INTERIM RECOVERY PLAN NO 162

ONE-HEADED SMOKEBUSH

(*CONOSPERMUM DENSIFLORUM* SUBSP. *UNICEPHALATUM*)

INTERIM RECOVERY PLAN

2004-2009

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Photo: Vanessa Clarke

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DEPARTMENT OF Conservation AND LAND MANAGEMENT
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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.

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.

CALM is committed to ensuring that Critically Endangered taxa are conserved through the preparation and implementation of Recovery Plans or Interim Recovery Plans and by ensuring that conservation action commences as soon as possible and always within one year of endorsement of that rank by the Minister.

This Interim Recovery Plan will operate from June 2004 to May 2009 but will remain in force until withdrawn or replaced. It is intended that this IRP will be reviewed after five years and the need for a full Recovery Plan will be assessed.

This IRP was given regional approval on 4 June, 2004 and was approved by the Director of Nature Conservation on 22 June, 2004. The allocation of staff time and provision of funds identified in this Interim Recovery Plan is dependent on budgetary and other constraints affecting CALM, as well as the need to address other priorities.

Information in this IRP was accurate at June 2004.

ACKNOWLEDGMENTS

The following people have provided assistance and advice in the preparation of this Interim Recovery Plan:

Vanessa Clarke	Conservation Officer (Flora) CALM's WA Threatened Species and Communities Unit
Andrew Crawford	Technical Officer, CALM's Science Division
Diana Papenfus	Former Conservation Officer, CALM
Amanda Shade	Horticulturalist, Botanic Garden and Parks Authority

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

SUMMARY

Scientific Name:	*Conospermum densiflorum* Lindl. subsp. *unicephalatum* E.M.Benn	**Common Name:**	One -headed Smokebush
Family:	Proteaceae	**Flowering Period:**	September-November
CALM Region:	Midwest	**CALM District:**	Moora
Shires:	Moora, Victoria Plains, Gingin	**Recovery Team:**	Moora District Threatened Flora Recovery Team

Illustrations and/or further information: Brown, A., Thomson-Dans, C. and Marchant, N. (Eds). (1998) *Western Australia's Threatened Flora*. Department of Conservation and Land Management, Western Australia; FloraBase - Information on the Western Australian Flora. Department of Conservation and Land Management, Western Australia. http://www.calm.wa.gov.au/science/.

Current status: *Conospermum densiflorum* subsp. *unicephalatum* was declared as Rare Flora under the Western Australian *Wildlife Conservation Act 1950* on 28 November 1997. It currently meets World Conservation Union (IUCN 2000) Red List Category Endangered (EN) under criteria B1ab(iii)+B2ab(iii) as it is only known from five populations totalling 295 mature plants occurring over a narrow geographic range, with some decline in quality of habitat. The species is also listed as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation* Act 1999 (EPBC Act). The main threats are habitat fragmentation, road and rail maintenance, weed invasion, inappropriate fire regimes, and lack of associated vegetation .

Description: *Conospermum densiflorum* subsp. *unicephalatum* is an erect perennial shrub to 0.6 m. The stems and foliage have long, spreading hairs. The leaves are crowded, filiform, ca. 30-40 mm long, with white, spreading hairs. The peduncle is leafless, with a single, almost globular, head-like inflorescence which is 1.5 cm in diameter. The floral bracts are slender and hairy and as long as the flowers. The flowers are tubular and two-lipped, ca. 10 mm long, and bluish-white in colour (Patrick and Brown 2001).

Habitat requirements: *Conospermum densiflorum* subsp. *unicephalatum* has been recorded from near Gillingarra in the Moora District and also from near Gingin in the Swan Region. It grows in low lying clay soil and also on gravel.

Critical habitat: The critical habitat for *Conospermum densiflorum* subsp. *unicephalatum* comprises the area of occupancy of the known populations; similar habitat within 200 metres of known populations; remnant vegetation that surrounds or links populations; and additional nearby occurrences of similar habitat that do not currently contain the taxon but may have done so in the past and may be suitable for translocations.

Habitat critical to the survival of the species, and important populations: Given that this taxon is listed as Endangered it is considered that all known habitat is habitat critical, and all populations, including translocated populations are important.

