

INTERIM RECOVERY PLAN NO. 292

**Bodallin Poison**  
*(Gastrolobium diabolophyllum)*

**INTERIM RECOVERY PLAN**  
**2009-2014**



November 2009  
Department of Environment and Conservation  
Kensington



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.

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.

DEC is committed to ensuring that Threatened taxa are conserved through the preparation and implementation of Recovery Plans (RPs) or IRPs, and 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This plan will operate from July 2009 to June 2014 but will remain in force until withdrawn or replaced. It is intended that, if the taxon is still ranked as Critically Endangered (CR), this IRP will be reviewed after five years and the need for further recovery actions assessed.

This IRP was given regional approval on 24 September 2009 and was approved by the Director of Nature Conservation on 2 November 2009. The provision of funds identified in this IRP is dependent on budgetary and other constraints affecting DEC, as well as the need to address other priorities.

Information in this IRP was accurate at November 2009.

## IRP PREPARATION

This IRP was prepared by Robyn Luu<sup>1</sup> and Andrew Brown<sup>2</sup>.

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## ACKNOWLEDGMENTS

The following people provided assistance and advice in the preparation of this IRP:

Andrew Crawford	Principal Technical Officer, DEC Threatened Flora Seed Centre
Ben Lullfitz	Flora Conservation Officer, DEC Yilgarn District
Amanda Shade	Assistant Curator (Nursery), Botanic Gardens and Parks Authority

Thanks also to the staff of the W.A. Herbarium for providing access to Herbarium databases and specimen information, and DEC's Species and Communities Branch for assistance.

Cover photograph by Wendy Johnston.

## CITATION

This IRP should be cited as:

Department of Environment and Conservation (2009) Bodallin Poison (*Gastrolobium diabolophyllum*) Interim Recovery Plan 2009-2014. Interim Recovery Plan No.292 Department of Environment and Conservation, Western Australia.

**SUMMARY**

<b>Scientific Name:</b>	<i>Gastrolobium diabolophyllum</i>	<b>Common Name:</b>	Bodallin Poison
<b>Family:</b>	Papilionaceae	<b>Flowering Period:</b>	September
<b>DEC Region:</b>	Wheatbelt	<b>DEC District:</b>	Yilgarn
<b>Shire:</b>	Yilgarn	<b>NRM Region:</b>	Avon
<b>Recovery Team:</b>	Yilgarn District Threatened Flora and Communities Recovery Team (YDTFCRT)		

**Illustrations and/or further information:** Chandler, G.T., Crisp, M.D., Cayzer, L.W. and Bayer, R.J. (2002) Monograph of *Gastrolobium* (Fabaceae: Mirbelieae). *Australian Systematic Botany* 15, 619-739; Lullfitz, B.R., Konnur, A., Alderton, J., Jolliffe, D. S. and Squire, M. (2008) *Threatened and Poorly Known Flora of the Yilgarn Region*. Department of Environment and Conservation, Western Australia; Western Australian Herbarium (1998-) *FloraBase – The Western Australian Flora*. Department of Environment and Conservation. <http://florabase.dec.wa.gov.au/>.

**Current status:** *Gastrolobium diabolophyllum* was declared as Rare Flora under the Western Australian *Wildlife Conservation Act 1950* in April 2002 and is currently ranked as Critically Endangered (CR) under World Conservation Union (IUCN 2001) criteria B1ab(iv); C2a(ii) due to the extent of occurrence being less than 100km<sup>2</sup>, and a continuing decline in the number of locations and mature individuals. The main threats to the species are road and firebreak maintenance, weeds, lack of associated natural vegetation, grazing and trampling, inappropriate fire regimes, poor recruitment and rabbits. The species is listed as CR under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999).

**Description:** *Gastrolobium diabolophyllum* is an open shrub to 1.5 m high. The leaves are opposite, obtriangular and have three pungent points. The flowers are orange to orange-yellow with a red ring surrounding the yellow centre.

**Habitat requirements:** *Gastrolobium diabolophyllum* is found south of Bodallin, growing in yellow-brown sand over laterite in open mallee shrubland.

