TFSC). The TFSC tests the viability of the seed initially, after one year in storage and again after five years. The initial germination rate ranged from 50% to 85%, and after one year in storage was 36% (unpublished data A. Cochrane[2]). The germinants produced through viability testing have been provided to the Botanic Gardens and Parks Authority (BGPA) for propagation.

The BGPA currently have 40 plants of *Grevillea elongata* from four clones, three of which were from seedling stock. The species generally does acceptably well from cuttings, with strike rates ranging from 33% to 73% (personal communication A. Shade[3]).

Weed control research has been conducted at Population 2 by the Department's Science Division. Two experimental treatments were examined; weed control in isolation, and weed control combined with disturbance.

Control of Bridal Creeper, a noxious weed, was undertaken near Population 3 in 1998.

Populations 1a to 1e, 2a to 2d and 7a have previously been sprayed with phosphite to combat *Phytophthora* infection. Treatment is likely to be continued on a biannual basis.

The removal of pine trees to a distance of 10 m around the perimeter of Population 6 has been commenced, reducing the competition for soil nutrients, water and sunlight. Monitoring suggests that this already having a positive effect in the areas cleared to date.

A fire response strategy has been prepared and incorporated into the Blackwood District's Fire Control Working Plan.

Staff from The Department's Blackwood District regularly monitor all populations of this species.

The South West Region Threatened Flora Recovery Team (SWRTFRT) 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

[2] Anne Cochrane, Manager, the Department's Threatened Flora Seed Centre
[3] Amanda Shade, Horticulturalist, Botanic Garden and Parks Authority

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

1. Coordinate recovery actions

The SWRTFRT will coordinate recovery actions for *Grevillea elongata* and other Declared Rare flora in the region. They 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 (Blackwood District) through the SWRTFRT
Cost: $400 per year

2. Map critical habitat

It is a requirement of the EPBC Act that spatial data relating to critical habitat be determined. Although critical habitat is described in Section 1, the areas as described have not yet been mapped and that will be done under this action. If any additional populations are located, then critical habitat will also be determined and mapped for these locations.

Action: Map critical habitat
Responsibility: The Department (Blackwood District, WATSCU) through the SWRTFRT
Cost: $2000 in the first year

3. Undertake weed control

Weeds are a serious threat to Populations 1, 2, 3 and 4, which are located on road, rail and drain reserves, Population 5, located on private land, and Population 1e which is on recently purchased land. Control will be by hand weeding or localised application of herbicide during the appropriate season to minimise the effect of herbicide on the species and the surrounding native vegetation. All applications of weed control will be followed by a report on the method, timing and success of the treatment, and the effect on *Grevillea elongata* and associated native plant species.

Action: Undertake weed control
Responsibility: The Department (Blackwood District, Science Division) through the SWRTFRT
Cost: $500 per year

4. Implement fire response strategy

Fire appears to kill adult plants of the species, and regeneration is likely to be largely from seed. Frequent fire may prevent the accumulation of sufficient soil stored seed to allow regeneration of the populations. Fire should therefore be prevented from occurring in the area of populations, except where it is being used experimentally as a recovery tool. A fire response strategy has been developed for this species, and incorporated into the Blackwood District's Fire Control Working Plan. Other fire fighting agencies will be informed of appropriate responses to fire threatening these sites. Firebreaks will continue to be maintained.

Action: Implement fire response strategy
Responsibility: The Department (Blackwood District) through the SWRTFRT
Cost: $1,000 per year

5. Cull pines

Population 6 occurs within a *Pinus radiata* plantation that was established in 1993. Many of the plants are experiencing stress or death possibly as a result of competition with the pines. *Phytophthora cinnamomi* has also been positively identified at Populations 6a and 6b. These populations are at risk from further plantation activities including fertiliser application, thinning and harvesting. Pines up to a distance of 10m surrounding

each subpopulation will be culled to reduce competition with *Grevillea elongata* plants. Regeneration will be monitored.

Action: Cull pines
Responsibility: The Department (Blackwood District, Science Division) and Forest Products Commission through the SWRTFRT
Cost: $3,400 in first year

6. Maintain disease hygiene

Dieback hygiene will be practiced for activities such as installation and maintenance of firebreaks and walking into the populations in wet soil conditions. The impact and spread of the disease will also be monitored and the need for disease control assessed

Action: Maintain disease hygiene and monitor disease
Responsibility: The Department (Blackwood District) through the SWRTFRT
Cost: $600 per year

7. Continue *Phytophthora* control

It is known that *Phytophthora cinnamomi* occurs within populations of *Grevillea elongata*. Research conducted between 1992 and 1997 indicates that phosphite application is a very effective tool in controlling the impact of dieback disease in a wide range of species (Murray 1997). Monitoring of disease status is ongoing, and where dieback is found to be active, selective (hand spraying) or broad-scale treatment with phosphite will be undertaken to provide some protection to the habitat, and to *Grevillea elongata*.

The impact of phosphite application on this species and its habitat will continue to be monitored, and this will also indicate the requirement for follow-up treatment.

Action: Continue *Phytophthora* control
Responsibility: The Department (Blackwood District, Dieback Disease Coordinator) through SWRTFRT
Cost: $2000 in third year for spraying, plus $500 per year for monitoring

8. Liaise with land managers

Staff from the Department's Blackwood District will continue to liaise with managers and owners of land on which populations of *Grevillea elongata* occur, and with managers of adjacent land. This will help prevent accidental damage or destruction of the plants.