Benefits to other species/ecological communities: Recovery actions implemented to improve the quality or security of the habitat of *Conospermum densiflorum* subsp. *unicephalatum* will also improve the status of other Declared Rare Flora (DRF) and Priority flora that occur in the habitat. These are *Calothamnus pachystachyus* (Priority 4) and *Dryandra serratuloides* subsp. *serratuloides* (DRF).

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. The taxon is not listed under any specific international treaty, however, and therefore this IRP does not affect Australia's obligations under any other international agreements.

Role and interests of indigenous people: There are no known indigenous communities interested or involved in the management of areas affected by this plan and, according to the Department of Indigenous Affairs Aboriginal Heritage Sites Register, no registered sites are known from the habitat of the species. Input and involvement will be sought from any indigenous groups that have an active interest in the areas that are habitat for *Conospermum densiflorum* subsp. *unicephalatum*, and this is discussed in the recovery actions.

Social and economic impacts: The implementation of this recovery plan is unlikely to cause significant adverse social and economic impacts as all populations are located on rail and road reserves.

Evaluation of the Plans Performance: CALM, in conjunction with the Recovery Team will evaluate the performance of this IRP. The plan is to be reviewed within five years.

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

1. Westnet Rail and Main Roads WA (MRWA) have been notified of the presence of *Conospermum densiflorum* subsp. *unicephalatum* on lands they manage.
2. Declared Rare Flora (DRF) markers have been installed at most populations along the road and rail line.
3. Dashboard stickers and posters describing the significance of DRF markers have been produced and distributed.
4. Extensive searches for new populations have been carried out along rail and road verges and some of the nature reserves in areas surrounding known populations.
5. Botanic Gardens and Parks Authority has endeavoured to propagate the taxon from tissue culture and cuttings, but with minimal success.
6. There have been several collections of seed from populations 1, 2 and 4 of *Conospermum densiflorum* subsp. *unicephalatum* by the Threatened Flora Seed Centre (TFSC).
7. Testing for resistance to *Phytophthora* spp. has been carried out by CALM. Three plants were tested and were found to be resistant to the disease.
8. CALM staff regularly monitor populations of this taxon.
9. The Moora District Threatened Flora Recovery Team (MDTFRT) is overseeing the implementation of this IRP and will include information on progress in their annual report to CALM's Corporate Executive and funding bodies.

IRP Objective: The objective of this Interim Recovery Plan is to abate identified threats and maintain or enhance *in situ* populations to ensure the long-term preservation of the taxon in the wild.

Recovery criteria

Criteria for success: The number of individuals within populations and/or the number of populations have increased by ten percent or more over the period of the plan's adoption under the EPBC Act.

Criteria for failure: The number of individuals within populations and/or the number of populations have decreased by ten percent or more over the period of the plan's adoption under the EPBC Act.

Recovery actions

1. Coordinate recovery actions
2. Map critical habitat
3. Undertake weed control
4. Install DRF markers
5. Compare genetics of the subspecies
6. Conduct further surveys
7. Develop and implement a fire management strategy
8. Collect and store seed
9. Monitor populations
10. Promote awareness
11. Obtain biological and ecological information
12. Liaise with relevant land managers
13. Start translocation process
14. Stimulate the germination of soil-stored seed
15. Review the need for a full Recovery Plan

1. BACKGROUND

History

Conospermum densiflorum subsp. *unicephalatum* was first collected by William Blackwell in 1932 "near Gingin between Midland and Moora" and recollected in 1974 and 1975. All other previous herbarium collections except for one on the Great Northern Highway have been relocated in recent surveys.

Conospermum densiflorum subsp. *unicephalatum* is currently known from five populations on the road and rail verge within a 10km stretch near Gillingarra between Mogumber and Moora. It is known from a total of 295 adult and 886 juvenile plants.