**Habitat critical to the survival of the species, and important populations:** As *Gastrolobium diabolophyllum* is listed as threatened, it is considered that all known habitat for wild populations is critical to the survival of the species, and that all wild populations are important populations. Habitat critical to the survival of *G. diabolophyllum* includes the area of occupancy of populations, areas of similar habitat surrounding and linking populations (these providing potential habitat for population expansion and for pollinators), additional occurrences of similar habitat that may contain undiscovered populations of the species or be suitable for future translocations, and the local catchment for the surface and/or groundwater that maintains the habitat of the species.

**Benefits to other species or ecological communities:** Recovery actions implemented to improve the quality or security of the habitat of *Gastrolobium diabolophyllum* will also improve the status of associated native vegetation. One DRF species and three Priority flora taxa occur in association with *G. diabolophyllum*.

**International obligations:** Although 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, *Gastrolobium diabolophyllum* is not listed under any specific international treaty and this IRP does not affect Australia's obligations under any other international agreements.

**Indigenous Consultation:** As the Aboriginal Sites Register maintained by the Department of Indigenous Affairs does not list any significant sites in the vicinity of populations of *Gastrolobium diabolophyllum*, input and involvement is being 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. As this is not expected to be completed before the approval of the IRP, further consultation has been included as a recovery action to ensure there has been Indigenous engagement in relation to the recovery actions posed in this plan.

**Social and economic impacts:** As both known populations of *Gastrolobium diabolophyllum* occur on private property their protection may potentially affect development and asset protection measures in these areas.

**Affected interests:** The protection of the species may potentially impact on Shire operations and private landholder activities.

**Evaluation of the Plan's Performance:** The DEC in conjunction with the Yilgarn District Threatened Flora and Communities Recovery Team (YDTFCRT) will evaluate the performance of this IRP. 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:

1. Appropriate people have been made aware of the existence of this species and its locations.
2. Surveys of reserves and road verges near known populations of *Gastrolobium diabolophyllum* were undertaken by DEC staff during the 2000 flowering season.
3. Declared Rare Flora (DRF) markers have been installed at Subpopulation 1a.
4. In December 2001, 148 seeds of *Gastrolobium diabolophyllum* were collected from Population 1 and stored in DEC's Threatened Flora Seed Centre (TFSC) at -18°C.
5. In September 2007, a 'Have you seen this plant?' postcard was developed by DEC Yilgarn District staff and sent to land holders in the Shire of Yilgarn.
6. Staff from DEC's Yilgarn District regularly monitor populations of *Gastrolobium diabolophyllum*.
7. The YDTFCRT is overseeing the implementation of this IRP and will include information on progress in its annual report to DEC's Corporate Executive and funding bodies.

**IRP Objective:** The objective of this IRP 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 populations have increased and/or the number of mature individuals have increased by ten percent or more over the term of the plan.

**Criteria for failure:** The number of populations have decreased and/or the number of mature individuals have decreased by ten percent or more over the term of the plan.

### Recovery actions

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|---|--|
| 1. Coordinate recovery actions  | 11. Conduct further surveys  |
| 2. Map habitat critical to the survival of <i>Gastrolobium diabolophyllum</i>             | 12. Develop and implement a fire management strategy                 |
| 3. Liaise with relevant Indigenous groups   | 13. Develop and implement disturbance trials                         |
| 4. Assess the need for DRF markers along firebreaks and install if necessary              | 14. Achieve long-term protection of habitat                          |
| 5. Undertake weed control and follow up with additional control if required               | 15. Liaise with relevant land managers                               |
| 6. Assess the need for fencing Subpopulation 1a and Population 2 and install if necessary | 16. Promote awareness  |
| 7. Conduct habitat rehabilitation   | 17. Obtain biological and ecological information                     |
| 8. Collect seed and other material to preserve genetic diversity                          | 18. Start the translocation process if necessary                     |
| 9. Monitor populations  | 19. Review this IRP and assess the need for further recovery actions |
| 10. Implement rabbit control if necessary   |  |

## 1. BACKGROUND

### History

The accumulation of the highly toxic monofluoroacetic acid (1080) in *Gastrolobium* species has resulted in the past poisoning of stock and, as a consequence, lead to a *Gastrolobium* eradication program, particularly in the Wheatbelt region of Western Australia. This may have resulted in the rareness of many *Gastrolobium* species today (Chandler *et al.* 2002).

