

INTERIM RECOVERY PLAN NO. 286

Velvety Spiral Pod Wattle
(*Acacia cochlocarpa* subsp. *velutinosa*)

INTERIM RECOVERY PLAN
2009-2014



June 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This plan will operate from June 2009 to May 2014 but will remain in force until withdrawn or replaced.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 13 June 2009 and was approved by the Director of Nature Conservation on 22 June 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 June 2009.

IRP PREPARATION

This IRP was prepared by Robyn Luu¹ and Andrew Brown².

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ACKNOWLEDGMENTS

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

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|-----------------|---|
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| Andrew Crawford | Principal Technical Officer, Threatened Flora Seed Centre, DEC Science Division |
| Monica Hunter | Project Officer, DEC Species and Communities Branch |
| 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 Joel Collins.

CITATION

This IRP should be cited as:

Department of Environment and Conservation (2009) Velvety Spiral Pod Wattle (*Acacia cochlocarpa* subsp. *velutinos*) Interim Recovery Plan 2009-2014. Interim Recovery Plan No. 286 Department of Environment and Conservation, Western Australia.

SUMMARY

| | | | |
|-------------------------|---|--------------------------|---------------------------|
| Scientific Name: | <i>Acacia cochlocarpa</i> subsp. <i>velutinosa</i> | Common Name: | Velvety spiral pod wattle |
| Family: | Mimosaceae | Flowering Period: | June - August |
| DEC Region: | Wheatbelt | DEC District: | Avon-Mortlock |
| Shires: | Wongan-Ballidu, Dowerin | NRM Region: | Avon |
| Recovery Team: | Avon-Mortlock Threatened Flora and Communities Recovery Team (AMDTFCRT) | | |

Illustrations and/or further information: Maslin, B.R. and Chapman, A.R. (1999) *Acacia* miscellany 19. The Taxonomy of some Western Australian species of *Acacia* section *Juliflorae* with 4-merous flowers (Leguminosae: Mimosoideae). *Nuytsia* 12 (3), 469-486; Western Australian Herbarium (1998-) *FloraBase – The Western Australian Flora*. Department of Environment and Conservation. <http://florabase.dec.wa.gov.au/>.

Current status: *Acacia cochlocarpa* subsp. *velutinosa* was declared as Rare Flora under the Western Australian *Wildlife Conservation Act 1950* in July 2004 and is currently ranked as Critically Endangered (CR) under World Conservation Union (IUCN 2001) criteria B1ab(v)+2ab(v) due to the extent of occurrence being less than 100km², the area of occupancy less than 10km², and the continuing decline in the number of mature individuals. *A. cochlocarpa* subsp. *velutinosa* is listed as Critically Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The main threats to the subspecies are road, rail and track maintenance activities, weeds, degraded habitat, inappropriate fire regimes, grazing, illegal waste dumping, continued clearing, hydrological changes and poor recruitment.

Description: *Acacia cochlocarpa* subsp. *velutinosa* is a spreading shrub to 70 cm high and 3 metres across. The flower heads are bright golden and the seed pods are tightly coiled. The phyllodes are 2.5 to 4 cm long, 3 to 5 mm wide, and have 3 to 5 nerves. The name *velutinosa* refers to the hairy covering on the branchlets, phyllodes and especially the pods.

Habitat requirements: *Acacia cochlocarpa* subsp. *velutinosa* occurs north-east of Perth in the Manmanning, Dowerin and Wongan Hills areas. It grows in sandy clay in heath and on sandy laterite in mallee.

Habitat critical to the survival of the subspecies, and important populations: Given that *Acacia cochlocarpa* subsp. *velutinosa* is ranked as CR, 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. cochlocarpa* subsp. *velutinosa* 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 subspecies or be suitable for future translocations, and the local catchment for the surface and/or groundwater that maintains the habitat of the subspecies.

Benefits to other species or ecological communities: Recovery actions implemented to improve the quality or security of the habitat of *Acacia cochlocarpa* subsp. *velutinosa* will also improve the status of associated native vegetation including three Priority flora taxa.

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 cochlocarpa* subsp. *velutinosa* is not listed under any specific international treaty however, and this IRP does not affect Australia's obligations under any other international agreements.