Description

Conospermum densiflorum subsp. *unicephalatum* is a conspicuous plant when flowering, and is an erect perennial shrub to 0.6 m tall. The stems and foliage have long, spreading hairs. The leaves are crowded, filiform, ca. 30-40 mm long, with white, spreading hairs. The peduncle is leafless, with a single, almost globular, head-like inflorescence which is 1.5 cm in diameter. The floral bracts are slender and hairy and as long as the flowers. The flowers are tubular and two-lipped, ca. 10 mm long and bluish-white in colour (Patrick and Brown 2001).

Conospermum densiflorum subsp. *unicephalatum* differs from *C. densiflorum* subsp. *densiflorum* in that it has a single head of flowers on each scape, rather than several (up to 10) heads forming a compact corymb (Brown *et al.* 1998).

Distribution and habitat

Conospermum densiflorum subsp. *unicephalatum* is restricted to low lying sandy clay soils with surface lateritic gravel, in an area between Gingin and Moora over a range of about 10 km. A previous collection in 1974, which has not been relocated, extends this range to 35km. Generally the plants are healthy, although the surrounding habitat is quite disturbed. Habitat consists of heathland of *Acacia acuminata*, *A. puchella*, *Adenanthos cygnorum*, *Allocasuarina campestris*, *Austrostipa elegantissima*, *Daviesia preissii*, *Dryandra serratulioides* subsp. *serratulioides* (DRF taxon ranked as Vulnerable), *Conostylis setigera*, *Calothamnus pachystachyus* (Priority 4), *Glischrocaryon aureum*, *Hibbertia* sp., *Labichea lanceolata*, *Melaleuca sp.*, *Ptilotus* sp. and *Verticordia sp*.

Conospermum densiflorum subsp. *unicephalatum* appears to be a disturbance opportunist as new seedlings are often located following disturbances such as gravel extraction.

Biology and ecology

Very little is known about the biology and ecology of the genus Conospermum. Most Conospermums are insect pollinated by either native bees or flies which trigger the explosive mechanism in the flower. Although copious amounts of fruit are produced, the amount of viable seed is low. Propagation of *Conospermum* by cuttings is difficult (Sainsbury 1991). In May 2001, one batch of 14 cuttings of *Conospermum densiflorum* subsp. *unicephalatum* cuttings was planted by BGPA, but these did not strike (A. Shade pers. comm.[1]). *Conospermum* seedlings generally develop a tap root (Sainsbury 1991).

Initial germination rates from untreated seed trials have been variable, ranging from 16-67% (A. Crawford unpublished data[2]).

Conospermum densiflorum subsp. *unicephalatum* appears to be a disturbance opportunist, with germination apparently stimulated by soil disturbance where gravel has been extracted. Response to fire is unknown, but as it is a seeder, the plants are likely to be killed by fire, and then germinate from soil stored seed.

Dieback testing for resistance to *Phytophthora* spp. has been carried out by CALM's Science Division. Three plants were tested and were found to be resistant to the disease.

[1] Amanda Shade, Horticulturalist, Botanic Garden and Parks Authority
[2] Andrew Crawford, Senior Technical Officer, CALM's Threatened Flora Seed Centre

There has been some debate by field staff as to the differences between *Conospermum densiflorum* subsp. *unicephalatum* and the common subsp. *densiflorum.* Populations of the two subspecies occur in the same area in identical habitat, and some specimens have been shown to have properties from both subspecies in the flower heads of the same plant. As the distinction between the two subspecies is largely based on floral characteristics, genetic studies are therefore required to ascertain the relationship between the two taxa.

Threats

Conospermum densiflorum subsp. *unicephalatum* was declared as Rare Flora on 28 November 1997 under the Western Australian *Wildlife Conservation Act 1950*. It currently meets World Conservation Union (IUCN 2000) Red List category Endangered (EN) under criteria B1ab(iii)+B2ab(iii) as it is only known from five populations totalling 295 mature plants growing over a narrow geographic range with some decline in the quality of the habitat. The taxon is also listed as Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The main threats are habitat fragmentation, road and rail maintenance, weed invasion, inappropriate fire regimes, and lack of associated vegetation.

- **Habitat Fragmentation** is a serious threat to the long term survival of this subspecies as it occurs over such a small range (10km) and exists in narrow strips of remnant vegetation in a disturbed environment.

