

# Orange-Flowered Wattle

## *(Acacia auratiflora)*

### RECOVERY PLAN



Department of Environment and Conservation  
Kensington

## 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.

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 IRP replaces IRP 23, prepared by Gillian Stack and Andrew Brown in 1999.

This IRP will operate from April 2008 to March 2013 but will remain in force until withdrawn or replaced. It is intended that, if the species is still ranked as Vulnerable (VU) at the end of the five-year term, this IRP will be reviewed and the need for further recovery actions assessed.

This IRP was approved by the Director of Nature Conservation on the 30 April 2008. 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 April 2008.

This IRP 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).

## IRP PREPARATION

This IRP was prepared by Craig Douglas<sup>1</sup>, Bethea Loudon<sup>2</sup> and Kym Pryor<sup>3</sup>.

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## ACKNOWLEDGMENTS

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

Andrew Crawford	Technical Officer, DEC's Threatened Flora Seed Centre
Bob Elkins	Technical Assistant, Botanic Gardens and Parks Authority
Amanda Shade	Assistant curator of displays and development, Botanic Gardens and Parks Authority
Andrew Brown	Threatened Flora Coordinator, Species and Communities Branch, DEC

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 Diana Papenfus.

## CITATION

Department of Environment and Conservation (2009). Orange-Flowered Wattle (*Acacia auratiflora*) Recovery Plan . Commonwealth Department of the Environment, Water, Heritage and the Arts, Canberra

## SUMMARY

<b>Scientific Name:</b>	<i>Acacia auratiflora</i>	<b>Common Name:</b>	Orange-Flowered Wattle
<b>Family:</b>	Mimosaceae	<b>Flowering Period:</b>	Late June - August
<b>DEC Region:</b>	Wheatbelt	<b>DEC District:</b>	Great Southern
<b>Shire:</b>	Lake Grace	<b>Recovery Team:</b>	Great Southern District Threatened Flora Recovery Team.

**Illustrations and/or further information:** Atkins, K. (2008) *Declared Rare and Priority Flora List for Western Australia*. Department of Environment and Conservation, Western Australia; Brown, A., Thompson-Davies, C. and Marchant, N. (1998). *Western Australia's Threatened Flora*. Department of Conservation and Land Management, Western Australia. Pp 61. Cowan, R.S. and Maslin, B.R. (1999). *Acacia miscellany 17. Miscellaneous new taxa and lectotypifications in Western Australian Acacia, mostly section Plurinerves (Leguminosae: Mimosoideae)*. *Nuytsia* **12(3)**: 413-452. Western Australian Herbarium (2007) *FloraBase 2 – Information on the Western Australian Flora*. Department of Environment and Conservation, Western Australia. <http://florabase.dec.wa.gov.au>.

**Analysis of outputs and effectiveness of Interim Recovery Plan (IRP) 23 (1999-2002)** prepared by G. Stack and A. Brown.

Criteria for success in the previous plan (the number of individuals in populations and/or the number of populations have increased over the term of the plan) has been met, as follows.

At the time of compilation of the 1999 IRP, four populations of *Acacia auratiflora* were known to exist. Further surveys as per Action 4 of the IRP uncovered eleven new populations, bringing the current known total to fifteen populations. Additional surveys of habitat within the vicinity of the original four known populations resulted in extensions to two of these and additional plants at a third. These discoveries have raised the number of known mature individual plants from 215 known prior to 1999 to around 1,200 at the present time.

**Current status:** *Acacia auratiflora* was declared as Rare Flora under the Western Australian *Wildlife Conservation Act 1950* in 1997 and is currently ranked as Vulnerable (VU) under World Conservation Union (IUCN 2001) Red List criteria C2a(i) due to the species numbering fewer than 10,000 mature individuals with no subpopulation containing more than 1,000 mature individuals and continuing decline observed in the number of mature plants. The main threats are road, rail and firebreak maintenance, salinity, weeds and drought. The species is listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

*Acacia auratiflora* is confined to the southern Wheatbelt of Western Australia where it is currently known from fifteen populations totalling around 1,200 mature plants.

**Description:** *Acacia auratiflora* is a dense spreading shrub, 0.3 to 1 m tall by 0.6 to 2 m in diameter. New shoots are resinous. Branchlets are resinous but not sticky and covered by minute white or pale golden hairs. Phyllodes are narrowly oblong-elliptic, 20 to 40 mm long by 3 to 7 mm wide, leathery, pale green, without hairs or sometimes with sparsely appressed-hairy margins and with a hooked tip. The inflorescence is densely covered in short fine straight erect golden hairs. Inflorescence heads are globular, golden, 5 to 7 mm in diameter with thirty to forty two flowers. Flowers are five-merous with sepals two thirds as long as the petals, united to below middle or almost to apex, oblong and covered in upright stiffened distinct golden hairs. Petals are free but coherent in the midsection and densely covered in golden hairs. Young pods are densely covered in light golden hairs (Cowan and Maslin 1999).

**Habitat requirements:** *Acacia auratiflora* grows on sandy clays and occasionally also in sandy loams with clay, in drainage lines and depressions amongst open shrub mallee or low gimlet (*Eucalyptus salubris*) woodland over *Melaleuca* thicket with grasses.