Indigenous Consultation: The Aboriginal Sites Register maintained by the Department of Indigenous Affairs does not list any significant sites in the vicinity of populations of *Acacia cochlocarpa* subsp. *velutinosa* and no indigenous communities that may be interested or involved in the area affected by this plan have been identified. Although there appear to be no specific actions identified in the plan that would potentially be at variance with indigenous culture or land management practices, the advice of the South West Aboriginal Land and Sea Council (SWALSC) and Department of Indigenous Affairs is being sought to determine whether there are any other issues or interests identified. If no role is identified for indigenous communities in the recovery of this subspecies, opportunities may exist through cultural interpretation and awareness of the subspecies. Recovery actions identified within this plan refer to continued liaison and cooperation with indigenous communities and the managers of the land.

Social and economic impacts: The implementation of this recovery plan is unlikely to cause significant adverse social and economic impact. However, as Populations 2 and 3 occur on private property, the protection of *Acacia cochlocarpa* subsp. *velutinosa* may potentially affect development and asset protection measures at these sites.

Affected interests: The protection of the subspecies may potentially impact on Shire, WestNet Rail operations and private landholder activities.

Evaluation of the Plan's Performance: The DEC in conjunction with the Avon-Mortlock District Threatened Flora and

Communities Recovery Team (AMDTCRT) 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.

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

1. Surveys for *Acacia cochlocarpa* subsp. *velutinosa* were undertaken in 2000, 2001, 2006, 2007 and 2008.
2. Declared Rare Flora (DRF) markers have been installed at Populations 4, 5, 6, 7, 8, 9 and 10.
3. In November 1998, 4742 seeds were collected from Population 1 and 212 seeds from Population 2 of *Acacia cochlocarpa* subsp. *velutinosa*. All seeds are stored at DEC's Threatened Flora Seed Centre (TFSC) at -18°C.
4. Staff from DEC's Avon-Mortlock District regularly monitor populations.
5. The AMDTCRT is overseeing the implementation of this IRP and will include information on progress in its annual report to DEC's Corporate Executive and relevant 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 subspecies 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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| <ol style="list-style-type: none"> 1. Coordinate recovery actions 2. Map habitat critical to the survival of <i>Acacia cochlocarpa</i> subsp. <i>velutinosa</i> 3. Confirm identification and formally notify land managers 4. Install DRF markers 5. Remove rubbish from Population 1 6. Deter rubbish dumping at Population 1 7. Undertake weed control and follow up with additional control if required 8. Collect seed and other material to preserve genetic diversity 9. Conduct habitat rehabilitation 10. Monitor populations | <ol style="list-style-type: none"> 11. Implement grazing control where necessary 12. Conduct further surveys 13. Develop and implement a fire management strategy 14. Develop and implement disturbance trials 15. Achieve long-term protection of habitat 16. Liaise with relevant land managers and Indigenous groups 17. Promote awareness 18. Obtain biological and ecological information 19. Start the translocation process if necessary 20. Review this IRP and assess the need for further recovery actions |
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1. BACKGROUND

History

The first authenticated collection of *Acacia cochlocarpa* subsp. *velutinosa*, housed at the WA Herbarium, was made near Manmanning by B. and M. Smith in 1974. A possible earlier collection was made from near York, but it is likely this locality description is an error (Maslin and Chapman 1999).

Surveys of Crown lands by DEC staff from Merredin District (now Yilgarn District) within a 25 km radius of Manmanning, during the 2000 flowering season, failed to locate any new populations of *Acacia cochlocarpa* subsp. *velutinosa*. Further surveys of 160 km of roadsides and 22 reserves in the Manmanning area were undertaken by WA Herbarium staff during the 2001 flowering season. No new populations were discovered.

From 2006 to 2008, surveys over a wider area by DEC staff from the Avon-Mortlock District and volunteers resulted in the discovery of five new populations on road reserves and one on a rail reserve. A potential new population was also discovered on a road reserve in the Shire of Wongan-Ballidu but has yet to be confirmed as the subspecies.

Acacia cochlocarpa subsp. *velutinosa* is currently known from ten populations consisting of approximately 141 mature individuals.