- **Road and rail maintenance activities** threaten all populations. Threats include grading, chemical spraying, construction of drainage channels and the mowing of roadside vegetation. Several of these actions also encourage weed invasion. Westnet Rail is currently replacing many of the jarrah railway sleepers with concrete sleepers on the Gingin–Moora stretch of rail line, and this has the potential to impact populations.

- **Weed invasion** is a major threat to all populations. Weeds suppress early plant growth by competing for soil moisture, nutrients and light. They also exacerbate grazing pressure and increase the fire hazard due to easy ignition of high fuel loads, which are produced annually by many weed species.

- **Inappropriate fire regimes** would affect the viability of the populations, as *Conospermum densiflorum* subsp. *unicephalatum* appears to be an obligate seeder that germinates following fire or other disturbance. The soil seed bank is therefore likely to be rapidly depleted if fires recur before regenerating or juvenile plants reach maturity and replenish the soil seed bank. However, occasional fires or other disturbances are likely to be required for the taxon to propagate from soil stored seed.

- **Lack of associated vegetation** is a threat to all road reserve populations. As a result, pollinators and any native digging and burrowing animals that may historically have disturbed the soil and thereby stimulated germination, are likely to be infrequent or absent. In addition, with little vegetation present providing a buffer, weeds (in particular grasses) are able to invade from the road.

- **Fertiliser and herbicide drift** from adjacent farmlands also pose potential threats to many of the *Conospermum densiflorum* subsp. *unicephalatum* populations.

Summary of population information and threats

Pop. No. & Location	Land Status	Year/No. plants	Condition	Threats
1A Bindoon-Moora Road, North of Gillingarra	MRWA Road Reserve	1996 300+* 1999 50+ 2000 150+* 2003 251 (532)	Moderate	Road and rail maintenance activities, weed competition, inappropriate fire regimes
1b Bindoon-Moora Road, North of Gillingarra	Westnet Rail Rail Reserve	1996 300+* 2000 150+* 2003 0	Moderate	Road and rail maintenance activities, weed competition, inappropriate fire regimes
2A. Bindoon-Moora Road, South of Gillingarra	MRWA Road Reserve	1996 250* 1999 250+ * 2003 1	Moderate	Road and rail maintenance activities, weed competition, inappropriate fire regimes
2B. Bindoon-Moora Road, South of Gillingarra	Westnet Rail Rail Reserve	1996 250* 1999 250+ * 2003 31(185)	Moderate	Road and rail maintenance activities, weed competition, inappropriate fire regimes

3 Bindoon-Moora Road, South of Gillingarra	Westnet Rail Rail Reserve	2003 1	Moderate	Road and rail maintenance activities, weed competition, inappropriate fire regimes, population size
4 Bindoon - Moora Road, North of Gillingarra	Westnet Rail Rail Reserve	2000 10+ 2000 60+ 2003 11 (169)	Moderate	Road and rail maintenance activities, weed competition, inappropriate fire regimes
5 Bindoon - Moora Road. North of Gillingarra	Westnet Rail Rail Reserve	2003 1	Moderate	Road and rail maintenance activities, weed competition, inappropriate fire regimes, population size.

Numbers in brackets = number of seedlings.
*= total for subpopulations combined.

Guide for decision-makers
Section 1 provides details of current and possible future threats. Developments in the immediate vicinity of the populations or within the defined critical habitat of *Conospermum densiflorum* subsp. *unicephalatum* require assessment. No developments should be approved unless the proponents can demonstrate that they will have no significant impact on the taxon, or its habitat or potential habitat.

Critical habitat
Critical habitat is habitat identified as being critical to the survival of a listed threatened species or listed threatened ecological community. Habitat is defined as the biophysical medium or media occupied (continuously, periodically or occasionally) by an organism or group of organisms or once occupied (continuously, periodically or occasionally) by an organism, or group of organisms, and into which organisms of that kind have the potential to be reintroduced (*Environment Protection and Biodiversity Conservation Act 1999*).