*Gastrolobium diabolophyllum* has been collected from two sites within 10 km of one other. The first collection was made by R. Cranfield in 1982 (Population 1) and the second, also in 1982, by A. Strid, (Population 2). The second population was not seen again until 2006 when relocated by consultants surveying fire access tracks for DEC Yilgarn District. These two populations together contain 3085 mature individuals.

Surveys of reserves and road verges near known populations during the 2000 flowering season, failed to locate any new populations of *Gastrolobium diabolophyllum*.

### Description

*Gastrolobium diabolophyllum* is an open, robust shrub, to 1.5 m high. The leaves are opposite, obtriangular and have three pungent points. The flowers are orange to orange-yellow with a red ring surrounding the yellow centre. The name *diabolophyllum* comes from the Greek *diabolos* (devil) and *phyllon* (leaf), which refers to the extremely pungent points (Chandler *et al.* 2002).

The species vegetatively resembles some juvenile forms of *Gastrolobium polystachyum*, but is distinguished by its more robust leaves that are strongly recurved and have three pungent points, compared to juvenile forms of *G. polystachyum* which have weak leaves that are not recurved (Chandler *et al.* 2002).

### Distribution and habitat

*Gastrolobium diabolophyllum* is known from south of Bodallin some 290 km east-north-east of Perth where it grows in open mallee shrubland on broadly undulating dunes in yellow-brown sand over laterite (Chandler *et al.* 2002). Associated species include *Eucalyptus sheathiana*, *Allocasuarina acutivalvis*, *Acacia rossei*, *Boronia ternata* var. *foliosa*, *Calytrix leschenaultii*, *Chamelaucium pauciflorum*, *C. megalopetalum*, *C. naviculum*, *Banksia rufa*, *B. sphaerocarpa*, *Philotheca thryptomenoides*, *Hakea francisiana*, *Verticordia chrysantha*, *Grevillea biformis* subsp. *biformis*. The extent of occurrence is approximately 10 km<sup>2</sup>.

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

Pop. No. & Location	DEC District	Shire	Vesting	Purpose	Manager
<b>1A. S of Bodallin</b>	Yilgarn	Yilgarn	Shire of Yilgarn	Road Reserve	Shire of Yilgarn
<b>1B. S of Bodallin</b>	Yilgarn	Yilgarn	Freehold	Private Property	Landowners
<b>2A. S of Bodallin</b>	Yilgarn	Yilgarn	Conservation Commission of WA	Conservation of Flora and Fauna	DEC
<b>2B. S of Bodallin</b>	Yilgarn	Yilgarn	Freehold	Private Property	Landowners
<b>2C. S of Bodallin</b>	Yilgarn	Yilgarn	Freehold	Private Property	Landowners

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

### Biology and ecology

There is little known about the biology and ecology of *Gastrolobium diabolophyllum*, and recovery actions refer to a need for research.

Based on plants germinating following roadside grading, it is presumed that *Gastrolobium diabolophyllum* is a disturbance opportunist, regenerating from soil-stored seed.

### Threats

*Gastrolobium diabolophyllum* was declared as Rare Flora under the Western Australian *Wildlife Conservation Act 1950* in April 2002 and is currently ranked as Critically Endangered (CR) under World Conservation Union (IUCN 2001) criteria B1ab(iv); C2a(ii) due to the extent of occurrence being less than 100km<sup>2</sup>, and a continuing decline in the number of locations and mature individuals. The main threats to the species are road and firebreak maintenance activities, weeds, lack of associated vegetation, grazing and trampling, inappropriate fire regimes, lack of recruitment and rabbits. The species is listed as CR under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999).

