

Yornaning Wattle

(*Acacia insolita* subsp. *recurva*)

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 the draft IRP, prepared by Gillian Stack and Andrew Brown in 1999.

The plan will operate from February 2008 to January 2013 but will remain in force until withdrawn or replaced. It is intended that, if the taxon is still ranked as Endangered (EN), this IRP will be reviewed after five years and the need for further recovery actions assessed.

This IRP was given regional approval on 17 January 2008 and was approved by the Director of Nature Conservation on 6 February 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 February 2008.

IRP PREPARATION

This IRP was prepared by Craig Douglas¹ and Marie Strelein²

¹ Project Officer, Species and Communities Branch, DEC, PO Box 51 Wanneroo, 6946.

² Flora Conservation Officer, Great Southern District, DEC, PO Box 100, Narrogin, WA, 6312.

ACKNOWLEDGMENTS

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

Amanda Shade	Assistant curator of displays and development, Botanic Gardens Parks Authority
Bob Elkins	Technical Assistant, Botanic Gardens and Parks Authority
Andrew Crawford	Technical Officer, Threatened Flora Seed Centre, DEC
Anne Cochrane	Senior Research Scientist, Albany Research Station, DEC
Andrew Brown	Threatened Flora Coordinator, Species and Communities Branch, DEC
Heather Taylor	Project Officer, Species and Communities Branch, DEC
Kim Kershaw	Flora Conservation Officer (1997-2004), Narrogin District, 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 Kate Brown.

CITATION

This Recovery Plan should be cited as:

Department of Environment and Conservation (2009). Yornaning Wattle (*Acacia insolita* subsp. *recurva*) Recovery Plan, Department of Environment and Conservation, Western Australia.

SUMMARY

Scientific Name:	<i>Acacia insolita</i> subsp. <i>recurva</i>	Common Name:	Yornaning Wattle
Family:	Mimosaceae	Flowering Period:	July-August
DEC Region:	Midwest	DEC District:	Great Southern
Shire:	Wickepin	Recovery Team:	Great Southern District Threatened Flora Recovery Team

Illustrations and/or further information: Brown, A., Thomson-Dans, C. and Marchant, N. (1998). *Western Australia's Threatened Flora*. Department of Conservation and Land Management, Western Australia. pp 62; Durell, G.S and Buehrig, R.M. (2001) *Declared Rare and poorly Known Flora in the Narrogin District*. Western Australian Wildlife Management Program No. 30. Department of Conservation and Land Management. pp 163; Maslin, B.R. (1999) the taxonomy of fifty-five species of *Acacia*, primarily Western Australian, in section *Phyllodineae* (Leguminosae: Mimosoideae). *Nuytsia*. **12(3)**: 363; CALM (2003 onwards) *Western Australian Herbarium FloraBase 2 – Information on the Western Australian Flora*. Department of Conservation and Land Management, Western Australia. Accessed 2006. <http://www.calm.wa.gov.au/science/>.

Analysis of outputs and effectiveness of draft Interim Recovery Plan (IRP) (1999-2001) prepared by G. Stack and A. Brown.

The 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.

The number of known plants in wild populations has increased from a 771 to 800 due to the discovery of an additional 29 mature plants in Population 2 and no recent deaths in previously known plants.

Actions carried out in the previous plan include:

- Action 1 Obtain biological and ecological information:** Research into reproductive phenology, population structure, soil seed bank dynamics, germination rate, response to fire, impact of grazing and efficiency of germplasm storage techniques has been undertaken.
- Action 5 Preserve genetic diversity of the subspecies:** DEC's Threatened Flora Seed Centre (TFSC) has seed from both populations.