Description

Acacia cochlocarpa subsp. *velutinosa* is a spreading shrub to 70 cm high and 3 metres across. Flower heads are bright golden and seed pods tightly coiled. Phyllodes are 2.5 to 4 cm long, 3 to 5 mm wide, and have 3 to 5 nerves. The name *velutinosa* refers to the hairy covering on the branchlets, phyllodes and especially the pods (Maslin and Chapman 1999).

Although it appears the two subspecies of *Acacia cochlocarpa* do not directly overlap in distribution (Maslin and Chapman 1999) with *A. cochlocarpa* subsp. *cochlocarpa* occurring near Watheroo and north of Goomalling and *A. cochlocarpa* subsp. *velutinosa* occurring near Manmanning, a new population of *A. cochlocarpa* subsp. *cochlocarpa* located last year near North of Goomalling, was only 25 km from the other subspecies.

Acacia cochlocarpa subsp. *velutinosa* has hairy branchlets, pods and phyllode nerves, compared to the glabrous branchlets, pods and phyllodes of *A. cochlocarpa* subsp. *cochlocarpa*. *A. cochlocarpa* subsp. *velutinosa* has an affinity with *Acacia lirellata* subsp. *compressa* but can be distinguished by its phyllodes which are 3 to 6 mm wide, and its tightly spirally or irregularly coiled pods (Maslin and Chapman 1999).

Distribution and habitat

Acacia cochlocarpa subsp. *velutinosa* is known from ten populations in the Manmanning, Dowerin and Wongan Hills areas approximately 180 km north-east of Perth. The subspecies grows in sandy clay in heath and on sandy laterite in mallee (Maslin and Chapman 1999). Associated species include *Allocasuarina campestris*, *Ecdiocollea monostachya*, *Astroloma serratifolium*, *Melaleuca radula*, *Hakea scoparia*, *Grevillea hookeriana* and *Austrostipa elegantissima*.

Biology and ecology

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

Acacia seeds often have a hard seed coat and remain dormant until the seed coat is ruptured by heating or scarifying. This is a method exploited by many Australian species of *Acacia* to survive fires that are a regular natural occurrence in many Australian habitats. This was evident at Population 3, which regenerated after a fire in 1986, appearing healthy and flowering when observed 15 years later.

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

| Pop. No. & Location | DEC District | Shire | Vesting | Purpose | Manager |
|-----------------------------|---------------|----------------|-------------------------|------------------------|-------------------------|
| 1. SW of Manmanning | Avon-Mortlock | Dowerin | Non vested | Unallocated Crown Land | Shire of Dowerin |
| 2. SW of Manmanning | Avon-Mortlock | Dowerin | Freehold | Private Property | Landowners |
| 3. SW of Manmanning | Avon-Mortlock | Dowerin | Freehold | Private Property | Landowners |
| 4. E of Cadoux | Avon-Mortlock | Wongan-Ballidu | Shire of Wongan Ballidu | Road Reserve | Shire of Wongan Ballidu |
| 5. NE of Dowerin | Avon-Mortlock | Dowerin | Shire of Dowerin | Road Reserve | Shire of Dowerin |
| 6. WSW of Manmanning | Avon-Mortlock | Wongan-Ballidu | Shire of Wongan Ballidu | Road Reserve | Shire of Wongan Ballidu |
| 7. WSW of Manmanning | Avon-Mortlock | Wongan-Ballidu | Shire of Wongan Ballidu | Road Reserve | Shire of Wongan Ballidu |
| 8. WSW of Manmanning | Avon-Mortlock | Wongan-Ballidu | Shire of Wongan Ballidu | Road Reserve | Shire of Wongan Ballidu |
| 9. E of Cadoux | Avon-Mortlock | Wongan-Ballidu | Shire of Wongan Ballidu | Road Reserve | Shire of Wongan Ballidu |
| 10a. S of Cadoux | Avon-Mortlock | Wongan-Ballidu | Shire of Wongan Ballidu | Rail Reserve | WestNet Rail |
| 10b. S of Cadoux | Avon-Mortlock | Wongan-Ballidu | Shire of Wongan Ballidu | Rail Reserve | WestNet Rail |

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

Threats

Acacia cochlocarpa subsp. *velutinosa* was declared as Rare Flora under the Western Australian *Wildlife Conservation Act 1950* in July 2004 and is currently ranked as Critically Endangered (CR) under World Conservation Union (IUCN 2001) criteria B1ab(v)+2ab(v) due to its extent of occurrence being less than 100km², its area of occupancy less than 10km², and the continuing decline in the number of mature individuals. *A. cochlocarpa* subsp. *velutinosa* is listed as Critically Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The main threats to the subspecies are road and track maintenance activities, weeds, degraded habitat, inappropriate fire regimes, grazing, illegal waste dumping, clearing, hydrological changes and poor recruitment.

