



020499

020499

CALM LIBRARY ARCHIVE
NOT FOR LOAN

THE LIBRARY
DEPARTMENT OF CONSERVATION
& LAND MANAGEMENT
WESTERN AUSTRALIA

MOORA DISTRICT THREATENED FLORA MANAGEMENT PLAN

Natural Heritage Trust Project Number 6452

FINAL REPORT
January 2001

Alice Reaveley, Robyn Phillimore and Val English
for the Moora District Threatened Flora Recovery Team

Property and copyright of this document is vested jointly in the Director, National Parks & Wildlife Service, Environment Australia, and the Executive Director, WA Department of Conservation and Land Management

The Commonwealth disclaims responsibility for the views expressed.

Department of Conservation and Land Management
Moora District Office
PO Box 208, Jurien Bay WA 6516



Natural Heritage Trust
Helping Communities Helping Australia



Department of Conservation
and Land Management

INTRODUCTION

Western Australia's Department of Conservation and Land Management (CALM), ranks Declared Rare Flora into the categories Critically Endangered (CR), Endangered (EN) and Vulnerable (VU), using World Conservation Union (IUCN) criteria and CALM's Ranking Policy 50. At present (January 2000), 104 plant taxa are ranked as CR, 26 of which are located in the Moora District.

Interim Recovery Plans (IRPs) have been completed for 14 of the CR plant taxa in the Moora District. Of these, 13 have been supplied to the Commonwealth, and the remaining one is in late draft (refer Scope Item 2000.10). These plans have been written following assessment of known information, and consultation with land managers and scientists. During preparation, draft copies are provided to relevant staff of CALM regions and districts, CALM Science, Wildlife Branch, and Western Australian Threatened Species and Communities Unit (WATSCU). Relevant shires, landowners and community groups are also consulted for comment. Recovery actions are also implemented as the Interim Recovery Plans are developed.

The Natural Heritage Trust Endangered Species Program has provided funding for the implementation of the Moora District Threatened Flora Management Plan. This draft Wildlife Management Program has been endorsed by CALM's Corporate Executive and the Conservation Commission, and has been provided for Ministerial approval. Publication of the Plan is expected by the end of 2001.

This report details progress made since the beginning of project 6452.

SCOPE ITEMS

Scope No.	Description
2000.01	Appoint District Flora Conservation Officer.
2000.02	Continue all on-ground essential recovery actions documented in the Moora District Wildlife Management Plan, the Rose Mallee Recovery Plan and Interim Recovery Plans for Critically Endangered and Endangered taxa, including fencing of remnant vegetation supporting threatened flora populations, erection of Rare Flora markers, control of weeds and feral animals, and monitoring populations.
2000.03	Survey for populations of poorly known priority flora and review status of these taxa on an opportunistic basis.
2000.04	Implement essential recovery actions for plant taxa listed as poorly known in the first year, but now listed as Declared Rare Flora and assessed as Critically Endangered or Endangered.
2000.05	For all Critically Endangered and Endangered flora in the Moora District commence implementation of desirable recovery actions as per Recovery and Interim Recovery plans.
2000.06	Implement community education and involvement activities.
2000.07	Liaise with private landholders and catchment groups in regards to protective and recovery actions of threatened flora.
2000.08	Translocate nursery grown plants and establish new populations in habitats with reduced threats where practicable.
2000.09	Rehabilitate habitat where possible.
2000.10	Where projects involve preparation of recovery plans, funding is provided on the condition that the plans are prepared for adoption or approval under Commonwealth legislation. Where projects involve the implementation of recovery plans funding is provided on the condition that the plans will be submitted to the Commonwealth for adoption or approval under Commonwealth legislation within three months of signing the funding agreement.
2000.11	Where projects involve recovery action for a species or ecological community that meets the criteria for listing as Endangered or Vulnerable under the Endangered Species Protection Act 1992, but which are not yet nominated for listing, funding is provided on the condition that the proponent nominate the species or community within three months of signing the funding agreement. Nomination can either be through the ANZECC listing process or directly to the Director of National Parks and Wildlife.
2000.12	In addition to the reports outlined in the Payment and Reporting Schedule for this project, the project investigator should provide publication quality 35 millimetre colour transparencies or photographs (with negatives) of each of the following: 1) the threatened species or ecological community (preferably in close-up); 2) its habitat; 3) people carrying out the project activities, and 4) on ground management activities. The slides/photographs should be clearly labelled with the subject and photographer.