Action 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 2** Propose ranking change
- Action 5** Develop and implement an insect pest control strategy and follow-up with regular monitoring and additional control if required
- Action 9** Seek security of tenure for land supporting Population 2
- Action 10** Develop and implement fire and disturbance trials

Current status: *Acacia insolita* subsp. *recurva* was declared as Rare Flora in 1996 under the *Western Australian Wildlife Conservation Act 1950* and is ranked as Endangered (EN) under World Conservation Union (IUCN 1994) Red List criteria B1+2ce. However, due to its extent of occurrence being less than 100 km² and area of occupancy less than 10 km² with fragmented populations and continuing decline in habitat quality, the subspecies now meets Critically Endangered (CR) under IUCN 2001 criteria. It is therefore proposed in Recovery Action 2 to recommend to the Threatened Species Scientific Committee (TSSC) that the ranking of *Darwinia apiculata* be amended to CR under criterion B1ab(iii)+2ab(iii). Threats include inappropriate fire regimes, track maintenance, weed invasion, dieback disease, rubbish dumping, trampling, mining activities, and the development of small tracks bisecting the habitat. The subspecies is listed as Endangered (EN) under the *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act).

Acacia insolita subsp. *recurva* is known from two populations and a total of 800 mature plants over a range of less than 7 km in the Shire of Wickepin.

Population one is located in a Nature Reserve and represents 96% of the total plant numbers. Population 2 is located on private property.

Description: *Acacia insolita* subsp. *recurva* is a multi-stemmed shrub 60 to 120 cm tall. Its slender green or reddish stems, which may or may not have short fine hairs, are usually erect but sometimes scramble through associated low vegetation. Each leaf is made up of two compound leaflets, which persist on mature plants. Leaflets curve downwards and are shallowly concave but often fold longitudinally about the midrib when dry. The golden flower heads are borne at the ends of the branchlets (Brown *et al.* 1998; Maslin 1999). The seed pod is 5 to 6 mm long and the seeds are transverse and cubic to obloid (Maslin 1999).

Acacia insolita subsp. *insolita* is distinguished from *A. insolita* subsp. *recurva* as by its flat, non-recurved leaflets (Brown *et al.* 1998).

Habitat requirements: *Acacia insolita* subsp. *recurva* occurs on exposed lateritic breakaways and lateritic soils, in shallow sandy clay supporting open low *Eucalyptus wandoo* and *Allocasuarina huegeliana* woodland over open scrub of *Banksia nobilis*, *Banksia sessilis*, *Gastrolobium* sp. and sedges.

Habitat critical to the survival of the subspecies, and important populations: Given that *Acacia insolita* subsp. *recurva* is ranked as EN, it is considered that all known habitat for wild populations is critical to the survival of the subspecies, and that all wild populations are important populations. Habitat critical to the survival of *A. insolita* subsp. *recurva* includes the area of occupancy of extant populations, areas of similar habitat surrounding populations as it may provide potential habitat for natural recruitment, remnant vegetation that surrounds and links important populations (habitat for pollinators) and additional occurrences of similar habitat that may contain the subspecies or be suitable for future translocations.

Benefits to other species or ecological communities: Recovery actions implemented to improve the quality or security of the habitat for *Acacia insolita* subsp. *recurva* will also improve the status of remnant native vegetation in which it is located. Notably open low *Eucalyptus wandoo* and *Allocasuarina huegeliana* woodland over open scrub of *Banksia nobilis*, *Banksia sessilis*, *Gastrolobium* sp. and sedges. No other threatened or priority flora species are located with *Acacia insolita* subsp. *recurva*.

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 insolita* subsp. *recurva* is not listed under any specific international treaty however, and this recovery plan does not affect Australia's obligations under any other international agreements.

Role and interests of Indigenous people: Involvement of the Indigenous community is being sought through the South West Aboriginal Land and Sea Council (SWALSC) and the Department of Indigenous Affairs to assist in the identification of cultural values for land occupied by *Acacia insolita* subsp. *recurva*, or groups with a cultural connection to land that is important for the subspecies' 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 does not list any significant sites in the vicinity of populations of *Acacia insolita* subsp. *recurva*. Where no role is identified for the Indigenous community associated with this subspecies in the development of the recovery plan, opportunities may exist through cultural interpretation and awareness of the subspecies. 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 impacts: The implementation of this recovery plan is unlikely to cause significant adverse social and economic impact. However, as one population of *Acacia insolita* subsp. *recurva* occurs on private property the protection of it may potentially affect future farming activities. Where populations 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 are the owners of private property.