The critical habitat for *Conospermum densiflorum* subsp. *unicephalatum* comprises:
- the area of occupancy of known populations;
- areas of similar habitat within 200 metres of known populations, ie. gravel or clay soils that support heathland consisting of *Dryandra* spp., and *Allocasuarina campestris* (these provide potential habitat for natural range extension);
- remnant vegetation that surrounds or links several populations (this is necessary to allow pollinators to move between populations); and
- additional occurrences of similar habitat that do not currently contain the taxon but may have done so in the past (these represent possible translocation sites).

Habitat critical to the survival of the species, and important populations
Given that this taxon is listed as endangered it is considered that all known habitat is habitat critical. In addition, all populations, including those resulting from translocation, are considered important to the survival of the taxon. Recovery actions include survey for further populations that would lead to the identification of additional habitat critical.

Benefits to other species/ecological communities
Recovery actions implemented to improve the quality or security of the habitat of *Conospermum densiflorum* subsp. *unicephalatum* will also improve the status of *Calothamnus pachystachyus* (Priority 4) and may benefit populations of *Dryandra serratulioides* subsp. *serratulioides* that occur in the habitat.

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. However, as *Conospermum densiflorum* subsp. *unicephalatum* is not listed under any specific international agreement, the implementation of other international environmental responsibilities is not affected by this plan.

Role and interests of indigenous people
There are no known indigenous communities interested or involved in the management of areas affected by this plan and, according to the Department of Indigenous Affairs Aboriginal Heritage Sites Register, no registered

sites are known from the habitat of the species. Input and involvement will be sought from any indigenous groups that have an active interest in the areas that are habitat for *Conospermum densiflorum* subsp. *unicephalatum*, and this is discussed in the recovery actions.

Social and economic impacts
As the known populations are on road and rail reserves, the implementation of this recovery plan is unlikely to cause significant adverse social and economic impacts.

Evaluation of the Plans Performance
CALM, in conjunction with the Moora District Threatened Flora Recovery Team will evaluate the success of this Interim Recovery Plan. In addition to annual reporting on progress and evaluation against the criteria for success and failure, the plan will be reviewed within five years of its implementation. Any changes to management or recovery actions will be documented accordingly.

2. RECOVERY OBJECTIVE AND CRITERIA

Objectives
The objective of this Interim Recovery Plan is to abate identified threats and maintain or enhance *in situ* populations to ensure the long-term preservation of the taxon in the wild.

Criteria for success: The number of individuals within populations and/or the number of populations have increased by ten percent or more over the period of the plan's adoption under the EPBC Act.
Criteria for failure: The number of individuals within populations and/or the number of populations have decreased by ten percent or more over the period of the plan's adoption under the EPBC Act.

3. RECOVERY ACTIONS

Existing recovery actions
Westnet Rail and Main Roads Western Australia (MRWA) have been formally notified of the presence and threatened nature of populations of *Conospermum densiflorum* subsp. *unicephalatum* on their land. The notification details the Declared Rare status of the taxon and the associated legal responsibilities.

Declared Rare Flora (DRF) markers have been installed at most populations along the road and rail line. The newly discovered populations will be marked as part of Westnet Rail's Rare Flora Management protocol. These markers serve to alert people working in the vicinity to the presence of DRF, and the need to avoid work that may damage plants or their habitat. Dashboard stickers and posters describing the significance of DRF markers have been produced and distributed.

Extensive surveys have been carried out in the area since 1985 to relocate *Conospermum densiflorum* subsp. *unicephalatum* in previous collection sites or discover new populations. Consultant E. Bennett did not record any new populations during extensive surveys undertaken since 1985. The taxon was also not collected by T. Griffith during floristic surveys of the remnant vegetation in the Bindoon – Moora area during 1991, and was not located during the Bioprospecting surveys conducted by R. Cranfield and D. Kabay during 1992-1993.

D. Papenfus undertook searches for the taxon in 1996 and relocated Populations 1 and 2, however the other populations were not relocated. She continued surveys for Priority flora in nearby areas during June to November 1996, however no additional populations of this taxon were located. All known populations were relocated by CALM staff in 2003 except for one 70km south of Moora on Great Northern Highway. A new population (Population 5) of one plant was discovered during this survey. *Conospermum densiflorum* subsp. *unicephalatum* was not located during surveys by various botanists in South Koogee Nature Reserve, Gillingarra Nature Reserve, Udamung Nature Reserve, Boonanarring Nature Reserve or Seven Mile Well Nature Reserve.