PROGRESS OF SCOPE ITEMS TO DATE

Scope Item 2000.01

The project commenced in 1997 with the appointment of a Conservation Officer, Rebecca Wolstenholme. Ms Wolstenholme subsequently left the position in March 1998. In May 1999 Wayne Stalder was then appointed to the position. Mr Stalder resigned from the position in October 1999. Alice Reaveley commenced as the current Conservation Officer in April 2000.

Scope Items 2000.02; 2000.03

Many recovery actions documented in the Moora District Wildlife Management Program and Interim Recovery Plans for Critically Endangered and Endangered taxa have been implemented. These include fencing of remnant vegetation supporting threatened flora populations, habitat rehabilitation, erection of Rare Flora markers, control of weeds and feral animals, and monitoring populations. Opportunistic surveys of poorly known priority flora and status reviews of these taxa have also been undertaken. Progress of recovery actions for Critically Endangered taxa are listed below.

Scope Items 2000.06; 2000.07

Liaison with private landholders, catchment groups, other community groups and other government departments has been an ongoing priority in the protection and recovery of threatened flora. Education programs have been undertaken including talks at local schools, shires and other government departments and local interest groups. There have been many presentations such as workshops, talks and seminars about the importance and management of rare flora at venues such as agricultural shows, shires, and schools. Three articles that detail such information have also been produced and distributed to the wider community. The local community has continued to be involved in many rare flora surveys and in implementing recovery actions in the Moora District (see below for details).

Funding has also been obtained through non-government organisations such as World Wide Fund for Nature (WWF) to aid in the implementation of the Moora Threatened Flora Management Plan. These projects were undertaken in conjunction with Australian Trust for Conservation Volunteers (ATCV).

Individual species' posters have been produced for *Caladenia drakeoides*, *Darwinia carnea*, *Eremophila nivea*, *Grevillea calliantha*, *Hemiandra gardneri*, *Hemiandra* sp. Watheroo, *Verticordia spicata* subsp. *squamosa*, *Daviesia bursarioides*, *Thomasia* sp. Green Hill, *Jacksonia pungens*, *Eremophila scaberula*, *Verticordia albida* and *Chorizema humile*. These posters include a description of the plant, its habitat type, threats, management actions and photographs of individual taxa, and have been distributed to many organisations to promote awareness of Declared Rare Flora (DRF). For the protection of DRF in the wild, dashboard stickers and posters have been produced and distributed to government departments. These illustrate DRF markers, inform of their purpose and provide a contact telephone number to use if such a marker is encountered.

Scope item 2000.08

Translocations have been undertaken for *Acacia aprica*, *Acacia cochlocarpa* subsp. *cochlocarpa*, *Daviesia bursarioides* and *Grevillea calliantha*. These translocations involved the collection of seed by the Threatened Flora Seed Centre (TFSC), growing plants at Botanic Gardens and Parks Authority (BGPA) and then planting them out in secure habitats. Translocations are currently being planned for *Eremophila nivea* and *Eremophila scaberula* and the seed required from each species has already been collected.

Scope Item 2000.11

All species for which funding has been received through this project are listed under the Commonwealth's Endangered Species Protection Act, or have been nominated for listing.

PROGRESS WITH THE INTERIM RECOVERY PLANS (IRPs) (Scope items 2000.02, 2000.04; 2000.05; 2000.06; 2000.07; 2000.08; 2000.09)***Acacia aprica* ms**

Seed was collected by CALM's TFSC from Population 1 in 1996 and 1997. The initial germination rate of this seed was found to range from 43 to 85%; and was 68% after one year in storage.

All relevant people have been made aware of the existence of this taxon and its locations. Notifications were sent to the relevant Shire, Main Roads Western Australia (MRWA) and private property owners in 1998 and 1999.

Declared Rare Flora (DRF) markers were installed at Populations 3 and 5 in July 1998, and at Populations 1 and 2 in December 1998. In 2000 the markers at Population 3 were moved to incorporate an extension of the population on the northern road verge.

In August 1998, 1500 *Acacia aprica* ms seeds were planted into a Shire reserve in accordance with an approved Translocation Proposal. In 1999, 181 seedlings were planted out. The translocation is being conducted on an experimental basis, and will also provide information about effective techniques for future translocations. The site is being monitored quarterly until May 2001. After that, the site will be monitored annually. In 2000, assistance was provided by the Conservation Officer to collect growth and reproductive data of all live plants at the translocation site – both those newly planted as additions to the population, and the original translocation plants of 1998. Measurements taken included height, health, reproductive state and number of buds, flowers and fruit on each plant.