**Habitat critical to the survival of the species, and important populations:** Habitat critical to the survival of the species includes the area of occupancy of important populations, areas of similar habitat surrounding important populations (i.e. sandy clays in drainage lines and depressions amongst open shrub mallee or low gimlet woodland over *Melaleuca* thicket with grasses), additional occurrences of similar habitat that may contain important populations of the species or be suitable sites for future translocations, and the local catchment for the surface and/or groundwater that maintains the habitat of the species.

Populations of *Acacia auratiflora* that are important to the species' ongoing survival include those on conservation reserves, large and healthy populations and those at the extremities of its range. On this basis it appears that all populations are important.

**Benefits to other species or ecological communities:** Recovery actions implemented to improve the quality or security of the habitat of *Acacia auratiflora* will also improve the status of associated native vegetation. The threatened and priority species *Verticordia staminosa* subsp. *cylindracea* var. *erecta* (Critically Endangered), *Bentleya spinescens* (Priority 4) and *Eremophila veneta* (Priority 4) are associated with *A. auratiflora*.

**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. *Acacia auratiflora* is not listed under any specific international treaty, and therefore this IRP does not affect Australia's obligations under any other international agreements.

**Indigenous Consultation:** Involvement of the Indigenous community is being sought through the South West Aboriginal Land and Sea Council and the Department of Indigenous Affairs to assist in the identification of cultural values for land occupied by *Acacia auratiflora*, or groups with a cultural connection to land that is important for the species' conservation, and to determine whether there are any issues or interests identified in the plan. A search of the Department of Indigenous Affairs Aboriginal Heritage Sites Register has identified that there are no sites of Aboriginal significance at or near populations of the species covered by this IRP. Where no role is identified for the Indigenous community associated with this species in the development of the recovery plan, opportunities may exist through cultural interpretation and awareness of the species. Indigenous involvement in the implementation of recovery actions will be encouraged.

Continued liaison between DEC and the Indigenous community will identify areas in which collaboration will assist implementation of recovery actions.

**Social and economic impact:** As five populations and three subpopulations of *Acacia auratiflora* are located on private property, their protection has the potential to affect farming activities. Where populations or subpopulations are located on private property, recovery actions refer to continued liaison between stakeholders with regard to these areas.

**Affected interests:** Stakeholders potentially affected by the implementation of this plan include owners of private property, the Shire of Lake Grace, Main Roads WA, WestNet Rail and the Department of Agriculture and Food.

**Evaluation of the plan's performance:** The Department of Environment and Conservation, in conjunction with the Great Southern District Threatened Flora Recovery Team (GSDTFRT) 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 four years of implementation.

### Completed Recovery Actions

1. Land managers have been made aware of the threatened nature of this species, its location and their legal obligations to protect it.
2. Declared Rare Flora (DRF) markers have been installed at Populations 2, 4, 7 and 12 and Subpopulations 1a, 3a-d, 6b and 9a and 9b.
3. Private Property Populations 10, 11, 13-15 and Subpopulations 5a and 5b have been fenced
4. Since 1999, surveys of suitable habitat within the Shire of Lake Grace has increased the number of populations known in the wild.
5. Seed collections are stored with DEC's Threatened Flora Seed Centre (TFSC).
6. Germination trials have been conducted on seed accessions held by DEC's TFSC.
7. Research has been undertaken into the susceptibility of *Acacia auratiflora* to *Phytophthora cinnamomi*.

### Ongoing and future recovery actions

1. The GSDTFRT 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.
2. Staff from DEC's Great Southern District are monitoring all known populations.

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

### Recovery criteria

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

**Recovery actions**

1. Coordinate recovery actions
2. Liaise with relevant land managers
3. Monitor populations
4. Install DRF markers
5. Undertake weed control
6. Conduct further surveys
7. Collect seed
8. Map areas prone to salinity
9. Promote awareness
10. Develop and implement disturbance trials
11. Obtain biological and ecological information
12. Map habitat critical to the survival of the species, and important populations
13. Review the recovery plan and assess the need for further recovery actions

## 1. BACKGROUND

**Analysis of outputs and effectiveness of Interim Recovery Plan (IRP) 23 (1999-2002)** prepared by G. Stack and A. Brown.

Criteria for success in the previous plan (the number of individuals in populations and/or the number of populations has increased over the term of the plan) has been met, as follows.

At the time of compilation of the 1999 IRP, four populations of *Acacia auratiflora* were known to exist. During further surveys as per Action 4 of the IRP, eleven new populations were located, bringing the current known total to fifteen populations. Additional surveys of habitat within the vicinity of the original four known populations resulted in extensions to two of these and additional plants at a third. These discoveries have raised the number of known mature individual plants from 215 known prior to 1999 to around 1,200 at the present time.

Actions carried out in the previous plan include:

- Action 2** Monitor populations. Population monitoring has been conducted annually between 1999 and 2002.
- Action 4** Conduct further surveys. Surveys in areas likely to support *Acacia auratiflora* have been conducted.
- Action 5** Collect Seed. Seed collected from Population 13 in 2002 is stored at DEC's Threatened Flora Seed Centre (TFSC).

Actions 2, 4 and 5 and other recovery actions included in the previous plan are ongoing and are included in this revised plan.

New recovery actions included in this plan are:

- Action 8** Map areas susceptible to salinity.
- Action 10** Develop and implement fire and disturbance trials.
- Action 12** Map habitat critical to the survival of *Acacia auratiflora*.