Fourteen cuttings of *Conospermum densiflorum* subsp. *unicephalatum* were taken by BGPA in May 2001, but no plants developed from these.

BGPA currently holds two clones of *Conospermum densiflorum* subsp. *unicephalatum* from tissue cultures. They have previously received material from 3 clones however most material is now dead. 31 seedlings were potted between January 2000 and March 2001 however only two of these remain.

There have been several collections of *Conospermum densiflorum* subsp. *unicephalatum* seed by the Threatened Flora Seed Centre (TFSC). In 1999, 7gm (~2545 fruits) were collected from Population 2. The initial germination rate was 67% (with estimated viability of 81%). In 2000, 731 fruits were collected from population 4, and 666 fruits collected from Population 1. The seed from Population 4 had an initial germination rate of 23%, and the seed from Population 1 had an initial germination rate of 16% with an estimated viability of 18%. Seed was also collected from Population 1 in November 2003 however this has not yet been cleaned.

Initial testing for resistance to *Phytophthora* spp. has been carried out by CALM Science. Three plants were tested and were found to be resistant to the disease.

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

Staff from CALM's Moora District regularly monitor populations of this taxon.

Future recovery actions
Where populations occur on lands other than those managed by CALM, permission has been or will be sought from appropriate land managers prior to recovery actions being undertaken. The following recovery actions are roughly in order of descending priority; however this should not constrain addressing any of the priorities if funding is available for 'lower' priorities and other opportunities arise.

1. Coordinate recovery actions
The Moora District Threatened Flora Recovery Team (MDTFRT) will continue to coordinate recovery actions for *Conospermum densiflorum* subsp. *unicephalatum* and other Declared Rare Flora in their region. They will include information on progress in their annual report to CALM's Corporate Executive and funding bodies.

Action: Coordinate recovery actions
Responsibility: CALM (Moora District) through the MDTFRT
Cost: $2,200 per year.

2. Map critical habitat
It is a requirement of the EPBC Act that spatial data relating to critical habitat be determined. Although critical habitat is described in Section 1, the areas as described have not yet been mapped and that will be done under this action. If any additional populations are located, then critical habitat will also be determined and mapped for these locations.

Action: Map critical habitat
Responsibility: CALM (Moora District, WATSCU) through the MDTFRT
Cost: $1,500 in the first year

3. Undertake weed control
Weed control will be undertaken in consultation with relevant land managers. Appropriate methods of weed control are found in Brown and Brooks (2002) and may include hand weeding or localised application of herbicide. All applications of weed control will be followed by a report on the method, timing and success of the treatment against weeds, and the effect on *Conospermum densiflorum* subsp. *unicephalatum* and associated native plant species. It is anticipated that native species in the habitat will regenerate after weed competition is removed.

Action: Undertake weed control
Responsibility: CALM (Moora District) through the MDTFRT
Cost: $800 per year.

4. Install Declared Rare Flora markers

Declared Rare Flora (DRF) markers are required at the road reserve at Population 5. Their purpose is to alert people operating in the area to the presence of DRF and to help prevent habitat disturbance.

Action: Install DRF markers
Responsibility: CALM (Moora District) through the MDTFRT
Cost: $400 in first year.

5. Determine genetics of the subspecies

The distinctiveness of the two subspecies needs to be clarified through genetic analysis as they occur in close proximity in similar habitat, and have quite similar floral characteristics. Some specimens have been shown to possess properties of both subspecies in the flower heads of the same plant. Genetic analysis will determine whether the subsp. *unicephalatum* is a separate subspecies to the common subsp. *densiflorum.*

Action: Compare genetics of the subspecies
Responsibility: CALM (Science Division) through the MDTFRT
Cost: $3500 in first year.