Staff from CALM's Moora District regularly monitor all populations. In 2000 Populations 2, 3, 4 and 5 were monitored.

The Moora District Threatened Flora Recovery Team (MDTFRT) is overseeing the implementation of the IRP for this species and will include information on progress in its annual report to CALM's Corporate Executive and funding bodies.

Acacia cochlocarpa* subsp. *cochlocarpa

All relevant people have been made aware of the existence of this taxon and its locations. Main Roads Western Australia (MRWA) and private property owners were formally notified of the presence of *Acacia cochlocarpa* subsp. *cochlocarpa* ms populations on their lands in 1998.

Declared Rare Flora (DRF) markers have been installed at Population 1.

Seed was collected by CALM's TFSC from the only known population in November 1996 and 1997. The initial germination rate of this seed ranged from 39 to 72%, and after one year in storage was 42%.

In August 1998, 1500 *Acacia cochlocarpa* subsp. *cochlocarpa* ms seeds were planted into a Nature Reserve, consistent with an approved Translocation Proposal. By December 1998 there had been 25% germination. In 1999, 346 seedlings were also planted. The translocation is being conducted on an experimental basis, and will also provide information

about effective techniques for future translocations. The treatments being tested are mulching, watering once a week from early November to late April, and a combination of the two. The site is being monitored quarterly until May 2001. After that, the site will be monitored annually.

In 2000, research was undertaken on this species by the WA Herbarium. A trial burn was conducted on mature plants at one of the populations to stimulate germination of the soil seed bank. Plots of seeds were also planted in various experimental designs: seeds with/without smoke treatment; and seeds with/without cages to prevent grazing to determine which treatments resulted in the maximum germination and survival of seedlings.

Staff from CALM's Moora District regularly monitor the wild population.

The Moora District Threatened Flora Recovery Team (MDTFRT) is overseeing the implementation of the IRP for the taxon and will include information on progress in its annual report to CALM's Corporate Executive and funding bodies.

***Acacia* sp. (Dandaragan)**

All appropriate people have been made aware of the existence of this taxon and its locations. This species is known from two populations that are only 8 km apart. It is because of this very limited distribution and the small number of individuals that the Dandaragan Wattle has been listed as Critically Endangered and an Interim Recovery Plan is being drafted. Seed has been collected by CALM's TFSC and populations are monitored regularly by CALM staff.

In 2000 a student conducted an Honours project to determine if *Acacia microbotrya* and *A. sp. Dandaragan* are genetically distinct. The Conservation Officer provided assistance with collecting data from plants at a population in a Nature Reserve and the adjoining private property.

Acacia vassalii

All relevant people have been made aware of the existence of this taxon and its locations. Extensive survey, with the help of a local community member, has located new populations not far from the known populations. Seed has been collected and is being stored at CALM's TFSC. Regular monitoring of these plants has revealed that a gall insect is covering whole *Acacia* flowers, possibly reducing seed set. Plant cuttings containing galls were taken to Agriculture WA and were incubated and hatched to reveal a wasp.

In 2000 a section of Population 2 was monitored. Plants numbers had increased from 54 in 1998 to hundreds in 2000..

Population 5, NE of Watheroo, which had not been visited since 1992, was also monitored in 2000. Thirty-three plants (numbers had not been previously recorded) were found along the road verge and more could be seen in remnant vegetation through the fenceline on both sides of the road.

Caladenia drakeoides

Numerous surveys involving the local orchid group and other volunteers have been undertaken, and a new population (Population 14) was discovered in 1997 on private property. Populations 1, 7 and 14 and subpopulation 2b (all private property) have been fenced to exclude sheep. Goat control was also undertaken by CALM's Moora District on a population located on a Nature Reserve.

In 1998, flowers in populations 4, 5 and 13 were hand-pollinated and then ripe pods were collected and passed onto BGPA for germination and storage.

Postal drops of the poster produced for this species were sent out in August 1999 to seek information about new populations. These postal drops acted as a method for surveying private property. Five replies were received resulting in the location of two new populations of the Hinged Dragon Orchid.

Chorizema humile

All relevant people have been made aware of the existence of this species and its locations.

Declared Rare Flora markers were installed at Populations 2 and 3 in September 1996.