- **Road and firebreak maintenance activities** threaten populations and associated habitat. Threats include actions such as grading road reserves and firebreaks, spraying of chemicals, construction and maintenance of drainage channels and mowing the roadside vegetation to improve visibility. As well as direct damage to plants these disturbance events often encourage weed invasion into adjacent habitat.
- **Weeds** are a threat to Population 2 of *Gastrolobium diabolophyllum*. Weeds suppress early plant growth by competing for soil moisture, nutrients and light. They also increase the fire hazard due to the easy ignition of high fuel loads, which are produced annually by many grass weed species.
- **Lack of associated vegetation:** Subpopulations 2b and 2c occur in a mostly cleared paddock which contains very little associated native vegetation.
- **Grazing and trampling** is a potential threat to Subpopulations 2b and 2c on private property. The plants are not currently fenced and it is not certain whether the area is or will be accessed by livestock. Livestock can impact plants by grazing and trampling, as well as introducing weeds and degrading supporting habitat.
- **Inappropriate fire regimes** is a potential threat to all populations. Although fire is thought to be needed for recruitment, frequent fire is likely to facilitate weed invasion resulting in degradation of habitat.
- **Lack of recruitment** is a threat to all populations.
- **Rabbits** (*Oryctolagus cuniculus*) are a potential threat to populations. Digging, erosion, the addition of nutrients and introduction of weed seeds result from rabbit activity.

The intent of this plan is to provide actions that will deal with immediate threats to *Gastrolobium diabolophyllum*. 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	Threats
1A. S of Bodallin	Shire Road Reserve	1999 158 (34) 2000 158 (34) 2001 130 2006 203 (20) [10] 2007 221 (1) [1] 2008 215 (5)	Healthy	Road and firebreak maintenance, rabbits, inappropriate fire regimes
1B. S of Bodallin	Private Property	2006 15 2007 15	Healthy	Firebreak maintenance, inappropriate fire regimes
2A. S of Bodallin	Nature Reserve	2006 40 (23) 2008 2779	Healthy	Firebreak maintenance, rabbits, inappropriate fire regimes
2B. S of Bodallin	Private Property	2008 21	Healthy	Firebreak maintenance, weeds, rabbits, lack of associated vegetation, inappropriate fire regimes, grazing and trampling
2C. S of Bodallin	Private Property	2006 3 2008 55	Healthy	Firebreak maintenance, weeds, rabbits, lack of associated vegetation, inappropriate fire regimes, grazing and trampling

Note: ( ) = number of seedlings; [ ] = number of dead.

### Guide for decision-makers

Section 1 provides details of current and possible future threats. Development and/or land clearing in the immediate vicinity of *Gastrolobium diabolophyllum* will require assessment. On-ground works should not be approved unless the proponents can demonstrate that their actions will have no significant negative impact on the species, its habitat or potential habitat or on the local surface hydrology, such that drainage in the habitat of the species would be altered.

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

Given that *Gastrolobium diabolophyllum* is listed as threatened, it is considered that all known habitat for wild populations is critical to the survival of the species, and that all wild populations are important populations. Habitat critical to the survival of *G. diabolophyllum* includes the area of occupancy of populations, areas of similar habitat surrounding and linking populations (these providing potential habitat for population expansion and for pollinators), additional occurrences of similar habitat that may contain undiscovered populations of the species or be suitable for future translocations, and the local catchment for the surface and/or groundwater that maintains the habitat of the species.

### Benefits to other species or ecological communities

Recovery actions implemented to improve the quality or security of the habitat of *Gastrolobium diabolophyllum* will also improve the status of associated native vegetation. One threatened (Vulnerable), and three Priority flora taxa occur in association with *G. diabolophyllum*. These taxa are listed in the table below:

**Table 3. Conservation-listed flora species occurring in habitat of *Gastrolobium diabolophyllum***

Species name	Conservation Status (WA)	Conservation Status (EPBC Act 1999)
<i>Banksia sphaerocarpa</i> var. <i>dolichostyla</i>	Vulnerable	Vulnerable
<i>Hibbertia chartacea</i>	Priority 2	
<i>Hibbertia glabriuscula</i>	Priority 2	
<i>Verticordia mitodes</i>	Priority 3	

For a description of the Priority categories see Atkins (2008).

No Threatened Ecological Communities (TECs) occur in association with the species.

### International obligations

Although 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, *Gastrolobium diabolophyllum* is not listed under any specific international treaty and this IRP does not affect Australia's obligations under any other international agreements.

### Indigenous Consultation

As the Aboriginal Sites Register maintained by the Department of Indigenous Affairs does not list any significant sites in the vicinity of populations of *Gastrolobium diabolophyllum*, input and involvement is being 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. As this is not expected to be completed before the approval of the IRP, further consultation has been included as a recovery action to ensure there has been Indigenous engagement in relation to the recovery actions posed in this plan.