### History

The first collection of *Acacia auratiflora* was made by Paul Wilson in 1968 from an area west of Lake Bidy (Western Australian Herbarium 2007). The species was described by Richard Cowan and Bruce Maslin in 1999 (Cowan and Maslin 1999).

Collections held by the Western Australian Herbarium indicate that historically *Acacia auratiflora* has had a marginally wider distribution than now. In 1972 Dr Bernard Dell collected the species from approximately 4 km west of the species' current distribution (Western Australian Herbarium 2007).

*Acacia auratiflora* occurs in DEC's Great Southern District where it is currently known from fifteen populations, totalling 1,200 mature plants.

### Description

*Acacia auratiflora* is a dense spreading shrub 0.3 to 1 m tall by 0.6 to 2 m in diameter. New shoots are resinous. Branchlets are resinous but not sticky and are covered in minute white or pale golden hairs. Phyllodes are narrowly oblong-elliptic, 20 to 40 mm long by 3 to 7 mm wide, leathery, pale green, without hairs or sometimes with sparsely appressed-hairy margins and with a hooked tip. The inflorescence is densely covered in short fine straight erect golden hairs. Inflorescence heads are globular, golden, 5 to 7 mm in diameter with thirty to forty two flowers. Flowers are five-merous with sepals two thirds as long as the petals, united to below middle or almost to apex, oblong and covered in upright stiffened distinct golden hairs. Petals are free but coherent in the midsection and densely covered in golden hairs. Young pods are densely covered in light golden hairs (Cowan and Maslin 1999).

*Acacia auratiflora* is related to *A. cassicula* which is distinguished by its shorter phyllodes (mostly 15 to 20 mm long), twenty to thirty flowered heads on hairless peduncles 3 to 5 mm long, and hairless petals and pods. *Acacia auratiflora* is also related to *A. lanei* which is recognised by its distinct non-connecting phyllode nerves, longer peduncles (3 to 5 mm), free sepals and hairless pods (Cowan and Maslin 1999).

### Distribution and habitat

*Acacia auratiflora* is found over an area of approximately 390 km<sup>2</sup> in the southern Wheatbelt of Western Australia. Plants are located on Private Property, Main Roads WA reserves, Shire reserves, roadside 'Stopping Place' and WestNet Rail reserves.

The habitat that supports *Acacia auratiflora* comprises sandy clays and occasionally sandy loams with clay in drainage lines and depressions amongst open shrub mallee or low gimlet (*Eucalyptus salubris*) woodland over *Melaleuca* thicket. Species associated with *Acacia auratiflora* include *Melaleuca uncinata*, *M. adnata*, *M. lateriflora*, *Grevillea huegelii*, *Phebalium filifolium*, *Templetonia sulcata* and *Eucalyptus* species.

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

Pop. No. & Location	DEC District	Shire	Vesting	Purpose	Manager
<b>1a. W of Newdegate</b>	Great Southern	Lake Grace	Main Roads WA	Road Reserve	Main Roads WA
<b>1b. W of Newdegate</b>	Great Southern	Lake Grace	Freehold	Private Property	Landholders
<b>1c. W of Newdegate</b>	Great Southern	Lake Grace	Shire of Lake Grace	Shire Reserve	Shire of Lake Grace
<b>2. W of Newdegate</b>	Great Southern	Lake Grace	Unvested	Road Side 'Stopping Place'	
<b>3a. NW of Newdegate</b>	Great Southern	Lake Grace	Public Transport Authority	Rail Reserve	WestNet Rail
<b>3b. NW of Newdegate</b>	Great Southern	Lake Grace	Shire of Lake Grace	Road Reserve	Shire of Lake Grace
<b>3c. NW of Newdegate</b>	Great Southern	Lake Grace	Public Transport Authority	Rail Reserve	WestNet Rail
<b>3d. NW of Newdegate</b>	Great Southern	Lake Grace	Shire of Lake Grace	Road Reserve	Shire of Lake Grace
<b>4. W of Newdegate</b>	Great Southern	Lake Grace	Shire of Lake Grace	Road Reserve	Shire of Lake Grace
<b>5a. NW of Newdegate</b>	Great Southern	Lake Grace	Freehold	Private Property	Landholders
<b>5b. NW of Newdegate</b>	Great Southern	Lake Grace	Freehold	Private Property	Landholders
<b>6a. NW of Newdegate</b>	Great Southern	Lake Grace	Shire of Lake Grace	Road Reserve	Shire of Lake Grace
<b>6b. NW of Newdegate</b>	Great Southern	Lake Grace	Shire of Lake Grace	Road Reserve	Shire of Lake Grace
<b>7. W of Newdegate</b>	Great Southern	Lake Grace	Shire of Lake Grace	Road Reserve	Shire of Lake Grace
<b>8. W of Newdegate</b>	Great Southern	Lake Grace	Shire of Lake Grace	Road Reserve	Shire of Lake Grace
<b>9a. W of Newdegate</b>	Great Southern	Lake Grace	Main Roads WA	Road Reserve	Main Roads WA
<b>9b. W of Newdegate</b> (Nature Reserve)	Great Southern	Lake Grace	Conservation Commission of Western Australia	Conservation of Flora and Fauna	DEC
<b>10. S of Newdegate</b>	Great Southern	Lake Grace	Freehold	Private Property	Landholders
<b>11. NW of Newdegate</b>	Great Southern	Lake Grace	Freehold	Private Property	Landholders
<b>12. NW of Newdegate</b>	Great Southern	Lake Grace	Shire of Lake Grace	Shire Reserve	Shire of Lake Grace
<b>13. NW of Newdegate</b>	Great Southern	Lake Grace	Freehold	Private Property	Landholders
<b>14. NW of Newdegate</b>	Great Southern	Lake Grace	Freehold	Private Property	Landholders
<b>15. NW of Newdegate</b>	Great Southern	Lake Grace	Freehold	Private Property	Landholders

Populations in **bold text** are considered to be Important Populations.