Population 1 occurs in remnant vegetation on private property and was fenced from stock in 1975. Kangaroos have continued to have a serious impact on the population through grazing and trampling, drastically impacting plant condition and seed set. Small wire cages were constructed over 47 individual plants at this population in August 1998 to address this problem. This was completed with the aid of a team from the ATCV. Seed collection conducted in 1998 suggests that the cages helped reduce the impact of kangaroos. Seed numbers are still not as high as in Population 3, but it is hoped that they will increase as the condition of the plants improves with continued exclusion of grazing.

A stock-exclusion fence was erected around Population 3b in 1997. Stock movement on the road reserve that contains Population 3a is an ongoing threat. To prevent grazing and trampling damage to the *Chorizema humile* plants, seven steel mesh cages were installed over ten plants at Population 3a in July 1998. A further nine cages were installed in November 1998. Approval was gained from the Shire of Moora to move the firebreak to the outside of that fence. During monitoring in July 1998, it was observed that the subpopulation was still sustaining damage from kangaroos, and in October 1998, wire netting cages were installed over all seven *C. humile* plants in this subpopulation.

Staff from the TFSC collected seed from Population 1 and 3 in November 1996, 1997 and 1998. The initial germination rate of seed varied from 50 to 84%, and after one year in storage, from 71 to 88%. In February 1998, 1000 seeds of those collected from Population 3 in 1996 were sent to BGPA as a duplicate collection. This strategy is designed to safeguard the resource by maintaining it in two locations.

The species is in cultivation at the National Botanic Gardens, Canberra. They provided cutting material to BGPA in July 1984. The success rate of cuttings taken from this cultivated material has been excellent, with between 70 and 100% of cuttings developing roots. In February 1999, BGPA held four plants of the species in its nursery.

CALM's Moora District staff regularly monitor all populations. In 2000, Populations 1, 3a, 3b and 4 were monitored. The DRF markers at Population 3a and 4 were moved to incorporate an extension of the populations.

A consultant was employed to conduct five days of survey for new populations during the species flowering period in Spring 2000. In total nine new populations were located, mostly on private property around Coorow.

The Moora District Threatened Flora Recovery Team (MDTFRT) is overseeing the implementation of the IRP for the species and will include information on progress in its annual report to CALM's Corporate Executive and funding bodies.

Darwinia carnea

All relevant land holders have been notified. Population 3 was fenced in May 1996, with extra fencing material being supplied in June 1997 to extend the fence line by 500m. Subpopulations 5A and 5b were also fenced in September 1996. Recent monitoring of a population in Mogumber revealed that some of the plants were being eaten by kangaroos and the seed being picked out by parrots. To prevent this, rabbit netting that was closed in at the top was placed around the plants.

Daviesia bursarioides

In 2000, Populations 1a, 2, 3, 4 and 6 were monitored. 3km of fencing has been erected around Population 5. All four of the roadside populations have had DRF markers installed, and the Shire has been notified. Recent monitoring required the moving of some of the markers to incorporate the extension of populations. Seed has been collected and survey has been undertaken to search for new populations. A small area north of an existing population was also burnt at the beginning of 1999.

A translocation for the species was undertaken in 1998, with 192 plants put in Sweetman Nature Reserve. In 2000, the Conservation Officer provided assistance to plant 162 additional seedlings at the translocation site (6T). Measurements were also taken of height, crown width, number of flower bud stems and condition of each plant that have been translocated since 1998. The same measurements were also collected for 12 tagged plants in a wild population in the NE corner of the nature reserve (Population 6) as baseline data for comparison of growth and reproductive development of the translocated population with a wild population of the species.

Eremophila nivea

Survey by CALM staff has resulted in the discovery of two new populations, one on private property. Funds from WWF enabled the area to be fenced. A large buffer zone where seedlings were planted to help reduce the salt problem, was included in the fenced area. WWF and CALM provided the fencing materials and the seedlings, the private property holder prepared the site and members of ACTV erected the fence and planted the seedlings. Weed control research has been conducted in two populations of *Eremophila nivea* by CALMScience. The objective of the trial was to determine the effect of weeds on the population dynamics of the species, and the impact of weed control on the populations of this threatened species.

A translocation of this species is currently being planned.

Eremophila scaberula

All relevant people have been made aware of the existence of this species and its locations.