6. Conduct further surveys

Further surveys will be conducted for this taxon during its flowering period (September to November) in appropriate habitat and similar soil types, including on private lands wherever possible. Volunteers from the local community, Wildflower Society and Naturalist Clubs will be encouraged to be involved in surveys supervised by CALM staff. Some of the first locations noted in herbarium records have not been relocated because of the vague locality description of "near Gingin" by Blackall in 1932, and Whibley in 1974 that locates the taxon as 30km north east of Gingin. Both localities warrant further investigation. Reserves in the vicinity that also warrant further investigation include; Bartletts Well Nature Reserve, Betts Nature Reserve, Lake Wannamal Nature Reserve, Mogumber Nature Reserve, Moochamulla Nature Reserve, Moore River National Park, Quins Hill Nature Reserve, Sand Spring Well Nature Reserve, and Yurine Swamp Nature Reserve. Remnant vegetation on suitable soil types exists in these areas. Recent bushfires in the Mogumber / Wannamal area may also have created appropriate disturbance for *Conospermum densiflorum* subsp. *unicephalatum* populations to regenerate, however weed invasion in this area may be inhibiting reestablishment. Areas considered suitable for translocation will also be noted.

The small areas that contain known populations of *Conospermum densiflorum* subsp. *unicephalatum* have unusual geology, and are located at the bottom of the Darling Scarp. The geology of these areas will be examined, and similar habitat will also be searched.

Action: Conduct further surveys
Responsibility: CALM (Moora District) through the MDTFRT
Cost: $2,100 per year.

7. Develop and implement a fire management strategy

As *Conospermum densiflorum* subsp. *unicephalatum* produces seed that germinates following soil disturbance, it is likely that it also germinates after fire. A fire management strategy will be developed to recommend fire frequency, intensity, season, and control measures. This will be carried out in conjunction with MRWA and Westnet Rail.

Action: Develop and implement a fire management strategy
Responsibility: CALM (Moora District) in conjunction with Main Roads WA and Westnet Rail, through the MDTFRT
Cost: $2,500 in first year and $1,000 in subsequent years.

8. Collect and store seed

Seed has been collected from Populations 1, 2 and 4. Ideally seed will be collected from all populations, and collections will also be made from Populations 3 and 5, if possible.

Action: Collect and store seed

Responsibility: CALM (Moora District, TFSC) and BGPA, through the MDTFRT
Estimated Cost: $2,200 per year

9. Monitor populations

Annual monitoring of factors such as habitat degradation (including weed invasion and plant diseases), population stability (expansion or decline), pollination activity, seed production, recruitment, longevity and predation is essential. All populations will be inspected annually.

Action: Monitor populations
Responsibility: CALM (Moora District) through the MDTFRT
Cost: $1,000 per year.

10. Promote awareness

The importance of biodiversity conservation and the need for long-term protection of wild populations of this taxon will be promoted to the community through poster displays and the local print and electronic media. Formal links with local naturalist groups, Bushcare and Catchment groups and interested individuals will also be encouraged. An information sheet that includes a description of the plant, its habitat, threats, recovery actions and photos will be produced. A reply paid postal drop of a pamphlet that illustrates *Conospermum densiflorum* subsp. *unicephalatum* and describes its distinctive features and habitat will be distributed to residents in Shires that contain possible habitat for the taxon. Postal drops aim to stimulate interest, provide information about threatened species and provide a name and number to contact if new populations are located.

Action: Promote awareness
Responsibility: CALM (Moora District) through the MDTFRT
Cost: $1,400 in first year, $700 in second year and $600 in remaining years.

11. Obtain biological and ecological information

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

1. Soil seed bank dynamics and the role of various disturbances (including fire), competition, rainfall and grazing in germination and recruitment.
2. The pollination biology of the taxon, and the requirements of pollinators.
3. The reproductive strategies, phenology and seasonal growth of the taxon.
4. The population genetic structure, levels of genetic diversity and minimum viable population size.

Action: Obtain biological and ecological information
Responsibility: CALM (Science Division, Moora District) through the MDTFRT
Cost: $18,900 per year for the first three years.

12. Liaise with land managers

Staff from CALM's Moora District will continue to liaise with Main Roads WA and Westnet Rail to ensure the populations are not accidentally damaged or destroyed during road and rail mantanance activities. Input and involvement will also be sought from any indigenous groups that have an active interest in areas that are habitat for *Conospermum densiflorum* subsp. *unicephalatum*.