### Biology and ecology

*Acacia auratiflora* favours drainage lines and depressions that are prone to seasonal inundation.

*Acacia auratiflora* germination trials indicate that initial germination rates are low (5-19%) and increase after one year's storage to 94%.

Flowering of *Acacia auratiflora* is from late June to August, occasionally extending to late October if conditions are suitable. Immature fruit has been recorded from August to November with mature fruit recorded in early November.

*Acacia auratiflora* is not susceptible to *Phytophthora cinnamomi* (Dr Bryan Shearer<sup>1</sup> personal communication).

<sup>1</sup> Principal Research Scientist, Science Division, DEC.

## Threats

*Acacia auratiflora* was declared as Rare Flora in 1997 under the Western Australian *Wildlife Conservation Act 1950* and is currently ranked as Vulnerable (VU) under World Conservation Union (IUCN 2001) Red List criteria C2a(i) due to the species numbering fewer than 10,000 mature individuals with no subpopulation containing more than 1,000 mature individuals and a continuing decline observed in the number of mature plants. The species is listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The main threats are road, rail and firebreak maintenance, salinity, weeds and drought.

- **Road, rail and firebreak maintenance** threatens *Acacia auratiflora* Populations 2, 4, 7-8 and 12 and Subpopulations 1a, 3d, 6a-b and 9a on road reserves, Subpopulations 3a and b on rail reserves and Subpopulation 9b which is located close to a firebreak. Plants can be damaged by grading and spraying of verge vegetation and the maintenance of roadside spoon drains. Grading also disturbs the habitat and encourages weed invasion. Relevant authorities have been informed of the location of this species so that appropriate protective actions can be implemented when maintenance is carried out.
- **Salinity** is currently a threat to Populations 2, 4 and 11 and Subpopulations 1a, 1c and 3c-d. However, as the species favours drainage lines and depressions that are susceptible to salinisation, Subpopulations 1b and 5a-b that occupy this habitat are likely to be threatened in the future. Salinity has the potential to affect up to 50% of known plants, as well as the vegetation associated with these populations.
- **Weeds** are a threat to *Acacia auratiflora* Population 7 and Subpopulations 1a, 3a-d, 6a and 9a. Weeds compete for resources with *A. auratiflora*, reducing the health of mature plants and seedlings and reducing overall fecundity. Heavy weed infestation also generates high fuel loads that increase the frequency and intensity of fire.
- **Drought** has the potential to affect all populations of *Acacia auratiflora*.
- **Waterlogging** of soil is a potential issue as many of the *Acacia auratiflora* populations are found in drainage lines and natural depressions in the landscape. Water collects around the roots of the plants making it difficult for them to take up nutrients, and causing the root systems to rot.
- **Degradation of associated vegetation** causes serious problems for plants. Surrounding vegetation provides shelter for plants, provides habitat for pollinators, protects the soil from erosion, and reduces the incidence of weed invasion and salinity.
- **Grazing** of plants is an issue with unfenced populations accessed by stock. Rabbits can also damage populations by grazing on seedlings.

**Table 2 - Summary of population information and threats**

Pop. No. & Location	Land Status	Year/No. plants	Condition	Threats
<b>1a. W of Newdegate</b>	Road Reserve	1995 15 2001 48 (1) [5] 2003 29 [3]	Moderate	Road maintenance, salinity, minor weeds, water logging
<b>1b. W of Newdegate</b>	Private Property	1995 15 2001 15	Healthy	Water logging, grazing
<b>1c. W of Newdegate</b>	Shire Reserve	1995 15 2001 29 (1)* 2001 30 (9) [8]	Healthy	Water logging, salinity
<b>2. W of Newdegate</b>	Road Side 'Stopping Place'	1995 35 2001 29 (1)*	Healthy	Road maintenance – spray drift, salinity, water logging
<b>3a. NW of Newdegate</b>	Railway Reserve	1995 20* 1997 19* 2000 24*	Moderate	Rail maintenance, weeds
<b>3b. NW of Newdegate</b>	Road Reserve	1995 20* 1997 19* 2000 24*	Moderate	Road and spoon drain maintenance, weeds
<b>3c. NW of Newdegate</b>	Railway Reserve	1999 92*	Healthy	Water logging, salinity, weed infestation
<b>3d. NW of Newdegate</b>	Road Reserve	1999 92*	Healthy	Road maintenance, water logging, salinity, weed infestation
<b>4. W of Newdegate</b>	Road Reserve	1997 63 2001 134 (2) [4]	Moderate	Road maintenance, salinity
<b>5a. NW of Newdegate</b>	Private Property	2000 <sub>Feb</sub> 4 2000 <sub>Aug</sub> 305 (13) [2]*	Moderate	Water logging



