INTERIM RECOVERY PLAN NO. 82

ALBANY CONE BUSH

(*ISOPOGON UNCINATUS*)

INTERIM RECOVERY PLAN

2001-2003

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Photograph: R. Smith

January 2001

Department of Conservation and Land Management
Western Australian Threatened Species and Communities Unit
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Natural Heritage Trust
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DEPARTMENT OF Conservation AND LAND MANAGEMENT
Conserving the nature of WA

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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This Interim Recovery Plan will operate from January 2001 to December 2003 but will remain in force until withdrawn or replaced. It is intended that, if the taxon is still ranked Critically Endangered, this IRP will be replaced by a full Recovery Plan after three years.

This IRP was approved by the Director of Nature Conservation on 12 April, 2001. The 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 January 2001.

SUMMARY

Scientific Name: ***Isopogon uncinatus***
Common Name: Albany Cone Bush
Family: Proteaceae
Flowering Period: October to December
CALM Region: South Coast
CALM District: Albany
Shire: Albany
Recovery Team: Albany District Threatened Flora Recovery Team (ADTFRT)

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; Robinson, C.J. and Coates, D.J. (1995) *Declared Rare and Poorly Known Flora in the Albany District*. Department of Conservation and Land Management, Western Australia, Australian Nature Conservation Agency, Canberra; Sainsbury, R.M. (1987) A Field Guide to *Isopogons* and *Petrophiles*. University of Western Australia Press, Western Australia.

Current status: *Isopogon uncinatus* was declared as Rare Flora in June 1990 and was ranked as Critically Endangered (CR) in December 1997. It currently meets World Conservation Union (IUCN, 1994) Red List Category 'CR' under criteria B1+2cde due to the severe fragmentation of populations and continuing decline in the area and quality of habitat, the number of locations and individuals. The main threats are disease, inappropriate fire regimes, drought, recreational activities and grazing.

Habitat requirements: *Isopogon uncinatus* is endemic to Western Australia where it is confined to the Albany area. It is found in seasonally damp areas in shallow sandy clay over granite, or gravelly soil from decomposed laterite over granite. Associated vegetation is heath, in saddles and mid slopes of hills (Robinson and Coates, 1995).

Critical habitat: The critical habitat of *Isopogon uncinatus* comprises the area of known populations, adjacent areas of similar habitat within 200 metres of populations, corridors of remnant vegetation that link populations, and other nearby occurrences of suitable habitat that are not currently known to contain populations of the species but which may be suitable for translocations.

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

1. Land managers have been informed of the species and its location.
2. Staff of CALM's Threatened Flora Seed Centre (TFSC) collected seed from Subpopulation 3a in 1992 and from Subpopulations 4b, c, and d in 1995 and 1996. The initial germination rate ranged from 30% to 79% and after one year in storage 0% to 58%.
3. The Botanic Garden and Parks Authority (BGPA) received five seedlings of *Isopogon uncinatus* from the TFSC in 1994, only one of which remains. A further nine seedlings were received in 1996 but all died within two years.
4. CALM staff have conducted numerous surveys for the species in areas of suitable habitat.
5. Aerial spraying of phosphite of one population to control *Phytophthora cinnamomi* commenced in 1996 and was repeated in 1999. An additional population was sprayed in 1999.
6. CALM staff from CALM's Albany District Office regularly monitor populations, particularly in relation to the effectiveness of phosphite application and the impact of *Phytophthora cinnamomi*.
7. The Albany District Threatened Flora Recovery Team (ADTFRT) is overseeing the implementation of this IRP and will include it in its 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 species in the wild.

Recovery criteria
Criteria for success: The number of individuals within populations and/or the number of populations have increased.

Criteria for failure: The number of individuals within populations and/or the number of populations have decreased.

Recovery actions

1. Coordinate recovery actions.
2. Apply phosphite.
3. Monitor the impact of phosphite.
4. Conduct further surveys.
5. Develop and implement a fire management strategy.
6. Notify and liaise with relevant land managers.
7. Monitor populations.
8. Collect seed and cutting material.
9. Vest reserve #27107 with the Conservation Commission.
10. Obtain biological and ecological information.
11. Promote awareness.
12. Write a full Recovery Plan.

1. BACKGROUND

History

Robert Brown described *Isopogon uncinatus* in 1830 from collections made from King George Sound area by William Baxter in 1828. A further nine collections have been made since and are held at the Regional Herbarium, Albany and the Western Australian Herbarium in Perth.

Two populations were known in 1988 and C. Robinson[1] found three more populations in 1992 and 1993. In 1995, 1999 and 2000 CALM staff discovered four further populations.

In summer 1997 a fire burnt most of Populations 1, 4, 7, 8 and 9 in Torndirrup National Park, with only a small number of adult plants surviving. Recruitment of seedlings at Populations 4 and 9 was observed in 1999 and 2000.

Isopogon uncinatus is currently known from nine populations totalling less than 100 adult plants. Several populations are threatened from dieback (*Phytophthora cinnamomi*) and canker.

Description

Isopogon uncinatus is a small shrub 15 to 30 cm high and a similar width across, with very short stems. It has entire, sword-like leaves with a curved apex. Young leaves are hooked (uncinate) and topped with small points, while mature leaves are petiolate and up to 30 cm long. Flower heads are aggravated. Cone scales are lanceolate and villous, the outer scales broad and inner ones narrow. Small yellow flowers are produced in early November (Brown, 1830; Sainsbury, 1987).

Isopogon uncinatus is difficult to identify without close examination. In particular, its leaves are very similar in shape to *Conospermum capitatum*.