Action: Liaise with land managers
Responsibility: CALM (Moora District), through the MDTFRT
Cost: $600 per year

13. Start translocation process

Translocations are generally undertaken under full Recovery Plans, however due the present location of the plants only on disturbed, narrow road and rail verges, translocation to more secure sites would be beneficial for the security of the species. It is possible to develop a Translocation Proposal and start propagating plants within the timeframe of an Interim Recovery Plan. Information on the translocation of threatened animals and plants in

the wild is provided in CALM Policy Statement No. 29 *Translocation of Threatened Flora and Fauna*. All Translocation Proposals require endorsement by the Director of Nature Conservation.

Action: Start translocation process
Responsibility: CALM (Moora District) through the MDTFRT
Cost: $5,300 in fifth year

14. Stimulate the germination of soil-stored seed, as required

Soil disturbance, burning, and/or smokewater may be effective in stimulating the germination of soil-stored seed. At present germinaton of soil stored seed is occurring in the absence of artificial stimulation. If natural germination rates fall, trials will be conducted near existing populations in areas newly cleared of weeds, and/or in areas where *Conospermum densiflorum* subsp. *unicephalatum* was known to occur previously. After treatment, annual monitoring of germinants will include recording the time when flowering first occurs, seed is produced and the age at which of senescence is reached. This will enable formulation of a recommended interval time between disturbances to maintain populations. When mature plants senesce, soil disturbance will be implemented as required to encourage recruitment.

Action: Stimulate the germination of soil-stored seed, as required
Responsibility: CALM (Moora District) through the MDTFRT
Cost: To be determined

15. Review the need for a full Recovery Plan

At the end of the fourth year of the five-year term of this Interim Recovery Plan, the need for further recovery or to update this plan, or replace it with a full Recovery Plan will be assessed.

Action: Review the need for a full Recovery Plan
Responsibility: CALM (WATSCU, Moora District) through the MDTFRT
Cost: $23,000 in the fifth year (if required).

4. TERM OF PLAN

This Interim Recovery Plan will operate from June 2004 to May 2009 but will remain in force until withdrawn or replaced. After five years, the need to review this IRP or to replace it with a full Recovery Plan will be determined.

5. REFERENCES

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6. TAXONOMIC DESCRIPTION

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Conospermum densiflorum

Erect, much branched shrub to 1 m tall. Basal leaves filiform,1.2-6.5 cm long, 0.25-0.6 mm wide, ascending curved sparsely velutinous, apex acute. Inflorescence a spike or corymb of spikes, peduncle 17-64 cm long, sparsely velutinous; bracteolate, 5-12 mm long, 1-3 mm wide, blue, glabrous or with scattered, golden hairs; midvein darker, ±raised. Perianth cream or blue, velutinous; tube 3.5-6 mm long; upper tip ovate, 2-3.5 mm long, 2-2.5 mm wide, with an acute recurved apex; lower lip united for 1-1.5 mm lone narrowly oblong, 2-4 mm long, 0.5-0.75 mm wide; 2 outer lobes twisted. Nut 2-2.6 mm long, 1.5-2 mm wide, orange, velutinous, orange hairs 1-1.25mm long. Occurs from just north of Perth to Jurien Bay, WA. Two subspecies are recognised.

Conospermum densiflorum* subsp. *densiflorum

Inflorescence terminal spikes. Occurs between Gingin and Moora, W.A.
Flowers September to November.

Australian Government

Department of the Environment and Heritage

ADDENDUM

One-Headed Smokebush (*Conospermum densiflorum* subsp. *unicephalatum*) Interim Recovery Plan 2004-2009

In adopting this plan under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the Minister for the Environment and Heritage has approved the addition of the following information.

Critical Habitat

The plan identifies critical habitat as including areas located a set distance around known populations which contain habitat similar to that in which the species occurs, as well as areas that do not currently contain the species but may have done so in the past. These areas identified in the plan do not represent areas of critical habitat as defined under section 207A of the EPBC Act.