Evaluation of the Plan's Performance: 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 implementation.

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

1. Appropriate land managers have been made aware of the threatened nature of this subspecies, its location and their legal obligations to protect it.
2. Joint DEC/community surveys were conducted in 1996.
3. A comprehensive survey of the plants in Population 1 was completed in 1997.
4. Fencing of Population 2 on private property has been undertaken.
5. Collections of seed from both populations have been stored at DEC's Threatened Flora Seed Centre (TFSC).
6. Research has been undertaken into factors affecting the subspecies reproductive potential.
7. Research into the subspecies response to fire has been conducted by staff from the TFSC and DEC's SCB.
8. Research has been undertaken into the susceptibility of *A. insolita* subsp. *recurva* to *Phytophthora*.
9. Surveys conducted in 2006 identified a number of private property remnants for further survey
10. The Great Southern District Threatened Flora Recovery Team (GSDTFRT) is overseeing the implementation of this recovery plan and will include information on progress in its annual report to DEC's Corporate Executive and funding bodies.
11. Staff from DEC's Great Southern District and community volunteers regularly monitor populations of the subspecies.

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 subspecies in the wild.

Recovery criteria

Criteria for success: The number of populations have increased and/or the number of mature individuals in populations have increased by 10 percent or more over the five year term of the plan.

Criteria for failure: The number of populations have decreased and/or the number of mature individuals in populations have decreased by 10 percent or more over the five year term of the plan.

Recovery actions

- | | |
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| 1. Coordinate recovery actions | 8. Collect seed |
| 2. Propose ranking change | 9. Conduct further surveys |
| 3. Liaise with relevant land managers | 10. Promote awareness |
| 4. Develop and implement fire and disturbance trials | 11. Seek security of tenure for land supporting Population 2 |
| 5. Develop and implement a fire management plan | 12. Obtain biological and ecological information |
| 6. Monitor populations | 13. Review the plan and need for further recovery actions |
| 7. Develop and implement insect control and follow-up with regular monitoring and additional control if required | |

1. BACKGROUND

Analysis of outputs and effectiveness of Interim Recovery Plan (IRP) (1999-2001) prepared by G. Stack and A. Brown.

The 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.

The number of known plants in wild populations has increased from 771 to 800 due to the discovery of an additional 29 mature plants in Population 2.

Actions carried out in the previous plan include:

- Action 1 Obtain biological and ecological information:** Research into reproductive phenology, population structure, soil seed bank dynamics, germination rate, response to fire, impact of grazing and efficiency of germplasm storage techniques has been undertaken.
- Action 5 Preserve genetic diversity of the subspecies:** DEC's Threatened Flora Seed Centre (TFSC) has seed from both populations stored.

Action 5 and other recovery actions included in the previous plan are ongoing and are included in the revised plan.

New recovery actions included in this plan are:

- Action 2** Propose ranking change.
- Action 5** Develop and implement an insect pest control strategy and follow-up with regular monitoring and additional control if required.
- Action 9** Seek security of tenure for land supporting Population 2.
- Action 10** Develop and implement fire and disturbance trials.

History

The first collection of *Acacia insolita* subsp. *recurva* was made from East Yornaning Nature Reserve by Dr. Ken Atkins in 1984. The subspecies was formally described by Bruce Maslin in 1999 (Maslin 1999).

An intensive survey was undertaken in September 1995 but no further populations were found until July 1997 when volunteers discovered a new population (Population 2) on private property.

Description

Acacia insolita subsp. *recurva* is a multi-stemmed shrub 60 to 120 cm tall with slender green or reddish stems that sometimes scramble through associated low vegetation. Each leaf is made up of two compound leaflets that persist on mature plants. The leaflets curve downwards and are shallowly concave but often fold longitudinally about the midrib when dry. The golden flower heads are borne at the ends of the branchlets (Brown *et al.* 1998; Maslin 1999). The seed pod is 5 to 6 mm long and seeds are transverse and cubic to obloid (Maslin 1999).