- **Road, rail and track maintenance activities** threaten Populations 1, and 4-10 and their habitat. Threats include grading road reserves and tracks, spraying of chemicals, construction and maintenance of drainage channels and mowing the roadside vegetation to improve visibility. These disturbance events often encourage weed invasion, as well as causing damage to plants. Relevant authorities need to be informed of the location of populations so that appropriate protective measures can be implemented. Adjacent landowners should also be informed of the location of populations to prevent possible damage due to fence, firebreak and crop maintenance, grazing and other activities.
- **Weeds** are a threat to Populations 4-10. 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.
- **Degraded habitat:** Populations that occur on degraded road reserves have very little associated natural vegetation. Native fauna, soil fungi and bacteria, upon which *Acacia cochlocarpa* subsp. *velutinosa* may be dependent for its long term survival, may be locally impoverished or no longer present at the site.
- **Inappropriate fire regimes** is a threat to all populations. It is not known how the subspecies responds to fire but it is likely that fire is needed for recruitment. Lack of fire may lead to a decline in population size while frequent fire may result in a depletion of the soil seed bank if it occurs before plants reach maturity and is also likely to facilitate weed invasion.
- **Grazing** has been observed at Populations 4, 5 and 9. However it is not known what impact, if any, it is having on the plant. Grazing of plants by animals such as rabbits (*Oryctolagus cuniculus*) may potentially reduce recruitment. In addition, digging, erosion, the addition of nutrients and introduction of weed seeds resulting from rabbit activity encourages weed invasion.
- **Illegal waste dumping** is a threat to Population 1, which is located adjacent to the townsite rubbish dump. Waste may impact on the site through the leaching of toxic chemicals into the soil, encouraging weeds, and

providing habitat for rabbits. While being unsightly, the appearance of waste usually contributes to more rubbish being dumped at the site.

- **Clearing** for future development is a threat to Population 1 which is located in a townsite reserve.
- **Hydrological changes** including salinity has the potential to impact on all populations. Many populations are in heavily cleared areas which are potentially threatened by future rising saline water tables.
- **Poor recruitment** observed in populations of the subspecies is likely due to a reduction of natural fire events and other factors in the subspecies habitat that influence reproduction.

The intent of this plan is to provide actions that will deal with immediate threats to *Acacia cochlocarpa* subsp. *velutinosa*. Although climate change may have a long-term effect on the subspecies, 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 |
|----------------------|------------------------|--------------------------------|-------------------|--|
| 1. SW of Manmanning | Unallocated Crown Land | 1998 30 2000 30 2001 30+ | Healthy | Rubbish dumping, track maintenance, clearing |
| 2. SW of Manmanning | Private Property | 2001 2 | Moderate | Inappropriate fire regimes |
| 3. SW of Manmanning | Private Property | 1998 100 2001 50+ | Healthy | Inappropriate fire regimes |
| 4. E of Cadoux | Shire Road Reserve | 2006 1 2007 0 | Disturbed | Road maintenance, grazing, weeds, salinity, degraded habitat |
| 5. NE of Dowerin | Shire Road Reserve | 2007 5 | Moderate | Road maintenance, weeds, grazing, salinity, degraded habitat |
| 6. WSW of Manmanning | Shire Road Reserve | 2007 1 | Disturbed | Road maintenance, weeds, degraded habitat |
| 7. WSW of Manmanning | Shire Road Reserve | 2007 1 | Disturbed | Road maintenance, weeds, degraded habitat |
| 8. WSW of Manmanning | Shire Road Reserve | 2007 11 | Disturbed | Road maintenance, weeds, degraded habitat |
| 9. E of Cadoux | Shire Road Reserve | 2007 4 | Disturbed | Road maintenance, weeds, grazing, salinity, degraded habitat |
| 10a. S of Cadoux | Rail Reserve | 2008 21 | Moderate | Weeds road and rail maintenance |
| 10b. S of Cadoux | Rail Reserve | 2008 16 | Moderate | Weeds, rail maintenance |