Action: Liaise with land managers
Responsibility: The Department (Blackwood District) through the SWRTFRT
Cost: $500 per year

9. Monitor populations

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

Action: Monitor populations
Responsibility: The Department (Blackwood District) through the SWRTFRT
Cost: $800 per year

10. Conduct further surveys

Volunteers from the local community, Wildflower Societies, Naturalist Clubs and other community-based groups will be encouraged to undertake surveys for *Grevillea elongata*. Surveys will also be conducted

opportunistically by Departmental staff, particularly during the species' flowering period (September to November).

In addition, Population 8 is currently known only from a Herbarium specimen collected on 22 September 1983. The specimen was determined by P.M. Olde, who formally described this species. The location is not described exactly, and only approximate geographical coordinates are given. A targeted survey will be undertaken in the area during the species' flowering period.

Action: Conduct further surveys
Responsibility: The Department (Blackwood District) through the SWRTFRT
Cost: $1700 per year

11. 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. A small quantity of seed has been collected and stored in the Threatened Flora Seed Centre. Additional seed will be collected as possible. Cuttings will also be collected to enhance the living collection of genetic material at the Botanic Garden and Parks Authority.

Action: Collect seed and cutting material
Responsibility: The Department (Blackwood District, TFSC) and BGPA, through the SWRTFRT
Cost: $800 per year

12. Investigate the need for a translocation

The feasibility and benefits of conducting an experimental translocation on this species will be investigated, with the intention of examining 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*). Variables examined will include comparison of cuttings and seedlings as a source of propagation material, age of translocates, and watering regimes.

Action: Investigate the need for a translocation
Responsibility: The Department (Blackwood District, Science Division) through the SWRTFRT
Cost: $5,500 in the third year and $4,000 in the fifth year

13. Obtain biological and ecological information

Improved knowledge of the biology and ecology of *Grevillea elongata* will provide a better scientific basis for its management in the wild. An understanding of the following is particularly 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.
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.
5. The impact of dieback disease and control techniques on *Grevillea elongata* and its habitat.

Action: Obtain biological and ecological information
Responsibility: The Department (Science Division, Blackwood District) through the SWRTFRT
Cost: $15,600 per year in the second, third and fourth years

14. Promote awareness

The importance of biodiversity conservation and the need for the long-term protection of wild populations of this species 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.

Action: Promote awareness
Responsibility: The Department (Blackwood District) through the SWRTFRT
Cost: $200 per year

15. Review the need for a full Recovery Plan

This Interim Recovery Plan will operate from March 2003 to January 2008, when it will be reviewed, but will remain in force until withdrawn or replaced. If the species is ranked as Critically Endangered at that time a full Recovery Plan may be required.

Action: Review the need for further recovery actions and/or a full Recovery Plan
Responsibility: The Department (WATSCU, Blackwood District) through the SWRTFRT
Cost: $20,300 in the fifth year (if full Recovery Plan required)

4. TERM OF PLAN

This Interim Recovery Plan will operate from March 2003 to February 2008 but will remain in force until withdrawn or replaced. If the taxon is ranked Critically Endangered after five years, the need to review this IRP or to replace it with a full Recovery Plan will be determined.

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7. TAXONOMIC DESCRIPTION

Olde, P. M. and Marriott, N. R. (1995). *The Grevillea Book* 2: 142-143. Kangaroo Press, Kenthurst N.S.W.

Shrub 1.5-2 m high, 2-2.5 m wide. **Branchlets** red, erect, glabrous or sparsely silky, terete with longitudinal ribbing. **Leaves** 2.5-5 cm long, glabrous, divaricately tripartite to pinnatipartite, sometimes with some or all lobes again bi- or tri-partite, sessile or shortly petiolate, the first lobe 12-30 mm from leaf base; leaf lobes often of uneven length, 5-30 mm long, c. 0.8 mm wide, subulate, trigonous, pungent; upper surface smooth, venation obscure; lower surface, bisulcate with midvein prominent; texture firmly papery to leathery. **Conflorescence** terminal or axillary, sessile or shortly pedunculate, simple or few-branched; unit conflorescence 2-5.5 cm long, open, cylindrical; development acropetal; peduncle tomentose; rachis c. 1 mm wide, sometimes sparsely pubescent at the base, otherwise glabrous; bracts 2.8-3.4 mm long, 3-4 mm wide, imbricate, ovate, glabrous except ciliate margin, persistent almost to anthesis; pedicels 2.2-3.2 mm long, glabrous; torus 0.3 mm wide, oblique at c. 10-15º. **Flower colour:** perianth and style white throughout, the bracts cream. **Flowers** glabrous; **perianth** 3.5 mm long, 0.5 mm wide, actinomorphic, oblong-obovate constricted below limb, erect; all tepals separating and rolling back at anthesis; limb 1 mm long, 1.2 mm wide; **pistil** 4.5 mm long; stipe 1.2 mm long, flexuose, filamentous; ovary 1 mm long, globose; style constricted just above ovary, dilating abruptly to 0.5 mm thick, gradually tapering to 0.3 mm wide at base of pollen presenter; pollen presenter 0.7 mm high 0.4 mm wide at base, erect with base slightly oblique, faintly rimmed, truncate-conical to subcylindrical. **Fruit** 8 mm long, 3.5 mm wide, 4 mm deep, oblique, rugulose; pericarp 0.2 mm thick at centre face of the suture. **Seed** not seen.