### Social and economic impacts

As Population 2 and part of Population 1 occur on private property the protection of *Gastrolobium diabolophyllum* may potentially affect development and asset protection measures on these sites.

### Affected interests

The protection of the species may potentially impact on Shire operations and private landholder activities.

### Evaluation of the Plan's Performance

The DEC in conjunction with the Yilgarn District Threatened Flora and Communities Recovery Team (YDTFCRT) will evaluate the performance of this IRP. 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 Interim Recovery Plan (IRP) is to abate identified threats and maintain or enhance *in situ* populations to ensure the long-term preservation of the species in the wild.

**Criterion for success:** The number of populations have increased and/or the number of mature individuals have increased by ten percent or more over the term of the plan.

**Criterion for failure:** The number of populations have decreased and/or the number of mature individuals have decreased by ten percent or more over the term of the plan.

## 3. RECOVERY ACTIONS

### Existing recovery actions

Private property owners and the Shire of Yilgarn have been notified about populations of *Gastrolobium diabolophyllum* that occur on lands that they manage or own. These notifications detailed the Declared Rare status of the species and the associated legal obligations.

Surveys of reserves and road verges near known populations of *Gastrolobium diabolophyllum* were undertaken by DEC staff during the 2000 flowering season. No new populations however were located.

Declared Rare Flora (DRF) markers have been installed at Subpopulation 1a. These serve to alert people working in the vicinity to the presence of the DRF and the need to avoid work that may damage plants or their habitat.

In December 2001, 148 seeds of *Gastrolobium diabolophyllum* were collected from Population 1 and stored in DEC's Threatened Flora Seed Centre (TFSC) at  $-18^{\circ}\text{C}$ . The TFSC test the viability of the seed initially and after one year in storage. The initial germination rate only of *G. diabolophyllum* seed has been tested and was found to be 100%.

In September 2007, a 'Have you seen this plant?' postcard was developed by DEC Yilgarn District staff and sent to land holders in the Shire of Yilgarn.

DEC staff from Yilgarn District regularly monitor populations of the species.

The YDTFCRT is overseeing the implementation of this IRP and will include 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 appropriate owners/land managers prior to recovery actions 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 YDTFCRT will oversee the implementation of the recovery actions for *Gastrolobium diabolophyllum* and will include information on progress in its annual report to DEC's Corporate Executive and funding bodies.

**Action:** Coordinate recovery actions

**Responsibility:** DEC (Yilgarn District) through the YDTFCRT



**Cost:** \$3,000 per year

## 2. Liaise with relevant Indigenous groups

*Gastrolobium diabolophyllum* may occur in habitat that is culturally sensitive and Indigenous consultation will take place to determine if there are any issues or interests.

**Action:** Liaise with relevant Indigenous groups  
**Responsibility:** DEC (Yilgarn District) through the YDTFCRT  
**Cost:** \$1,500 in the first year

## 3. Map habitat critical to the survival of *Gastrolobium diabolophyllum*

It is a requirement of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC) that spatial data relating to habitat critical to the survival of listed species be determined. Although habitat critical to the survival of *Gastrolobium diabolophyllum* is alluded to in Section 1, it has not yet been 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 *Gastrolobium diabolophyllum*  
**Responsibility:** DEC (SCB, Yilgarn District) through the YDTFCRT  
**Cost:** \$3,000 in year 1

## 4. Assess the need for DRF markers along firebreaks and install if necessary

Due to the frequent grading of populations along firebreaks, DRF markers may need to be installed to alert workers to the species.

**Action:** Assess the need for DRF markers along firebreaks and install if necessary  
**Responsibility:** DEC (Yilgarn District) through the YDTFCRT  
**Cost:** \$1,000 in year 1

## 5. Undertake weed control and follow up with additional control if required

Weeds threaten both populations and control is required. The following actions will be implemented:

1. Determine which weeds are present.
2. Select appropriate technique; herbicide, mowing or hand weeding.
3. Control invasive weeds by hand removal and/or spot spraying around *Gastrolobium diabolophyllum* plants when weeds first emerge.
4. Monitor the success of the treatment on weed death, and the tolerance of *Gastrolobium diabolophyllum* and associated native plant species to the treatment.
5. Report on the method and success of the treatment, and effect on *Gastrolobium diabolophyllum* plants and associated species.