Guide for decision-makers

Section 1 provides details of current and possible future threats. Development and/or land clearing in the immediate vicinity of *Acacia cochlocarpa* subsp. *velutinosa* 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 subspecies, its habitat or potential habitat or on the local surface hydrology, such that drainage in the habitat of the subspecies would be altered.

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

Given that *Acacia cochlocarpa* subsp. *velutinosa* is ranked as CR, it is considered that all known habitat for wild populations is habitat critical to the survival of the subspecies, and that all wild populations are important populations. Habitat critical to the survival of *A. cochlocarpa* subsp. *velutinosa* 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 subspecies or be suitable for future translocations, and the local catchment for the surface and/or groundwater that maintains the habitat of the subspecies.

Benefits to other species or ecological communities

Recovery actions implemented to improve the quality or security of the habitat of *Acacia cochlocarpa* subsp. *velutinosa* will also improve the status of associated native vegetation including three Priority flora taxa that occur in association with the subspecies. These are listed in the table below:

Table 3. Conservation-listed flora species occurring in habitat of *Acacia cochlocarpa* subsp. *velutinosa*

| Species name | Conservation Status (WA) | Conservation Status (EPBC Act 1999) |
|--------------------------------|--------------------------|-------------------------------------|
| <i>Leucopogon</i> sp. Bungulla | Priority 2 | - |
| <i>Cryptandra dielsii</i> | Priority 3 | - |
| <i>Melaleuca sclerophylla</i> | Priority 3 | - |

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

Acacia cochlocarpa subsp. *velutinosa* does not occur in any Threatened Ecological Communities (TECs).

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 cochlocarpa* subsp. *velutinosa* is not listed under any specific international treaty however, and this IRP does not affect Australia's obligations under any other international agreements.

Indigenous Consultation

The Aboriginal Sites Register maintained by the Department of Indigenous Affairs does not list any significant sites in the vicinity of populations of *Acacia cochlocarpa* subsp. *velutinosa* and no indigenous communities that may be interested or involved in the area affected by this plan have been identified. Although there appear to be no specific actions identified in the plan that would potentially be at variance with indigenous culture or land management practices, the advice of the South West Aboriginal Land and Sea Council (SWALSC) and Department of Indigenous Affairs is being sought to determine whether there are any other issues or interests identified. If no role is identified for indigenous communities in the recovery of this subspecies, opportunities may exist through cultural interpretation and awareness of the subspecies. Recovery actions identified within this plan refer to continued liaison and cooperation with indigenous communities and the managers of the land (see action 16).

Social and economic impacts

The implementation of this recovery plan is unlikely to cause significant adverse social and economic impact. However, as Populations 2 and 3 occur on private property, the protection of *Acacia cochlocarpa* subsp. *velutinosa* on these sites may potentially affect development and asset protection measures.

Affected interests

The protection of the subspecies may potentially impact on Shire, WestNet Rail operations and private landholder activities.

Evaluation of the Plan's Performance

The DEC in conjunction with the Avon-Mortlock District Threatened Flora and Communities Recovery Team (AMDTCRT) 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 subspecies 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

Surveys for *Acacia cochlocarpa* subsp. *velutinos* have been undertaken. During the 2000 flowering season, surveys of Crown lands by DEC district staff, within a 25 km radius of Manmanning, failed to locate any new populations. In 2001 surveys of 160 km of roadsides and 22 reserves in the Manmanning area were undertaken by WA Herbarium staff, also with no new populations discovered. From 2006 to 2008, surveys over a wider area by volunteers and staff from DEC's Avon-Mortlock District resulted in the discovery of five new populations on road reserves and one on a rail reserve.