Pop. No. & Location	Land Status	Year/No. plants	Condition	Threats
<b>5b. NW of Newdegate</b>	Private Property	2000 <sub>Aug</sub> 305 (13) [2]*	Moderate	Water logging
<b>6a. NW of Newdegate</b>	Road Reserve	1999 5	Moderate	Road maintenance, weed infestation
<b>6b. NW of Newdegate</b>	Road Reserve	2000 6	Poor	Road maintenance, degradation of associated vegetation
<b>7. W of Newdegate</b>	Road Reserve	2000 15	Moderate	Road maintenance, weeds, degradation of associated vegetation
<b>8. W of Newdegate</b>	Road Reserve	2000 19	Moderate	Road maintenance, degradation of associated vegetation
<b>9a. W of Newdegate</b>	Road Reserve	2000 12 2002 94	Healthy	Road maintenance, weeds
<b>9b. W of Newdegate</b>	Conservation Reserve	2000 1 2002 1	Healthy	Firebreak maintenance
<b>10. S of Newdegate</b>	Private Property	2000 53 2002 16+	Healthy	Threats unknown
<b>11. NW of Newdegate</b>	Private Property	2002 <sub>Apr</sub> 75± 2002 <sub>Nov</sub> 75±	Healthy	Salinity, grazing
<b>12. NW of Newdegate</b>	Shire Reserve	2002 411 [24]	Healthy	Road maintenance, drought
<b>13. NW of Newdegate</b>	Private Property	2002 50+ (2) [4]	Healthy	Threats unknown
<b>14. NW of Newdegate</b>	Private Property	2002 20+	Healthy	Drought
<b>15. NW of Newdegate</b>	Private Property	2002 50 [3]	Moderate	Drought

Populations in **bold text** are considered to be Important Populations; Note: \* = total for both subpopulations, ( ) = number of seedlings, [ ] = number dead

### Guide for decision-makers

Table 2 provides details of current and possible future threats. Developments in the immediate vicinity of the populations or within the defined habitat critical to the survival of *Acacia auratiflora* require assessment for the potential for a significant level of impact.

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

Habitat critical to the survival of the species includes the area of occupancy of important populations, areas of similar habitat surrounding important populations (i.e. sandy clays in drainage lines and depressions amongst open shrub mallee or low gimlet woodland over *Melaleuca* thicket with grasses), additional occurrences of similar habitat that may contain important populations of the species or be suitable sites for future translocations, and the local catchment for the surface and/or groundwater that maintains the habitat of the species.

As *Acacia auratiflora* is listed as Endangered under the Commonwealth EPBC Act, all populations are considered important populations.

### Benefits to other species or ecological communities

Recovery actions implemented to improve the quality or security of the habitat of *Acacia auratiflora* will also improve the status of associated native vegetation dominated by *Melaleuca uncinata*, *M. adnata*, *M. lateriflora*, *Grevillea huegelii*, *Phebalium filifolium*, *Templetonia sulcata* and several *Eucalyptus* species. One threatened and two Priority flora species that grow in association with *Acacia auratiflora* are listed in the table below.

### Conservation-listed flora species occurring in habitat of *Acacia auratiflora*

Species name	Conservation Status (WA)	Conservation Status (EPBC Act)
<i>Verticordia staminosa</i> subsp. <i>cylindracea</i> var. <i>erecta</i>	DRF, Critically Endangered	
<i>Bentleya spinescens</i>	Priority 4	
<i>Eremophila veneta</i>	Priority 4	Endangered

DRF – Declared Rare Flora; For a description of Priority categories see Atkins (2006).

## 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. *Acacia auratiflora* is not listed under any specific international treaty and this recovery plan does not affect Australia's obligations under any other international agreements.

## Indigenous consultation

Involvement of the Indigenous community is being sought through the South West Aboriginal Land and Sea Council and the Department of Indigenous Affairs to assist in the identification of cultural values for land occupied by *Acacia auratiflora*, or groups with a cultural connection to land that is important for the species' conservation, and to determine whether there are any issues or interests identified in the plan. A search of the Department of Indigenous Affairs Aboriginal Heritage Sites Register has identified that there are no sites of Aboriginal significance at or near populations of the species covered by this recovery plan. Where no role is identified for the Indigenous community associated with this species in the development of the recovery plan, opportunities may exist through cultural interpretation and awareness of the species. Indigenous involvement in the implementation of recovery actions will be encouraged.

Continued liaison between DEC and the Indigenous community will identify areas in which collaboration will assist implementation of recovery actions.

## Social and economic impact

As five populations and three subpopulations of *Acacia auratiflora* are located on Private Property, their protection has the potential to affect farming activities. Where populations or subpopulations are located on Private Property, recovery actions refer to continued liaison between stakeholders with regard to these areas.

## Affected interests

Stakeholders potentially affected by the implementation of this plan include owners of Private Property, the Shire of Lake Grace, Main Roads WA, WestNet Rail and the Department of Agriculture and Food.

## Evaluation of the plan's performance

The Department of Environment and Conservation (DEC), in conjunction with the Great Southern District Threatened Flora Recovery Team (GSDTFRT) will evaluate the performance of this recovery 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

### Objectives:

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

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

### 3. RECOVERY ACTIONS

#### Completed recovery actions

Relevant land managers, including private land owners, Main Roads WA, WestNet Rail, the Shire of Lake Grace and the Department of Agriculture and Food have been made aware of the threatened nature of this species, its location and their legal obligations to protect it.

Declared Rare Flora (DRF) markers have been installed at Populations 2, 4, 7 and 12 and Subpopulations 1a, 3a-d, 6b and 9a and b.