Fifty seeds were collected by BGPA in August 1996. Cutting material was taken at the same time, and resulted in 335 cuttings from 5 clones. The success of cuttings varied between clones, but was generally limited. More seed was collected from three populations in November and December 1996 for storage in CALM's TFSC. The initial germination rate of

the seed was found to vary from 39% to 70%. In May 1997, BGPA held approximately 80 plants of the species in their nursery.

Declared Rare Flora markers (DRF) have been installed at all populations on both the road and rail reserves.

Weed control research has been conducted at Population 2 by CALMScience. Two experimental treatments were examined - weed control in isolation, and weed control combined with disturbance.

In 2000 Populations 2 and 3 were monitored. Staff from CALM's Moora District regularly monitor populations.

Liaison that involved onsite inspections of the populations with Westrail staff was undertaken to ensure the protection of plants close to the railway line during rail maintenance operations.

Survey for new populations was conducted during the flowering period in 2000 at a shire reserve near the known populations.

The Moora District Threatened Flora Recovery Team (MDTFRT) is overseeing the implementation of the IRP for this species and will include information on progress in its annual report to CALM's Corporate Executive and funding bodies.

Eucalyptus absita

All populations of this species were monitored in 2000.

A survey for new populations was conducted in the Dandaragan shire with a local landholder whose property contains one of the known populations. Four new populations of *Eucalyptus absita* were recorded and 1 new population of the presumed hybrid *Eucalyptus absita* x *loxophleba* was located on a nearby property. Specimens were collected for vouchers at the herbarium.

Eucalyptus dolorosa

The single known population on Mt Misery was monitored in 2000.

Eucalyptus impensa

Populations 3, 5 and 6 in South Eneabba Nature Reserve monitored in 2000. All populations are showing post-fire regeneration. Population 3 is recovering from a prescribed burn seven years ago, and Population 5 and 6 are recovering from a wildfire that occurred five years ago.

Numbered metal tags were placed on all plants at Populations 3, 5 and 6 and growth and reproductive data were collected from each plant for the purpose of detailed annual monitoring and research into the biology of the species. Measurements collected included height, crown width, reproductive status – number of buds, flowers & fruit, and health of each plant.

Each population has been identified with a tagged stake along the firebreak tracks to signify the presence of DRF for future prescribed burns in the nature reserve.

Gastrolobium hamulosum

All relevant people have been made aware of the existence of this species and its locations.

Seed was collected in November 1995 and again in November 1996 from Population 1 and is being stored in CALM's TFSC. The seed collected from Population 1 in 1995 had an initial germination rate of 5%. The material collected in 1996 has only had initial processing, so the germination rate of that seed in storage is unknown.

In Spring 2000 a water reserve south-east of Calingiri that is under consideration for purchase by CALM was surveyed for new populations. No plants were located.

Grevillea althoferorum

Relevant land managers have been made aware of the locations of populations of this species.

DRF markers were installed at the roadside population in 1999.

CALM's TFSC collected and stored 66 seeds from population 2 in November 1997. An initial germination rate of 50% was recorded for this seed.

Two plants raised from seed and two from cuttings propagated from material collected by the TFSC are held in BGPA's nursery.

The Moora District and the Swan Region Threatened Flora Recovery Teams are overseeing the implementation of the IRP for this species and will include information on progress in reports to CALM's Corporate Executive and funding bodies.

Staff from CALM's Moora and Mundaring Districts regularly monitor the populations and the population in Moora District was monitored in 2000.

Grevillea batrachioides

This population is monitored regularly by CALM staff and BGPA. Seed and cuttings have been collected and stored by BGPA. The initial germination success for seed was quite low (40%), with the plants growing much better from cuttings. Numerous surveys have been undertaken in similar habitat in the National Park where the population occurs, but no new populations have been located.

Grevillea calliantha

Relevant land managers have been made aware of the locations of populations of this species. Rare Flora Markers have been installed at all roadside populations. A monitoring plot was established at Population 1 in 1997 to study the effects of weeds. Weed control was also undertaken at Population 6.

Fencing of the largest population was completed in early 1996. Population 1 on a Water Reserve was also fenced to exclude kangaroos that take refuge there. Regular monitoring in 1999 revealed high numbers of rabbits present which had been grazing on young plants at the Water Reserve population. On 19 May 1999 cages were placed around 2 small plants and a seedling to prevent grazing occurring. A translocation commenced in 1998, with the planting of 106 seedlings. A further 108 seedlings were also planted in 1999.