Acacia insolita subsp. *insolita* is distinguished from *A. insolita* subsp. *recurva* by its flat, non-recurved leaflets (Brown *et al.* 1998).

Distribution and habitat

Acacia insolita subsp. *recurva* is confined to the Shire of Wickkepin where it is known from two populations over a restricted range of less than 7km.

The subspecies is found on exposed lateritic breakaways and lateritic soils in shallow sandy clay supporting open low *Eucalyptus wandoo* and *Allocasuarina huegeliana* woodland over open scrub. Other associated species include *Banksia sessilis*, *Banksia nobilis*, *Acacia pulchella*, *Acacia stenoptera*, *Hovea trisperma* and *Eucalyptus falcata*.

Summary of population land vesting, purpose and tenure

Pop. No. & Location	DEC District	Shire	Vesting	Purpose	Manager
1. West of Wickepin (Nature Reserve)	Great Southern	Wickepin	Conservation Commission	Conservation of Flora and Fauna	DEC
2. West of Wickepin	Great Southern	Wickepin	private property	Freehold	Land Holders

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

Biology and ecology

Acacia insolita subsp. *recurva* is an obligate seeder that is non-lignotuberosus, hence the adult plant is killed by fire. Regeneration after fire occurs from soil stored seed (Yates *et al.* 2000). Initial germination post burn is high, however seedling survival after 18 months is less than 30% resulting in a seedling to parent ratio of 4:1. Seedling growth is initially slow with first flower bud development observed on seedlings after 2 years (Yates *et al.* 2000).

Acacia insolita subsp. *recurva* forms a small but persistent soil seed bank (Yates *et al.* 2000) averaging 10.6 seeds per square metre (Cochrane *et al.* 1999). Average viability of *ex-situ* germinated soil stored seed is 90% (range 82-100%) with initial germination after 11 days and final germination by day 44. Seed viability between individual plants is high, in the range of 95-100% and viability following a year under standard storage conditions is close to 100% (Yates *et al.* 2000).

Propagation from cuttings is observed to be very difficult and success is limited (Amanda Shade, pers. comm).

Despite large numbers of flowers, *Acacia insolita* subsp. *recurva* produces few fruits, with less than 2% of inflorescences over a two year period reaching reproductive maturity (Cochrane *et al.* 1999). Yates *et al.* (2000) observed no specific pollinators visiting *A. insolita* subsp. *recurva* inflorescences.

Yates *et al.* (2000) found that wood boring larvae from the longicorn beetle genus *Ancita* attack the flowering and fruiting tips of the plants resulting in considerable loss of reproductive potential. They conclude that loss of reproductive branches supporting buds, inflorescences and infructescence spikes resulted in a 12% reduction in total reproductive spikes, however Cochrane *et al.* (1999) observed this figure to be as high as 50%.

The distribution of plants across stage and size classes indicates that the population is dominated by adult plants with few immature plants, suggesting that populations will decline as plants senesce (Yates *et al.* 2000).

Preliminary studies, using 10 *Acacia insolita* subsp. *recurva* seedlings have shown that the taxon tends to be fairly resistant to *Phytophthora*.

Threats

Acacia insolita subsp. *recurva* was declared as Rare Flora in 1996 under the *Western Australian Wildlife Conservation Act 1950* and is ranked as Endangered (EN) under World Conservation Union (IUCN 1994) Red List criteria B1+2ce, due to the subspecies extent of occurrence being less than 5,000 km² with continuing decline in the quality of habitat. However, due to its extent of occurrence being less than 100 km² and area of occupancy less than 10km² with fragmented populations and continuing decline in habitat quality, the subspecies now meets Critically Endangered (CR) under IUCN 2001 criteria. It is therefore proposed in Recovery Action 2 to recommend to the Threatened Species Scientific Committee (TSSC) that the ranking of *Darwinia apiculata* be amended to CR under criterion B1ab(iii)+2ab(iii). The subspecies is listed as Endangered (EN) under the *Environment*

Protection Biodiversity Conservation Act, 1999 (EPBC Act). The main threats are damage from boring insects, track and firebreak maintenance activities and inappropriate fire regimes.