**Action:** Undertake weed control and follow up with additional control if required  
**Responsibility:** DEC (Yilgarn District, Science Division) through the YDTFCRT  
**Cost:** \$2,000 per year, as required

## 6. Assess the need for fencing at Subpopulation 1a and Population 2 and install if necessary

If fencing is required for Subpopulation 1a and Population 2 on private property, an agreement with the owners will be sought. A buffer of surrounding land will also be included to protect *Gastrolobium diabolophyllum* from potential grazing and other disturbances.

**Action:** Assess the need for fencing Subpopulation 1a and Population 2 and install if necessary  
**Responsibility:** DEC (Yilgarn District) through the YDTFCRT

**Cost:** \$6,000 in first year

## 7. Conduct habitat rehabilitation

Restoration of *Gastrolobium diabolophyllum* habitat by re-introduction of endemic plant species will be undertaken at Population 2.

**Action:** Conduct habitat rehabilitation  
**Responsibility:** DEC (Yilgarn District) through the YDTFCRT  
**Cost:** \$3,000 in years 1, 2 and 3

## 8. Collect seed and other material to preserve genetic diversity

Some seed has already been collected from Population 1. Further collections by DEC's TFSC are required from both populations to ensure the genetic diversity of the species is captured. Cuttings will also be collected to establish a living collection of genetic material.

**Action:** Collect seed and other material to preserve genetic diversity  
**Responsibility:** DEC (Yilgarn District, TFSC), BGPA through the YDTFCRT  
**Cost:** \$2,500 per year

## 9. Monitor populations

Monitoring of factors such as weed invasion, habitat degradation, hydrology (salinity), population stability (expansion or decline), pollinator activity, seed production, recruitment, and longevity is essential. Populations will be inspected annually.

**Action:** Monitor populations  
**Responsibility:** DEC (Yilgarn District) through the YDTFCRT  
**Cost:** \$3,500 per year

## 10. Implement rabbit control if necessary

The level of threat posed by rabbits may vary from year to year with conditions and numbers. When monitoring ascertains the threat is high, control measures may be required. Baiting using 1080 oats should be undertaken in summer months when less green feed is available as an alternative food source.

**Action:** Implement rabbit control if necessary  
**Responsibility:** DEC (Yilgarn District) through the YDTFCRT; relevant land managers  
**Cost:** \$3,000 in first, third and fifth years

## 11. Conduct further surveys

It is recommended that areas of suitable habitat, in particular Nature Reserve 28940 and private land adjacent to Populations 1 and 2, be surveyed for the presence of *Gastrolobium diabolophyllum* during its flowering period in September.

All surveyed areas will be recorded and the presence or absence of the species documented to increase survey efficiency and reduce unnecessary duplicate surveys. Where possible, volunteers from the local community, Landcare groups, wildflower societies and naturalists clubs will be encouraged to become involved.

**Action:** Conduct further surveys  
**Responsibility:** DEC (Yilgarn District) through the YDTFCRT  
**Cost:** \$3,000 in years 1, 3 and 5

## 12. Develop and implement a fire management strategy

Fire will be prevented from occurring in the habitat of populations, except where it is being used experimentally as a recovery tool. A fire management strategy will be developed that recommends fire frequency, intensity, season, and control measures.

**Action:** Develop and implement a fire management strategy  
**Responsibility:** DEC (Yilgarn District) through the YDTFCRT  
**Cost:** \$2,500 in first year and \$1,000 in subsequent years

### 13. Develop and implement disturbance trials

Suitable natural disturbance events (physical or fire) may be the most effective means of germinating *Gastrolobium diabolophyllum* seed in the wild. Different disturbance techniques should be investigated (i.e. soil disturbance and fire), to determine the most successful and appropriate method. Records will need to be maintained for future research.

**Action:** Develop and implement disturbance trials  
**Responsibility:** DEC (Science Division, Yilgarn District) through the YDTFCRT  
**Cost:** \$3,400 in years 1 and 3, \$700 in years 2, 4 and 5

### 14. Achieve long-term protection of habitat

Ways and means of improving the security of the area of private land containing Subpopulation 1b will be investigated.