In 2000 the Conservation Officer provided assistance to measure all the plants at Population 1 as part of long-term monitoring to show life stages and reproductive status over time as baseline data against which to compare similar trends in the translocated population. Measurements collected included height and width of plants, number of flowerbuds and number of fruit.

In 2000 Populations 1, 1T, 2, 5 and 6 were monitored with interested community members who own properties close to the existing populations.. At the same time caging was placed around a grazed plant at Population 1.

Also in 2000 the rusty DRF markers that denoted the previous locations of Population 2 and 3 were removed. Four new DRF markers (1 pair on each side of the road) were installed, incorporating the two populations into one population due to their close proximity and the expansion of the population further north.

Liaison was conducted with the Works Manager for the Shire of Dandaragan regarding the placement of a drainage channel through Population 2.

Grevillea curviloba subsp. incurva

The only recent collection of this subspecies in Moora District was made in 1997.

Numerous surveys have since been undertaken with the help of local volunteers, and a population was relocated in early 2000.

Grevillea humifusa

All relevant people have been made aware of the existence of this species and its locations. Declared Rare Flora (DRF) markers have been installed at Population 1.

The population and surrounding habitat on private land was fenced in May 1997 to protect it from grazing by stock and to allow natural habitat to regenerate. The plants appear to be thriving without the grazing pressure.

Seed was collected in October 1996 and in October 1997 from the only known population, and stored in CALM's TFSC. The initial viability of these collections has ranged between 64% and 92%. After storage for 12 months, both seed lots produced over 90% germination. Cuttings were collected in August 1996 and again in 1997, and the rooting success rate has been very good. In May 1997, BGPA held seven plants in its nursery, with condition varying from excellent to adequate. Germplasm is being stored as a genetic resource, ready for use as stock for translocation purposes and as an *ex-situ* genetic 'blueprint' of the species.

CALM's Moora District staff regularly monitor the population.

The Moora District Threatened Flora Recovery Team (MDTFRT) is overseeing the implementation of this IRP and will include information on progress in its annual report to CALM's Corporate Executive and funding bodies.

Hemiandra gardneri

Annual monitoring has been undertaken by CALM Moora and WATSCU staff. Recent survey by CALM staff in November 1999 located additional plants at most populations with the population boundaries also being extended. Populations found on Westrail reserves have been fenced and DRF markers installed. Markers have also been installed on road reserves

where required. Population 2b on private property was fenced to exclude stock. Seed was collected in 1997 and 1998 and the initial germination rate ranged from 50 to 100%.

This species was inspected in 2000 with Westrail staff on rail reserve north of Watheroo to ensure the protection of plants close to the railway line during rail maintenance operations.

Hemiandra hancocksiana (was *Hemiandra* sp. Watheroo)

A new population was discovered on private property in 1997, following a submission of a Notice of Intent to clear. DRF markers have been installed on the firebreaks of a population located in Alexander Morrison National Park. Seed was collected in 1997 by CALM's TFSC and the initial germination success was found to range from 47 to 87%.

A survey undertaken in 1999 by CALM staff indicated that the numbers of plants had increased. In particular regeneration of post-fire seedlings in a population that was recently burnt in Alexander Morrison National Park consisted of over 1000 plants. Based on the increased plant numbers and the security of the populations, this species has been recommended for downlisting to Endangered.

***Jacksonia pungens* ms**

Seed was collected in 1997 and 1999 and is stored in CALM's TFSC. An initial germination rate of 95% was recorded. The germination rates after storage were 99 and 100%. Fifteen plants were raised from rooted seedlings derived from germination tests, and these are held in the BGPA nursery.

All relevant authorities and land managers have been made aware of the threatened nature of *Jacksonia pungens* ms, its location, and the need for conservation of the taxon.

DRF markers have been placed where required along main roads and rail reserves. Moora District staff held an onsite meeting with the Coorow Shire and Westrail officials in 1997. The meeting was held to inform these authorities of the taxon's location and the need for conservation.

In April 2000 marking tape was placed on all plants in rail reserve close to a level crossing to assist Westrail staff in avoiding the population during clearing/slashing works to restore legal sighting distances at the crossing.

CALM Moora District staff regularly monitor the populations with all populations visited in 2000 and January 2001.

The Moora District Threatened Flora Recovery Team (MDTFRT) is overseeing the implementation of this IRP and will include information on progress in its annual report to CALM's Corporate Executive and funding bodies.