- **Damage from boring insects** dramatically reduces the reproductive potential of *Acacia insolita* subsp. *recurva*.
- **Track and firebreak maintenance** threatens *Acacia insolita* subsp. *recurva* Population 1 as plants are located on and adjacent to these areas.
- **Inappropriate fire regimes.** *Acacia insolita* subsp. *recurva* is an obligate seeder with mature plants killed by fire. If fires occur too frequently (before plants are able to flower and fruit) populations are likely to decline as the soil seed bank is exhausted (Yates *et al.* 2000).

Summary of population information and threats

Pop. No. & Location	Land Status	Date / No. of Plants	Condition	Threats
1. West of Wickepin	Nature Reserve	1995 50 1996 60 1997 350 1997 765 (22) [2]	Healthy	inappropriate fire, track and firebreak maintenance, insect damage
2. West of Wickepin	private property	1997 6 (1) 1998 6 (13) 2004 35	Healthy	inappropriate fire, insect damage

Populations in **bold text** are considered to be Important Populations, () = number of seedlings, [] = number dead

Guide for decision-makers

The above table provides details of current and possible future threats. Proposed actions in the immediate vicinity of populations of *Acacia insolita* subsp. *recurva* require assessment for the potential for a significant level of impact.

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

Given that *Acacia insolita* subsp. *recurva* is ranked as EN, it is considered that all known habitat for wild populations is critical to the survival of the subspecies, and that all wild populations are important populations. Habitat critical to the survival of *A. insolita* subsp. *recurva* includes the area of occupancy of extant populations, areas of similar habitat surrounding populations (provided potential habitat for natural recruitment), remnant vegetation that surrounds and links important populations (provides habitat for pollinators) and additional occurrences of similar habitat that may contain the subspecies or be suitable for future translocations.

Benefits to other species or ecological communities

Recovery actions implemented to improve the quality or security of the habitat for *Acacia insolita* subsp. *recurva* will improve the status of remnant native vegetation in which it is located.

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 insolita* subsp. *recurva* is not listed under any specific international treaty and this recovery plan does not affect Australia's obligations under any other international agreements.

Role and interests of Indigenous people

Involvement of the Indigenous community is being sought through the South West Aboriginal Land and Sea Council (SWALSC) and the Department of Indigenous Affairs to assist in the identification of cultural values for land occupied by *Acacia insolita* subsp. *recurva*, or groups with a cultural connection to land that is important for the subspecies' 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 does not list any significant sites in the vicinity of populations of *Acacia insolita* subsp. *recurva*. Where no role is identified for the Indigenous community associated with this subspecies in the development of the recovery plan, opportunities may exist through cultural interpretation and awareness of the subspecies. 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 impacts

The implementation of this recovery plan is unlikely to cause significant adverse social and economic impacts. However, as one population of *Acacia insolita* subsp. *recurva* occurs on private property, its protection potentially affects farming activities. Where populations are located on private property recovery actions refer to continued liaison between stakeholders.

Affected interests

Stakeholders potentially affected by the implementation of this plan are the private property owners.

Evaluation of the Plans 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 OBJECTIVES 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 subspecies in the wild.

Criteria for success The number of populations have increased and/or the number of mature individuals in populations have increased by 10 percent or more over the five year term of the plan.

Criteria for failure The number of populations have decreased and/or the number of mature individuals in populations have decreased by 10 percent or more over the five year term of the plan.

3. RECOVERY ACTIONS

Existing recovery actions

Appropriate land managers have been made aware of the threatened nature of the subspecies, its location and their legal obligations to protect it.

In 1996 a survey for *Acacia insolita* subsp. *recurva* was conducted covering nature reserves, Dryandra State Forest, Unallocated Crown Land and private property in the Shires of Wickepin, Cuballing and Pingelly. Nature Reserves surveyed include Yarling NR, Claypit NR, Fourteen Mile Brook NR, Rosedale NR, Mungerungcutting NR, Hotham River NR, Yornaning NR, Tutanning NR and Commodine NR. Two volunteers who took part in this survey subsequently discovered plants on private property (Population 2).