**Action:** Achieve long-term protection of habitat  
**Responsibility:** DEC (Yilgarn District) through the YDTFCRT  
**Cost:** \$1,500 per year

### 15. Liaise with relevant land managers

Staff from DEC's Yilgarn District will liaise with land managers to ensure that populations of *Gastrolobium diabolophyllum* are not damaged or destroyed.

**Action:** Liaise with relevant land managers  
**Responsibility:** DEC (Yilgarn District) through the YDTFCRT  
**Cost:** \$500 per year

### 16. Promote awareness

The importance of biodiversity conservation and the protection of *Gastrolobium diabolophyllum* will be promoted to the public. This will be achieved through an information campaign using local print and electronic media and by setting up poster displays. An information sheet that includes photos, a description of the plant, its habitat type, threats and management actions will be produced. Formal links with local naturalist groups and interested individuals will also be encouraged.

**Action:** Promote awareness  
**Responsibility:** DEC (Yilgarn District, Species and Communities Branch (SCB), Strategic Development and Corporate Affairs Division) through the YDTFCRT  
**Cost:** \$1,600 in year 1 and \$1,000 in years 2-5

### 17. Obtain biological and ecological information

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

1. Study of the soil seed bank dynamics and the role of various factors including disturbance, competition, drought, inundation 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.
5. The impact of changes in hydrology on the species and its habitat.

**Action:** Obtain biological and ecological information  
**Responsibility:** DEC (Science Division, Yilgarn District) through the YDTFCRT  
**Cost:** \$10,000 per year

#### 18. Start the translocation process if necessary

If surveys fail to locate new populations, translocation may be deemed necessary for the conservation of this species. A translocation proposal will be developed and suitable translocation sites selected. 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). All translocation proposals require endorsement by DEC's Director of Nature Conservation. Monitoring of translocations is essential and will be included in the timetable developed for the Translocation Proposal.

**Action:** Start the translocation process if necessary  
**Responsibility:** DEC (Yilgarn District) through the YDTFCRT  
**Cost:** \$2,200 in year 5

#### 19. Review this IRP and assess the need for further recovery actions

If *Gastrolobium diabolophyllum* is still listed as threatened at the end of the five-year term of this IRP, the need for further recovery actions, or a review of this IRP will be assessed and a revised plan prepared if necessary.

**Action:** Review this IRP and assess the need for further recovery actions  
**Responsibility:** DEC (SCB, Yilgarn District) through the YDTFCRT  
**Cost:** \$2,000 in year 5

**Table 4. Summary of Recovery Actions**

Recovery Action	Priority	Responsibility	Completion Date
Coordinate recovery actions	High	DEC (Yilgarn District) through the YDTFCRT	Ongoing
Liaise with relevant Indigenous groups	High	DEC (Yilgarn District) through the YDTFCRT	2010
Map habitat critical to the survival of <i>Gastrolobium diabolophyllum</i>	High	DEC (SCB, Yilgarn District) through the YDTFCRT	2010
Assess the need for DRF markers along firebreaks and install if necessary	High	DEC (Yilgarn District) through the YDTFCRT	2010
Undertake weed control and follow up with additional control if required	High	DEC (Yilgarn District) through the YDTFCRT	Ongoing
Assess the need for fencing Subpopulation 1a and Population 2 and install if necessary	High	DEC (Yilgarn District) through the YDTFCRT	2010
Conduct habitat rehabilitation	High	DEC (Yilgarn District) through the YDTFCRT	2012
Collect seed and other material to preserve genetic diversity	High	DEC (Yilgarn District, TFSC), BGPA through the YDTFCRT	2014
Monitor populations	High	DEC (Yilgarn District) through the YDTFCRT	Ongoing
Implement rabbit control if necessary	High	DEC (Yilgarn District) through the YDTFCRT; relevant land managers	Ongoing
Conduct further surveys	High	DEC (Yilgarn District) through the YDTFCRT	Ongoing
Develop and implement a fire management strategy	High	DEC (Yilgarn District) through the YDTFCRT	Developed by 2010 with implementation ongoing
Develop and implement disturbance trials	High	DEC (Science Division, Yilgarn District) through the YDTFCRT	2014