Synaphea quartzitica

All relevant people have been made aware of the existence of this species and its locations.

Staff of CALM's TFSC attempted to collect seed in 1997 and again in 1998, without much success. It appears that, as with most *Synaphea* species, *Synaphea quartzitica* sets almost no viable seed. The single seed collected germinated, but the seedling has since died.

Surveys conducted in August 1998 resulted in the discovery of three new populations. Additional surveys in 1998 located another population in Watheroo National Park. A new population of 5 plants was also found in the National Park in 2000. A Voucher specimen was collected in 2000 for the WA herbarium.

DRF markers have been installed at Population 2.

During the flowering period in 2000 all the populations in Watheroo National Park were monitored. This extended the known boundaries and size of one of the populations substantially.

Numbered metal tags were placed on 5 plants at Population 3 as the population has changed since last surveyed in 1998 – with the germination of three new seedlings and the death of one mature plant. Growth and reproductive data for annual monitoring of this population's behaviour was collected in 2000.

The MDTFRT is overseeing the implementation of this IRP and will include information on progress in its annual report to CALM's Corporate Executive and funding bodies.

***Thomasia* sp. Green Hill**

In 1995, the landowner was made aware of the existence and importance of *Thomasia* sp. Green Hill. Since then, the Farm Manager has participated in a survey for further populations and assisted CALM staff in locating the current subpopulations. Care is also being taken in the management of the bush block to conserve the two subpopulations of *Thomasia* sp. Green Hill. A survey was undertaken by the Orchid Society and CALM staff in 1999. Although no new populations were discovered, the extent of the existing population as well as the number of plants had increased.

Seed was collected from both subpopulations twice in November 1998 and stored in CALM's TFSC. Only a few seeds have germinated to date and germinants have been delivered to BGPA for maturation into full plants.

Staff at the CALM Moora District Office, TFSC and WATSCU monitor both subpopulations for changes in population size, increased threats and habitat changes.

The Moora District Threatened Flora Recovery Team (MDTFRT) is overseeing the implementation of the IRP for this species and will include information on progress in its annual report to CALM's Corporate Executive and funding bodies.

Verticordia albida

DRF markers have been installed at all roadside populations.

The remnant bush on private property (Population 1) has been fenced to exclude sheep from the area.

Collections of seed were made by CALM's TFSC in 1995, 1996 and 1997, with the initial germination success ranging from 0 to 87%. Cutting material was also collected by BGPA.

Regular monitoring and survey have been undertaken but no new populations have been located.

Research into the reproductive biology, seed bank dynamics and seed germination physiology - particularly the response to smoke, has been undertaken on several species of *Verticordias* including *V. albida*, by CALMScience and BGPA.

During the flowering period in 2000 remnant vegetation on property near the populations on Wilton Wells Rd was surveyed for additional populations. No new populations were located.

Verticordia spicata* subsp. *squamosa

All relevant land managers have been made aware of the existence of this taxon and its locations.

Declared Rare Flora (DRF) markers have been installed at Populations 1, 3 and 7, and Subpopulation 6a.

Cutting material was collected by BGPA staff in 1995. In February 1996, 138 cuttings were successfully growing in the nursery. All germinants, except one clone have since died, suggesting that the species is quite difficult to propagate. CALM's TFSC collected seed from four populations in January 1996 and this is being stored at -18°C. Further collections were made in 1997 and 1998. The initial germination rate of this seed was found to range from 6% to 86%, and after one year in storage was 33%.

Research into the reproductive biology, seed bank dynamics and seed germination physiology - particularly the response to smoke, has been undertaken on several species of *Verticordias* including *V. spicata* subsp. *squamosa*, by CALMScience and BGPA.

Populations (4b and 6b) on private property were fenced in 1997 to prevent sheep grazing and trampling plants and habitat.

The Moora and Geraldton District Threatened Flora Recovery Teams are overseeing the implementation of this IRP and will include information on progress in annual reports to CALM's Corporate Executive and funding bodies.

CALM staff from the Moora and Geraldton District Offices regularly monitor the populations. In 2000 the following populations were jointly monitored by the Conservation Officers from Geraldton and Moora and the following work undertaken:

- Population 3, 4b and 7 were monitored.
- Installed rabbit proof fencing around 4 new seedlings at Population. 4b.
- Weed spraying at Population 3.
- Determined proposed translocation site at 'Christmas Corner'.
- Staked quadrats around populations 3, 4b and 7 and scattered the sites with smoke granules as a management project to attempt to stimulate germination of the stored seed banks.