Population 1 was thoroughly surveyed in 1997 resulting in the accurate documentation of the number of plants present.

In 1997 rabbit proof fencing was erected around Population 2 with materials provided by DEC.

DEC's Threatened Flora Seed Centre (TFSC) holds 1,975 seeds from populations 1 and 2.

In March 1998 a control burn was undertaken to on 27 plants in Population 1 to establish the subspecies response to fire. The area was fenced to prevent grazing and the germination success monitored (Yates *et al.* 2000). Eighteen months post burn 359 seedlings had emerged.

Investigations into the reproductive phenology, inflorescence/fruit ratios and mean number of seed per pod in *Acacia insolita* subsp. *recurva* were conducted in 1997, 1998 and 1999. Investigations were also undertaken into density of weed seeds in soil seed banks at Population 1 (Yates *et al.* 2000).

Research was conducted in 1999 on the effects of grazing and invertebrate pests on the reproductive potential of *Acacia insolita* subsp. *recurva* (Yates *et al.* 2000).

In 2006 surveys for *Acacia insolita* subsp. *recurva* included Fourteen Mile Brook NR, North Yilliminning NR, Oakley NR, and Claypit NR. However, no new populations were found. During the searches a number of private property remnants were identified for future survey.

Preliminary studies using 10 *Acacia insolita* subsp. *recurva* seeds have shown that the subspecies is fairly resistant to *Phytophthora* species.

The Great Southern District Threatened Flora Recovery Team (GSDTFRT) is overseeing the implementation of this recovery plan and will include information on progress in annual reports to DEC's Corporate Executive and funding bodies.

Staff from DEC's Great Southern District and volunteers regularly monitor populations of the subspecies.

Future recovery actions

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 are coordinating recovery actions for *Acacia insolita* subsp. *recurva* and will include information on progress in their annual report to the DEC's Corporate Executive and funding bodies.

Action: Coordinate recovery actions
Responsibility: GSDTFRT
Cost: \$2,800 annually

2. Propose ranking change

Propose to the next meeting of the Threatened Species Scientific Committee (TSSC WA) that the ranking of *Acacia insolita* subsp. *recurva* be amended from EN B1+2ce to CR B1ab(iii)+2ab(iii). The subspecies now meets Criteria for CR due to the extent of occurrence being less than 100 km² and area of occupancy less than 10km² with fragmented populations and continuing decline in habitat quality.

Action: Propose ranking change

Responsibility: DEC (Species and Communities Branch (SCB) and Great Southern District) through the GSDTFRT
Cost: \$1,000 in first year.

3. Liaise with relevant land managers

Staff from DEC's Great Southern District will continue to liaise with the private property owners at Population 2. Input and involvement will also be sought from any Aboriginal groups that have an active interest in areas that are habitat for *Acacia insolita* subsp. *recurva*.

Action: Liaise with relevant land managers
Responsibility: DEC (Great Southern District), through the GSDTFRT
Cost: \$1000 in year 1 and \$500 in years 2-5

4. Develop and implement fire and disturbance trials

DEC's Great Southern District will, in consultation with private landowners and relevant authorities, develop and implement burn and disturbance trials to stimulate germination of *Acacia insolita* subsp. *recurva*. The results of trials will be monitored. Weed control may be needed if fire stimulates the germination of weed seeds.

Action: Develop and implement fire and disturbance trials
Responsibility: DEC (Science Division, Great Southern District) through the GSDTFRT, and relevant authorities.
Cost: \$2,400 annually.

5. Develop and implement a fire management plan

Acacia insolita subsp. *recurva* is an obligate seeder that germinates post fire and senesces over time. However, if fires occur before plants reach maturity and replace the soil seed bank, population extinction may result. It is important that a fire regime with appropriate fire frequency, intensity and seasonality be developed to maximize population size and health. A fire management plan will be developed by DEC's Great Southern District in consultation with relevant land managers and the GSDTFRT. This will include the maintenance of firebreaks in Yornaning Nature Reserve.