Populations 10, 11, 13-15 and Subpopulations 5a-b on Private Property have been fenced.

Surveys of suitable habitat within the Shire of Lake Grace have resulted in the discovery of new populations increasing the total number known from four to fifteen.

DEC's Threatened Flora Seed Centre (TFSC) holds two bulk collections of *Acacia auratiflora* seed made in 1997 and 2002 and one segregated collection made in 1998. Together, these total 4,479 seeds.

Research into the susceptibility of *Acacia auratiflora* to *Phytophthora cinnamomi* has been undertaken by staff from DEC's Science Division. The species was confirmed to be resistant to the pathogen.

#### Ongoing and future recovery actions

The GSDTFRT is overseeing the implementation of this recovery plan and will include it in its annual report to DEC's Corporate Executive and funding bodies.

Staff from DEC's Great Southern District are monitoring all known populations.

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

#### 1. Coordinate recovery actions

The GSDTFRT will continue to coordinate the implementation of recovery actions for *Acacia auratiflora* and will include information on progress in their annual reports to DEC's Corporate Executive and funding bodies.

**Action:** Coordinate recovery actions  
**Responsibility:** GSDTFRT  
**Cost:** \$1,500 annually in years 1-5.

#### 2. Liaise with relevant land managers

Staff from DEC's Great Southern District will liaise with appropriate land managers to ensure that populations are not accidentally damaged or destroyed. Input and involvement will also be sought from any Aboriginal groups that have an active interest in areas that are habitat for *Acacia auratiflora*.

**Action:** Liaise with relevant land managers  
**Responsibility:** DEC (Great Southern District), through the GSDTFRT  
**Cost:** \$2,500 annually in years 1-5.

### 3. Monitor populations

Monitoring of factors such as weed invasion, habitat degradation, population stability (expansion or decline), pollinator activity, seed production, recruitment, and longevity is essential. The populations will be inspected annually and Rare Flora Report Forms completed. Exact GPS location readings will also be taken at each population/subpopulation.

**Action:** Monitor populations  
**Responsibility:** DEC (Great Southern District) through the GSDTFRT  
**Cost:** \$3,000 annually in years 1-5.

### 4. Install DRF markers

Declared Rare Flora (DRF) markers are required at Subpopulation 6a and need to be moved to incorporate extensions to Population 4 and Subpopulations 1a, 3a, 3c and 3d.

**Action:** Install DRF Markers  
**Responsibility:** DEC (Great Southern District) through the GSDTFRT  
**Cost:** \$500 in the first year.

### 5. Undertake weed control

Weeds are a threat in several populations of *Acacia auratiflora*. The following actions will be implemented:

1. Selection of appropriate herbicides after determining which weeds are present.
2. Controlling invasive weeds by hand removal or spot spraying around *Acacia auratiflora* plants when weeds first emerge.
3. Protection of plants from herbicide drift/application during operations by covering plants or use of shrouds where appropriate and conducting in conditions of little to no wind.
4. Annual monitoring of weeds at each population and subsequent removal.

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

**Action:** Undertake weed control  
**Responsibility:** DEC (Great Southern District, Science Division) through the GSDTFRT  
**Cost:** \$7,500 in the first year; \$6,500 annually in years 2-5.

### 6. Conduct further surveys

Further surveys will be undertaken of areas deemed to support habitat similar to that of existing *Acacia auratiflora* populations. These will include appropriate habitat on private land but will focus on lands with secure tenure. More extensive surveys are required in Shire of Lake Grace Reserve no. 24932, Department of Agriculture and Food's Experimental Farm no. 24920 and the Main Roads WA reserve south of Newdegate-Lake Grace Road and adjacent to the western border of the Department of Agriculture and Food's Experimental Farm no. 24920. Remnant vegetation in the vicinity of Populations 12, 10 and 14 and roadside vegetation along Dyke and Grant Williams Roads also need more extensive survey. Surveys are also required in Breakaway Ridge NR (particularly the south east corner), Lockhart NR, Lake Bryde NR no.'s 29021 and 29020 and Lake Magenta NR.

All known populations of *Acacia auratiflora* will be resurveyed to ascertain accurate boundaries and ensure that no plants have been missed during previous surveys. All populations of *Acacia auratiflora* are in need of resurvey. Surveys will be conducted during the species' flowering period, between late June and August. Local volunteers and community groups will assist with the project, supervised by DEC staff.

**Action:** Conduct further surveys  
**Responsibility:** DEC (Great Southern District) through the GSDTFRT  
**Cost:** \$5,500 in years 1, 3, and 5.

## 7. Collect seed

DEC's Threatened Flora Seed Centre (TFSC) currently holds seed from three of the fifteen known *Acacia auratiflora* populations. Seed will be collected and stored by the DEC's TFSC and the Botanic Gardens and Parks Authority (BGPA). Collections will aim to sample and preserve the maximum range of genetic diversity possible. Collections will therefore aim to sample most populations, particularly those at the limits of the species' range. The "Germplasm Conservation Guidelines for Australia" produced by the Australian Network for Plant Conservation (ANPC 1997) will be used to guide this process.

**Actions:** Collect seed  
**Responsibility:** DEC (Great Southern District, TFSC), and BGPA through the GSDTFRT  
**Cost:** \$2,500 in years 1, 3 and 5.