Population 1 on Simpson Rd was also monitored with C. Strahan and T. Moore from the Shire of Three Springs. The road is to be widened due to imminent increased use by grain trucks travelling to Arrino Rail Depot. All plants found were hard against the fenceline and not in danger of being taken through road widening. Population 6a was also monitored. Five new plants were found (15 altogether) beyond the DRF marker at the NE end of the population and the DRF marker was moved to include them.

ENDANGERED SPECIES

Conospermum densiflorum subsp. unicephalum

In 2000 the Conservation Officer met with Westrail staff for an onsite inspection of a newly recorded population along the Moora-Mogumber Rd to install DRF markers in the rail reserve.

An onsite inspection of a rail reserve population was conducted with Westrail staff to identify the plants and ensure protection of the population close to the railway line during rail maintenance operations.

Daviesia dielsii

The Conservation Officer liaised with the landowner adjacent to Population 10, regarding his notification of an unrecorded population on a gravel pit nearby. Identified the new population.

Population 10 was monitored and DRF markers installed on both sides of Prices Rd to notify the shire about the population. The population had increased in size since last surveyed.

Dryandra serratuloides subsp. serratuloides

An onsite inspection of a rail reserve population conducted with Westrail staff to identify the plants and ensure protection of the population close to the railway line during rail maintenance operations.

A new population found by Alex George on Gt Northern Hwy near the Mogumber turnoff was officially recorded. A voucher specimen was collected.

A large population in "Boothendarra Hill" Nature Reserve was monitored.

Eucalyptus crispata

Population 6 in Yandanooka Vacant Crown Land (VCL) was located and monitored following a request from Wildlife Branch to assess the species post-fire regeneration after a fuel reduction burn in the VCL by the Bush Fires Board in 1996. The successful regeneration of the population was reported. It was in bud at the time of observation and appearing in good health. No threats to the population were noted.

Gastrolobium appressum

Population 5a was monitored in 2000.

Marking tape was placed in April 2000 on all plants that exist in rail reserve close to a level crossing to assist Westrail staff avoid the population during clearing/slashing works to restore legal sighting distances at the crossing.

Hakea megalosperma

All populations are being monitored opportunistically prior to the species possible reclassification from Vulnerable to Endangered.

No plants were located at Population 3d in Alexander National Park or in Population 10 in the east end of Lesueur National Park.

Plants at Population 5 were in good condition.

Leucopogon obtectus

A population that was subject to flooding in Beekeepers Reserve near Western Flora Caravan Park was monitored with other CALM staff and volunteers. The existing plants were in bud but some plants were dead.

Paracaleana dixonii

In conjunction with other CALM staff and volunteers:

- Monitored populations in Yandanooka VCL. No plants found at any of the population locations. It is now eight years since the last fire in Jan 1993. No plants seen more than 3 years after the fire. Tubers are probably still alive underground and sending up leaves each year, but not flowering.
- Recorded and collected a voucher specimen for new population no.13 found by BGPA staff. 9 plants in total located in Beekeeper's Reserve.
- Surveyed for new populations in Beekeepers Nature Reserve after the fire in January 1999. Surveyed in 6-7 sites and found no plants.
- Took Steve Byecroft from SNV Productions to the plants at Population 13 one week after the previous survey. Only 3 of the 9 plants were still flowering. Found an additional 3 plants 5-10m south.

Patersonia spirifolia

Surveyed for a population on Cadda Rd that was destroyed by grading works in 1997. Found 2 healthy plants growing in the gravel 1-2m from the protection of the road reserve. The 2 plants had been more recently buried by road works as seedlings were regenerating from mature plants covered with gravel. Original population was 6 plants.

DRF markers were installed either side of the 2 plants.

PRIORITY TAXA

***Dryandra borealis* A.S. George subsp. *elatio* (P3)**

DRF markers installed at roadside population near gravel pit (near Three Springs).

***Eucalyptus carnabyi* x (P4)**

Conservation Officer attempted to locate population on local landowner's property based on a DRF notification letter to the previous owner in 1986. The population was probably dead, based on mudmap description of location.

Scope Item 2000.11

All of the species that are listed as Declared Rare Flora in Western Australia are listed under the Commonwealth's *EPBC Act*, or have been nominated for listing under that Act.