Action: Develop and implement a fire management plan
Responsibility: DEC (Great Southern District) through the GSDTFRT, and relevant authorities.
Cost: \$3,100 in the first year.

6. 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. Populations will be inspected annually and Rare Flora Report Forms completed.

Action: Monitor populations
Responsibility: DEC (Great Southern District) through the GSDTFRT
Cost: \$400 annually

7. Develop and implement an insect control and follow-up with regular monitoring and additional control if required

Wood boring larvae from the longicorn beetle genus *Ancita* are attacking flowering and fruiting tips of *Acacia insolita* subsp. *recurva* resulting in loss of reproductive potential. Application of a systemic insecticide such as RogorTM at appropriate concentrations is recommended to abate this threat. The subspecies flowers from July to August, with buds present in April onwards so spraying is

recommended in March. Spraying of plants while in flower may be detrimental to pollination thus spraying at this time should be avoided.

Action: Develop and implement insect control and follow-up with regular monitoring and additional control if required
Responsibility: DEC (Great Southern District) through the GSDTFRT
Cost: \$3,500 in year 1 for plan development and \$6,800 in years 2-5 for implementation

8. Collect seed

Ex-situ conservation of seed provides insurance against extinction in the wild and provides material for research purposes and for future recovery programs. DEC's TFSC currently hold some seed from populations 1 and 2. It is recommended that additional seed be collected from both populations. Collections should aim to sample and preserve the maximum range of genetic diversity possible. The "Germplasm Conservation Guidelines for Australia" produced by the Australian Network for Plant Conservation (ANPC) should be used to guide this process.

Action: Collect seed
Responsibility: DEC (TFSC, Great Southern District) and BGPA, through the GSDTFRT
Cost: \$1,600 annually

9. Conduct further surveys

Further surveys for *Acacia insolita* subsp. *recurva* will be conducted with the assistance of local naturalists and volunteers during the plants flowering period.

Action: Conduct further surveys
Responsibility: DEC (Great Southern District) through the GSDTFRT
Cost: \$4,000 in years 1, 3 and 5.

10. Promote awareness

The importance of biodiversity conservation and the protection of *Acacia insolita* subsp. *recurva* 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 provides a description of the subspecies and information about threats and recovery actions needs to be developed and distributed to local land owners, relevant authorities and volunteer organizations, 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.

Action: Promote awareness
Responsibility: DEC (Great Southern District, Species and Communities Branch (SCB) and Strategic Development and Corporate Affairs Division) through the GSDTFRT.
Cost: \$1,600 in the first year; \$1,000 in years 3 and 5.

11. Seek security of tenure for land supporting Population 2

The conservation status of the remnant vegetation on private property that supports Population 2 will be reviewed and the possibility of additional protection through the reservation system investigated.

Action: Seek security of tenure for land supporting Population 2
Responsibility: DEC (Great Southern District) through the GSDTFRT
Cost: \$1,900 in the first year; \$300 in years 2-5.

12. Obtain biological and ecological information

Preliminary studies into the conservation biology of *Acacia insolita* subsp. *recurva* were undertaken by Yates *et al.* in 2000. Funding for the study was limited and further planned studies were not completed. These include studies on:

- Mating system and pollination biology.
- Population genetic structure, levels of genetic diversity and minimum viable population size.
- Age at which first seed is produced and age of maximum seed production.
- Longevity of soil seed banks

Action: Obtain biological and ecological information

Responsibility: DEC (Science Division, Great Southern District) through the GSDTFRT

Cost: \$18,000 per year for the first three years.

13. Review the plan and need for further recovery actions

At the end of its five-year term the recovery plan will be reviewed and the need for further recovery actions assessed.

Action: Review the need for further recovery actions

Responsibility: DEC (Great Southern District) through the GSDTFRT

Cost: \$1,500 in the forth year.