Achieve long-term protection of habitat	High	DEC (Yilgarn District) through the YDTFCRT	Ongoing
Liaise with relevant land managers	High	DEC (Yilgarn District) through the YDTFCRT	Ongoing
Promote awareness	Medium	DEC (Yilgarn District, SCB, and Strategic Development and Corporate Affairs Division) through the YDTFCRT	Ongoing
Obtain biological and ecological information	Medium	DEC (Science Division, Yilgarn District) through the YDTFCRT	2014
Start the translocation process if necessary	Medium	DEC (Yilgarn District) through the YDTFCRT	2014
Review this IRP and assess the need for further recovery actions	Medium	DEC (SCB, Yilgarn District) through the YDTFCRT	2014

#### 4. TERM OF PLAN

This IRP will operate from July 2009 to June 2014 but will remain in force until withdrawn or replaced. If the species is still listed as threatened after five years, the need for further recovery actions will be determined.

#### 5. REFERENCES

- Atkins, K. (2008) *Declared Rare and Priority Flora List for Western Australia*. Department of Environment and Conservation, Perth, Western Australia.
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- Conservation and Land Management (1992) Policy Statement No. 44 *Wildlife Management Programs*. Department of Conservation and Land Management, Western Australia.
- 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.
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- Lullfitz, B.R., Konnur, A., Alderton, J., Jolliffe, D. S. and Squire, M. (2008) *Threatened and Poorly Known Flora of the Yilgarn Region*. Department of Environment and Conservation, Western Australia.
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- World Conservation Union (2001) *IUCN Red List Categories: Version 3.1*. Prepared by the IUCN Species Survival Commission. IUCN, Gland, Switzerland and Cambridge, UK.

#### 6. TAXONOMIC DESCRIPTION

##### *Gastrolobium diabolophyllum*

Chandler, G.T., Crisp, M.D., Cayzer, L.W. and Bayer, R.J. (2002) Monograph of *Gastrolobium* (Fabaceae: Mirbelieae). *Australian Systematic Botany* 15, 619-739.

Erect, open, robust *shrubs*, 0.5–1.5 m high. *Branchlets* ascending, terete, moderately to densely sericeous. *Petioles* terete, continuous but not decurrent with the branchlet, 2–3 mm long. *Leaves* spreading to ascending, opposite, obtriangular to broadly so, rarely shallowly obtriangular, 12–26 x 10–32 mm, glabrous, occasionally somewhat glaucous; venation prominently reticulate, particularly on the upper surface; apex acute, rarely obtuse, recurved, all three angles with pungent points; margins entire, recurved to revolute; base rounded to cuneate. *Stipules* erect, triangular to hyaline, 1.5–2 mm long. *Inflorescences* terminal racemes, 5–10-flowered; *peduncle* 2–11 mm long; *rachis* 3–7 mm long; *subtending bracts* caducous, scale-like, entire to slightly trilobed, ovate, keeled, 3.5–4 mm long, moderately pubescent. *Pedicels* densely pubescent, 1.5–2 mm long. *Calyx* slightly campanulate, *c.* 5 mm long including 0.75–1-mm receptacle, moderately to densely pubescent, lobes all reflexed; upper 2 lobes united higher than the lower 3 into an almost truncate lip, broadly triangular, 1.5–2 mm long; lower 3 lobes triangular, acute, *c.* 1.5 mm long. *Corolla*: *standard* transversely ovate, 7–8 x 10.5–12 mm

including the 2.5–3-mm claw, orange to orange-yellow with a red ring surrounding the yellow centre, apex emarginate, base cordate, auriculate; *wings* obovate, 7–7.5 x 2.5–3 mm including the 2.5–3-mm claw, orange, becoming darker towards the base, apex rounded, incurved and overlapping to enclose the keel, base auriculate on both margins, saccate; *keel* half transversely broadly elliptic, turgid, margins incurved, 5.5–6 x 2–2.5 mm including the 2–2.5-mm claw, pink, apex obtuse, spout-like, base auriculate, saccate, with a circular opening near claws to expose the stamens from below. *Style* short, incurved, lower half pubescent; *ovary* stipitate, densely pubescent; *ovules* 2. *Pod* stipitate, ovoid, 5–6 x c. 3.5 mm, moderately to densely pubescent. *Seed* ellipsoid, c. 3 mm long, arillate.