## 8. Map areas prone to salinity

*Acacia auratiflora* favours drainage lines and depressions in the landscape making it susceptible to rising water tables and salinisation. It is recommended that mapping of areas that are prone to salinity be conducted so that populations most at risk can be identified.

**Action:** Map areas prone to salinity  
**Responsibility:** DEC (Great Southern District) through the GSDTFRT  
**Cost:** \$4,000 in the second year.

## 9. Promote awareness

An A4 sized information sheet that provides a description of the species and information about threats and recovery actions will be developed for *Acacia auratiflora* and distributed to local land owners, relevant authorities and volunteer organisations, libraries and schools. It is hoped that the poster will result in the discovery of new populations. Formal links with local naturalist groups and interested individuals should also be encouraged.

The exact location of *Acacia auratiflora* will be kept from the general public to minimise the risk of site interference. Such information will, however, be given to relevant land managers, Shire staff, Main Roads WA, WestNet Rail and relevant government authorities to prevent accidental damage to sites.

**Action:** Promote awareness  
**Responsibility:** DEC (Great Southern District, Species and Communities Branch (SCB) and Strategic Development and Corporate Affairs Division) through the GSDTFRT  
**Cost:** \$1,500 in the first year, \$1,000 in years 3 and 5.

## 10. Develop and implement disturbance trials

DEC's Great Southern District will, in consultation with land managers, the Shire of Lake Grace, Main Roads WA, WestNet Rail and relevant authorities, conduct research into the effectiveness of fire and mechanical disturbance in stimulating germination of soil-stored *Acacia auratiflora* seed. The results of trials will be monitored and, if successful, a larger scale operation undertaken.

**Action:** Develop and implement disturbance trials  
**Responsibility:** DEC (Science Division, Great Southern District) through the GSDTFRT, and relevant authorities.  
**Cost:** \$6,000 in the first year; \$800 in years 2-5.

## 11. Obtain biological and ecological information

Improved knowledge of the biology and ecology of *Acacia auratiflora* will provide a better scientific basis for management of the wild populations. An understanding of the following is particularly necessary for effective management:

1. Longevity of plants and time taken to reach maturity.
2. Pollination biology.
3. Size of soil seed banks.
4. Conditions necessary for germination.
5. Optimal disturbance regime to maximise population size and health.
6. Appropriate herbicides for weed control that will not adversely affect *A. auratiflora*.

**Action:** Obtain biological and ecological information  
**Responsibility:** DEC (Science Division, Great Southern District) through the GSDTFRT  
**Cost:** \$5,000 in years 1 & 2; \$3,500 in year 3 and \$500 in years 4 & 5.

## 12. Map habitat critical to the survival of *Acacia auratiflora*, and important populations

Although habitat critical to the survival of the species is described in Section 1, the areas described have not yet been mapped and that will be redressed under this action.

**Action:** Map habitat critical to the survival of *Acacia auratiflora*, and important populations  
**Responsibility:** DEC (Great Southern District) through the GSDTFRT  
**Cost:** \$3,000 in the second year.

## 13. Review the recovery plan and assess the need for further recovery actions

At the end of the fifth year the recovery plan will be reviewed and the need for further recovery actions assessed.

**Action:** Review the recovery plan and assess the need for further recovery actions  
**Responsibility:** DEC (SCB, Great Southern District) through the GSDTFRT  
**Cost:** \$1,500 in the fifth year.

## Summary of recovery actions

Recovery Actions	Priority	Responsibility	Completion date
Coordinate recovery actions	High	GSDTFRT	Ongoing
Liaise with relevant land managers	High	DEC (Great Southern District), through the GSDTFRT	Ongoing
Monitor populations	High	DEC (Great Southern District), through the GSDTFRT	Ongoing
Install DRF markers	High	DEC (Great Southern District), through the GSDTFRT	2009
Undertake weed control	High	DEC (Great Southern District, Science Division) through the GSDTFRT	Ongoing
Conduct further surveys	High	DEC (Great Southern District), through the GSDTFRT	Ongoing
Collect seed	High	DEC (Great Southern District, TFSC), and BGPA through the GSDTFRT	Ongoing
Map areas prone to salinity	High	DEC (Great Southern District), through the GSDTFRT	2009
Promote awareness	High	DEC (Great Southern District, Species and Communities Branch, Strategic Development and Corporate Affairs Division) through the GSDTFRT	Ongoing
Develop and implement disturbance trials	Moderate	DEC (Science Division, Great Southern District) through the GSDTFRT, and relevant authorities	2012
Obtain biological and ecological information	Moderate	DEC (Science Division, Great Southern District) through the GSDTFRT	2013
Map habitat critical to the survival of the species, and important populations	Moderate	DEC (Great Southern District) through the GSDTFRT	2009
Review the recovery plan and assess the need for further recovery actions	Moderate	DEC (SCB, Great Southern District) through the GSDTFRT	2013

#### 4. TERM OF PLAN

##### Western Australia

This Interim Recovery Plan will operate from April 2008 to March 2013 but will remain in force until withdrawn or replaced. If the species is still ranked VU after five years, the need for further recovery actions and an update of this IRP 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