Declared Rare Flora (DRF) markers have been installed at Populations 4, 5, 6, 7, 8, 9 and 10. 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 November 1998, 4742 seeds were collected from Population 1 and 212 seeds from Population 2. All are stored in DEC's Threatened Flora Seed Centre (TFSC) at -18°C . The TFSC test the viability of the seed initially and after one year in storage. The germination rate of *Acacia cochlocarpa* subsp. *velutinos* seed has been tested and was found to be 76%.

Staff from DEC's Avon-Mortlock District regularly monitor populations.

The AMDTFCRT are overseeing the implementation of this IRP and will include information on progress in their annual report to DEC's Corporate Executive and relevant 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 AMDTFCRT will continue to oversee the implementation of the recovery actions for *Acacia cochlocarpa* subsp. *velutinos* and will include information on progress in their annual report to DEC's Corporate Executive and relevant funding bodies.

Action: Coordinate recovery actions
Responsibility: DEC (Avon-Mortlock District) through the AMDTFCRT
Cost: \$3,000 per year

2. Map habitat critical to the survival of *Acacia cochlocarpa* subsp. *velutinos*

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 the subspecies be determined. Although this habitat 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 be determined and mapped also.

Action: Map habitat critical to the survival of *Acacia cochlocarpa* subsp. *velutinos*
Responsibility: DEC (Species and Communities Branch (SCB), Avon-Mortlock District) through the AMDTFCRT
Cost: \$3,000 in year 1

3. Confirm identification and formally notify land managers

A new population consisting of two subpopulations (10a and b) of *Acacia cochlocarpa* subsp. *velutinos* was discovered on a rail reserve by DEC staff in August 2008. The Public Transport Authority will be formally notified of its presence to ensure its protection. A potential new population was also discovered in July 2008 on a road reserve, but has yet to have its identification confirmed. The Shire of Dowerin will be formally notified of its presence once confirmed.

Action: Confirm identification and formally notify land managers
Responsibility: DEC (SCB, Avon-Mortlock District) through the AMDTFCRT
Cost: \$500 in year 1

4. Install DRF markers

DRF markers are required along tracks at Population 1.

Action: Install DRF markers
Responsibility: DEC (Avon-Mortlock District) through the AMDTFCRT
Cost: \$2,000 in year 1

5. Remove rubbish from Population 1

Rubbish dumped at Population 1 will need to be removed. As the population is located adjacent to a rubbish tip it is likely that rubbish removal will need to occur regularly.

Action: Remove rubbish from Population 1
Responsibility: DEC (Avon-Mortlock District), Shire of Dowerin through the AMDTFCRT
Cost: \$5,000 per year

6. Deter rubbish dumping at Population 1

Ways of deterring people from dumping rubbish at the site of Population 1 will need to be investigated. Such actions may include:

- Signs advising people of the significance of the site and advising them to dump rubbish at the rubbish tip only.
- Fencing or bollards to prevent access to the site.

Action: Deter rubbish dumping at Population 1
Responsibility: DEC (Avon-Mortlock District), Shire of Dowerin through the AMDTFCRT
Cost: \$5,000 in year 1

7. Undertake weed control and follow up with additional control if required

Weeds threaten Populations 4-10 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 when weeds first emerge.
4. Monitor the success of treatment.
5. Report on the method and success of the treatment, and effect on *Acacia cochlocarpa* subsp. *velutinos* and associated species.
6. Revegetate degraded areas with local native plant species to maintain low weed levels.

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

8. Collect seed and other material to preserve genetic diversity

Some seed has already been collected from Populations 1 and 2. Further collections by DEC's TFSC staff are required to ensure the genetic diversity of the subspecies 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 (Avon-Mortlock District, TFSC), BGPA through the AMDTFCRT
Cost: \$2,500 per year

9. Conduct habitat rehabilitation

Restoration of *Acacia cochlocarpa* subsp. *velutinos* habitat by the re-introduction of endemic plant species will be undertaken. In the long term, a link will be established with other nearby road reserve remnants so as to enable gene exchange between native plant species and the reintroduction fauna, fungi and bacteria that may be deficient at the site.

Action: Conduct habitat rehabilitation
Responsibility: DEC (Avon-Mortlock District) through the AMDTFCRT
Cost: \$3,000 in years 1, 2 and 3

10. 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.