Summary of recovery actions

Recovery Actions	Priority	Responsibility	Completion date
Coordinate recovery actions	High	GSDTFRT	Ongoing
Propose ranking change	High	DEC	2009
Liaise with relevant land managers	High	DEC (Great Southern District) through the GSDTFRT	Ongoing
Develop and implement fire and disturbance trials	High	DEC (Science Division, Great Southern District) through the GSDTFRT, and relevant authorities.	Ongoing
Develop and implement a fire management plan	High	DEC (Great Southern District) through the GSDTFRT, and relevant authorities.	Developed by 2009 with implementation ongoing
Monitor populations	High	DEC (Great Southern District) through the GSDTFRT	Ongoing
Develop and implement insect control and follow-up with regular monitoring and additional control if required	High	DEC (Great Southern District) through the GSDTFRT	Ongoing
Collect seed	High	DEC (TFSC, Great Southern District) and BGPA, through the GSDTFRT	Ongoing
Conduct further surveys	Moderate	DEC (Great Southern District) through the GSDTFRT	Ongoing
Promote awareness	Moderate	DEC (Great Southern District, Species and Communities Branch (SCB) and Strategic Development and Corporate Affairs Division) through the GSDTFRT.	Ongoing
Seek security of tenure for land supporting Population 2	Moderate	DEC (Great Southern District) through the GSDTFRT	2013
Obtain biological and ecological information	Moderate	DEC (Science Division, Great Southern District) through the GSDTFRT	2011
Review the plan and need for further recovery actions	Low	DEC (Great Southern District) through the GSDTFRT	2013

4. TERM OF PLAN

Western Australia

This IRP will operate from February 2008 to January 2013 but will remain in force until withdrawn or replaced. If the taxon is still ranked EN 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* this adopted recovery plan will remain in force until revoked.

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

5. REFERENCES

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6. TAXONOMIC DESCRIPTION

Excerpt from: Maslin, B.R. (1999) The taxonomy of fifty-five species of *Acacia*, primarily Western Australian, in section Phyllodineae (Leguminosae: Mimosoideae). *Nuytsia*. **12 (3)**: 363.

Shrub 0.6-1.2 m tall, dividing at ground level into many slender, spreading to erect branches. Differs from subsp. *insolita* chiefly in the following ways. *Stems* pubescent, glabrescent. *Pinnules* shallowly concave but commonly conduplicate when dry, recurved, \pm glaucous. *Phyllodes* 10-30 mm long, 1- 1.5 mm wide, flat to compressed, thick, midrib not prominent (seemingly absent on very narrow phyllodes which instead have a shallow medial groove running their entire length). *Heads* apparently golden. *Pod* 5 – 6 mm wide. Seeds transverse, cubic to obloid.

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	2,000	500	300	2,000	500	300	2,000	500	300	2,000	500	300	2,000	500	300
Propose ranking change	1,000														
Liaise with relevant land managers	1,000		200	300		200	300		200	300		200	300		200
Develop and implement disturbance trials	1,300	500	600	1,300	500	600	1,300	500	600	1,300	500	600	1,300	500	600
Develop and implement a fire management plan	2,000	600	500												
Monitor populations	300		100	300		100	300		100	300		100	300		100
Develop and implement insect control and follow-up with regular monitoring and additional control if required	3,000		500	6,000		800	6,000		800	6,000		800	6,000		800
Collect seed	1,300		300	1,300		300	1,300		300	1,300		300	1,300		300
Conduct further surveys	3,000		1,000				3,000		1,000				3,000		1,000
Promote awareness	1,000		600				1,000						1,000		
Seek security of tenure for land supporting Population 2	1,500		400	200		100	200		100	200		100	200		100
Obtain biological and ecological information	13,000		5,000	13,000		5,000	13,000		5,000						
Review the plan and need for further recovery actions										1,500					
Total	30,400	1,600	9,500	24,400	1,000	7,400	28,400	1,000	8,400	12,900	1,000	2,400	15,400	1,000	3,400
Yearly Total	41,500			32,800			37,800			16,300			19,800		

Ext. = External funding (funding to be sought).

Total DEC: \$111,500

Total Other: \$5,600

Total External Funding: \$31,100

Total Costs: \$148,200