- Atkins, K. (2008). *Declared Rare and Priority Flora List for Western Australia*. Department of Environment and Conservation, Western Australia.
- Australian Network for Plant Conservation. (1997). *Germplasm Conservation Guidelines for Australia, An introduction to the principles and practices for seed and germplasm banking of Australian Species*. Canberra, Australian Network for Plant Conservation Germplasm Working Group.
- Brown, A., Thomson-Dans, C. and Marchant, N. (1998) *Western Australia's Threatened Flora*. Department of Conservation and Land Management, Western Australia. pp 63.
- Cowan, R.S. and Maslin, B.R. (1999). *Acacia miscellany 17. Miscellaneous new taxa and lectotypifications in Western Australian Acacia, mostly section Plurinerves* (Leguminosae: Mimosoideae). *Nuytsia* **12(3)**: 413-452.
- 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 (1999). *Orange-Flowered Wattle (Acacia auratiflora) Interim Recovery Plan 1999-2002. Interim Recovery Plan No. 23*. Department of Conservation and Land Management, Western Australia.
- Western Australian Herbarium (2007) *FloraBase 2 – Information on the Western Australian Flora*. Department of Environment and Conservation, Western Australia. Accessed 2007. <http://florabase.dec.wa.gov.au/>
- 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

Excerpt from: Cowan, R.S. and Maslin, B.R. (1999). *Acacia miscellany 17. Miscellaneous new taxa and lectotypifications in Western Australian Acacia, mostly section Plurinerves* (Leguminosae: Mimosoideae). *Nuytsia* **12(3)**: 413-452.

Dense spreading *shrub* 0.3-1 m tall, 0.6-2 m diameter. *New shoots* resinous. *Branchlets* terete except slightly angular extremities, resinous but not viscid, sparsely to moderately antrorsely appressed puberulous, the hairs minute (sometimes difficult to see) and white or pale golden. *Stipules* 1-2 mm long, narrowly triangular to lanceolata-triangular, glabrous, persistent. *Phyllodes* narrowly oblong-elliptic, 20-40 mm long, 3-7 mm wide, coriaceous, patent to ascending, straight but often slightly upcurved at the narrowed base, pale green, glabrous or sometimes sparsely appressed-hairy on margins; main *longitudinal nerves* about 3, generally obscured by the secondary nerves which anastomose longitudinally to form an open reticulum, the veins often mealy-resinous; *apex* acute to obtuse-mucronate; *pulvinus* indistinct, 0.5-1 mm long. *Gland* 1, on upper margin of phyllode (1)2-4(5) mm above pulvinus, not prominent but sometimes with an obvious rim. *Inflorescence* a rudimentary 1-headed raceme; axis c. 1mm long, terminated by a resin-coated vegetative bud at anthesis; *peduncles* 1-2 mm long, often obscured by the anthers at anthesis, densely golden-puberulous; *basal peduncular bracts* persistent, ovate, acute, thick, 1.5-2 mm long, glabrous. *Heads* globular, golden, 5-7 mm diameter at anthesis, 30-42 flowered; *bracteoles* spatulate, subappressed golden-pilosulose adaxially. *Flowers* 5-merous; sepals  $\frac{2}{3}$  as long as petals, united to below middle or almost to apex, oblong to oblanceolate-oblong, subappressed golden-pilosulose; *petals* oblanceolate, free but coherent in midsection, subappressed golden-hairy. *Ovary* papillose-puberulous. *Pods* (young) densely pilose/villous, the hairs light golden. *Seeds* not seen.

## SUMMARY OF RECOVERY ACTIONS AND 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	1,000	300	200	1,000	300	200	1,000	300	200	1,000	300	200	1,000	300	200
Liaise with relevant land managers	1,600	0	900	1,600	0	900	1,600	0	900	1,600	0	900	1,600	0	900
Monitor populations	2,000	0	1,000	2,000	0	1,000	2,000	0	1,000	2,000	0	1,000	2,000	0	1,000
Install DRF markers	200	0	300	0	0	0	0	0	0	0	0	0	0	0	0
Undertake weed control	2,300	0	5,200	2,500	0	4,000	2,500	0	4,000	2,500	0	4,000	2,500	0	4,000
Conduct further surveys	3,800	0	1,700	0	0	0	3,800	0	1,700	0	0	0	3,800	0	1,700
Collect seed	1,600	0	900	0	0	0	1,600	0	900	0	0	0	1,600	0	900
Map areas prone to salinity	0	0	0	1,500	0	2,500	0	0	0	0	0	0	0	0	0
Promote awareness	500	0	1,000	0	0	0	500	0	500	0	0	0	500	0	500
Develop and implement disturbance trials	4,000	0	2,000	500	0	300	500	0	300	500	0	300	500	0	300
Obtain biological and ecological information	2,000	1,000	2,000	2,000	1,000	2,000	1,500	800	1,200	300	0	200	300	0	200
Map habitat critical to the survival of the species, and important populations	0	0	0	900	0	2,100	0	0	0	0	0	0	0	0	0
Review the recovery plan and assess the need for further recovery actions	0	0	0	0	0	0	0	0	0	0	0	0	1,200	0	300
<b>Total</b>	19,000	1,300	15,200	12,000	1,300	13,000	15,000	1,100	10,700	7,900	300	6,600	15,000	300	10,000
<b>Yearly Total</b>	<b>35,500</b>			<b>26,300</b>			<b>26,800</b>			<b>14,800</b>			<b>25,300</b>		

Ext. = External funding (funding to be sought), Other = in kind contribution by landholders, local government etc, DEC = in kind contribution by various DEC divisions.

Total DEC: \$68,900  
 Total Other: \$4,300  
 Total External Funding: \$55,500  
**Total Costs: \$128,700**