Action: Monitor populations
Responsibility: DEC (Avon-Mortlock District) through the AMDTFCRT
Cost: \$3,500 per year

11. Implement grazing control where necessary

When monitoring ascertains that the grazing threat is high, control measures may be required. For rabbits baiting using 1080 oats should be undertaken in summer months when less green feed is available as an alternative food source. For kangaroos a control strategy which may include caging the plants may be required.

Action: Implement grazing control where necessary
Responsibility: DEC (Avon-Mortlock District) through the AMDTFCRT; relevant land managers
Cost: \$3,000 in first, third and fifth years

12. Conduct further surveys

It is recommended that areas of potential suitable habitat be surveyed for the presence of *Acacia cochlocarpa* subsp. *velutinos* during the subspecies' flowering period between June to August.

All surveyed areas will be recorded and the presence or absence of the subspecies documented to increase future 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 be involved.

Action: Conduct further surveys
Responsibility: DEC (Avon-Mortlock District) through the AMDTFCRT
Cost: \$3,000 in years 1, 3 and 5

13. Develop and implement a fire management strategy

Fire will if possible 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 (Avon-Mortlock District) through the AMDTFCRT
Cost: \$2,500 in first year and \$1,000 in subsequent years

14. Develop and implement disturbance trials

Suitable natural disturbance events (physical or fire) may be the most effective means of germinating soil-stored seed of *Acacia cochlocarpa* subsp. *velutinos* 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, Avon-Mortlock District) through the AMDTFCRT
Cost: \$3,400 in years 1 and 3, \$700 in years 2, 4 and 5

15. Achieve long-term protection of habitat

Ways and means of improving the security of populations and their habitat will be investigated.

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

16. Liaise with relevant land managers and Indigenous groups

Staff from DEC's Avon-Mortlock District will liaise with appropriate land managers to ensure that populations of *Acacia cochlocarpa* subsp. *velutinos* are not accidentally damaged or destroyed. Input and involvement will also be sought from Indigenous groups that have an active interest in areas that are habitat for *A. cochlocarpa* subsp. *velutinos*.

Action: Liaise with relevant land managers and Indigenous groups
Responsibility: DEC (Avon-Mortlock District) through the AMDTFCRT
Cost: \$500 per year

17. Promote awareness

The importance of biodiversity conservation and the protection of *Acacia cochlocarpa* subsp. *velutinos* 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 A4 sized 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 organisations, libraries and schools. It is hoped that the poster will result in the discovery of new populations. An information sheet that includes a description of the plant, its habitat type, threats and management actions, and photos will be produced. Formal links with local naturalist groups and interested individuals will also be encouraged.

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

18. Obtain biological and ecological information

Increased knowledge of the biology and ecology of the subspecies will provide a scientific basis for management of *Acacia cochlocarpa* subsp. *velutinos* in the wild. Investigations will ideally include:

1. Investigating soil seed bank dynamics and the role of various factors including disturbance, competition, drought, inundation and grazing in recruitment and seedling survival.
2. Investigating reproductive strategies, phenology and seasonal growth.
3. Investigating the mating system and pollination biology.
4. Investigating population genetic structure, levels of genetic diversity and minimum viable population size.
5. Investigating the impact of changes in hydrology.

Action: Obtain biological and ecological information
Responsibility: DEC (Science Division, Avon-Mortlock District) through the AMDTFCRT
Cost: \$10,000 per year

19. Start the translocation process if necessary

Translocation may be deemed desirable for the conservation of this subspecies if surveys fail to locate new populations. If required, 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 CALM'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 (Avon-Mortlock District) through the AMDTFCRT
Cost: \$2,200 in year 5

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

If *Acacia cochlocarpa* subsp. *velutinos* is still listed as declared rare flora 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, Avon-Mortlock District) through the AMDTFCRT
Cost: \$2,000 in year 5

Table 4. Summary of Recovery Actions

| Recovery Action | Priority | Responsibility | Completion Date |
|---|-----------------|--|---|
| Coordinate recovery actions | High | DEC (Avon-Mortlock District) through the AMDTFCRT | Ongoing |
| Map habitat critical to the survival of <i>Acacia cochlocarpa</i> subsp. <i>velutinos</i> | High | DEC (SCB, Avon-Mortlock District) through the AMDTFCRT | 2010 |
| Confirm identification and formally notify land managers | High | DEC (SCB, Avon-Mortlock District) through the AMDTFCRT | 2010 |
| Install DRF markers | High | DEC (Avon-Mortlock District) through the AMDTFCRT | 2010 |
| Remove rubbish from Population 1 | High | DEC (Avon-Mortlock District), Shire of Dowerin through the AMDTFCRT | Ongoing |
| Deter rubbish dumping at Population 1 | High | DEC (Avon-Mortlock District), Shire of Dowerin through the AMDTFCRT | 2010 |
| Undertake weed control and follow up with additional control, if required | High | DEC (Avon-Mortlock District) through the AMDTFCRT | Ongoing |
| Conduct habitat rehabilitation | High | DEC (Avon-Mortlock District) through the AMDTFCRT | 2012 |
| Collect seed and other material to preserve genetic diversity | High | DEC (Avon-Mortlock District, TFSC), BGPA through the AMDTFCRT | 2014 |
| Monitor populations | High | DEC (Avon-Mortlock District) through the AMDTFCRT | Ongoing |
| Implement grazing control where necessary | High | DEC (Avon-Mortlock District) through the AMDTFCRT; relevant land managers | Ongoing |
| Conduct further surveys | High | DEC (Avon-Mortlock District) through the AMDTFCRT | Ongoing |
| Develop and implement a fire management strategy | High | DEC (Avon-Mortlock District) through the AMDTFCRT | Developed by 2010 with implementation ongoing |
| Develop and implement disturbance trials | High | DEC (Science Division, Avon-Mortlock District) through the AMDTFCRT | 2014 |
| Achieve long-term protection of habitat | High | DEC (Avon-Mortlock District) through the AMDTFCRT | Ongoing |
| Liaise with relevant land managers and Indigenous groups | High | DEC (Avon-Mortlock District) through the AMDTFCRT | Ongoing |
| Promote awareness | Medium | DEC (Avon-Mortlock District, SCB, Strategic Development and Corporate Affairs Division) through the AMDTFCRT | Ongoing |
| Obtain biological and ecological information | Medium | DEC (Science Division, Avon-Mortlock District) through the AMDTFCRT | 2014 |
| Start the translocation process if necessary | Medium | DEC (Avon-Mortlock District) through the AMDTFCRT | 2014 |
| Review this IRP and assess the need for further recovery actions | Medium | DEC (SCB, Avon-Mortlock District) through the AMDTFCRT | 2014 |

4. TERM OF PLAN

This IRP will operate from June 2009 to May 2014 but will remain in force until withdrawn or replaced. If the subspecies is still listed as declared rare flora 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.
- 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.
- Conservation and Land Management (1995) Policy Statement No. 29 *Translocation of Threatened Flora and Fauna*. Department of Conservation and Land Management, Western Australia.
- Maslin, B.R. and Chapman, A.R. (1999) *Acacia* miscellany 19. The Taxonomy of some Western Australian species of *Acacia* section *Juliflorae* with 4-merous flowers (Leguminosae: Mimosoideae). *Nuytsia* 12 (3), 469-486.
- Western Australian Herbarium (1998-) *FloraBase – The Western Australian Flora*. Department of Environment and Conservation. <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

Acacia cochlocarpa subsp. *velutinosa*

Maslin, B.R. and Chapman, A.R. (1999) *Acacia* miscellany 19. The Taxonomy of some Western Australian species of *Acacia* section *Juliflorae* with 4-merous flowers (Leguminosae: Mimosoideae). *Nuytsia* 12 (3), 469-486.

Branchlets pubescent. *Stipules* persistent, triangular 1.5 – 2 mm long, 0.5 - 0.7 mm wide, scarious, acute, red-brown, sparsely hairy abaxially. *Phyllodes* 2.5 - 4 cm long, 3-5 mm wide, 3-5(7)-nerved, normally hairy on nerves, the central nerve slightly excentric, slightly closer to adaxial margin); *apex* obtuse or occasionally acute. *Heads* sub-globular, 5-7 mm long (dry). *Bracteoles* ovate, 1.2 - 1.8 mm long, acute to acuminate. *Pods* ± velutinous.