Distribution and habitat

Isopogon uncinatus is endemic to Western Australia where it is confined to the Albany area. Soil is seasonally damp, shallow sandy-clay over granite, or gravelly soil from decomposed laterite over granite, in saddles between summit rocks. Associated vegetation is heath, (Robinson and Coates, 1995).

Associated species include *Hakea elliptica, Anthocercis viscosa, Banksia verticillata, Agonis marginata, Acacia myrtifolia, Verticordia plumosa, Eucalyptus marginata, Andersonia sprengelioides, Adenanthos obovatus, Conospermum capitatum, Banksia grandis, Isopogon attenuatus, Eucalyptus calophylla, Agonis parviceps, Isopogon cuneatus, Hakea ceratophylla, Conospermum petiolare, Xanthorrhea platyphylla, Hakea varia, Banksia occidentalis, Dryandra baxteri, Dryandra formosa, Platysace compressa, Nemcia coriacea, Conospermum caeruleum, Hakea ferruginea, Hakea trifurcata, Andersonia caerulea*, and *Banksia quercifolia*.

Isopogon uncinatus occurs with the Declared Rare species *Banksia brownii*, which is ranked as Endangered.

Critical Habitat

Critical habitat is habitat identified as being critical to the survival of a listed threatened species or community. Habitat means the biophysical medium or media: (a) occupied (continuously, periodically or occasionally) by an organism or group of organisms; or (b) 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* (EPBC Act)).

The critical habitat of *Isopogon uncinatus* comprises:

- The habitat of known populations.

[1] Previously Project Officer, CALM Albany District

- Similar habitat within 200 metres of known populations (these provide potential habitat for natural recruitment).
- Corridors of remnant vegetation that link populations with other nearby areas of apparently suitable habitat that do not currently contain the subspecies.
- Areas of similar habitat that may be used for future translocation.

Biology and ecology

What little is known about the biology and ecology of *Isopogon uncinatus* has come from field observations rather than definitive research. New growth of *I. uncinatus* appears pink to red and emerges from the base of new cones (fruiting bodies). Old cones are scattered along stems at ground level or develop into a mat-like clump. Termite predation of cones is also apparent where contact with soil occurs (personal observation A. Cochrane[2]).

Some variation in morphology exists between populations. *Isopogon uncinatus* plants in Population 4 (Torndirrup National Park) are very small compared with those in Population 3. Plants in Population 5 grow more as an understorey and have longer, narrower, darker green and more prominently hooked leaves than those of other populations.

According to Sainsbury (1987), *Isopogon* species are not easy to cultivate and BGPA nursery staff has had difficulty in propagating the species (personal communication A. Shade[3]).

In 1992, it was noted that many adult plants at Population 4 were dying from unknown causes. There has been no obvious sign of dieback disease in the area and so it is possible that the deaths may be a result of drought or competition (personal communication S. Barrett[4]).

Few adult plants are present at Population 6 but numerous seedlings have appeared. It is likely, however, that many of these will not survive the summer (personal communication S. Barrett).

As yet, CALMScience staff have not tested *Isopogon uncinatus* for susceptibility to *Phytophthora cinnamomi* (personal communication F. Tay[5]). However, Keighery (1992) considers the species highly susceptible.

Plants in Populations 4 and 9 were mostly killed by a hot fire in summer 1997, with recruitment occurring from soil-stored seed (personal observation S. Barrett). It would be detrimental to these populations if fire recurs before seedlings have reached maturity.

Threats

Isopogon uncinatus was declared as Rare Flora in June 1990 and was ranked as Critically Endangered (CR) in December 1997. It currently meets World Conservation Union (IUCN, 1994) Red List Category 'CR' under criteria B1+2cde due to the severe fragmentation of populations and continuing decline in the area and quality of habitat and the number of locations and individuals. The main threats are disease, inappropriate fire regimes, drought, recreational activities and grazing.

- **Disease** *Phytophthora cinnamomi* has been visually confirmed from the area of Population 5, upslope at Population 6 and at Population 8. However, as the associated habitat is susceptible to the disease, other populations may be affected in the future. Aerial canker has been visually identified at Population 3 with some *I. uncinatus* plants dying.

- **Inappropriate fire** may affect the long-term viability of populations. Seed germinates following fire and would be rapidly depleted if fires recur before regenerating or seedling plants reach maturity and replenish the soil seed bank. It is likely, however, that occasional summer fires are needed for the long-term

[2] Anne Cochrane, Manager Threatened Flora Seed Centre
[3] Amanda Shade, Horticulturalist, Botanic Garden and Parks Authority
[4] Sarah Barrett, Flora Officer, CALM Albany District
[5] Francis Tay, Manager Vegetation Health Service, CALMScience

conservation of this species. Further investigation is required and will be addressed in management action 10.

- **Drought** may directly impact on the species due to poor flowering, seed set and recruitment, and by increasing the mortality of adult plants and seedlings.

- **Recreational activities** that result in the crushing of plants by trampling and turning vehicles have the potential to impact on Population 3. The placement of a barrier at the site was deemed impractical due to vehicles driving around the barrier.

- The impact of **grazing** by herbivores is unclear. One plant at Population 6 has been grazed. However, with the decline in habitat quality from disease, grazing may become a significant threat in the future and needs to be monitored.

Summary of population information and threats

Pop. No. & Location	Land Status	Year/No. plants	Condition	Threats
1a. S of Albany	National Park	1986 200 2000 (20)	Healthy	Disease, inappropriate fire
1b. S of Albany	National Park	2000 (5)	Healthy	Disease, inappropriate fire
1c. S of Albany	National Park	2000 (50)	Healthy	Disease, inappropriate fire
1d. S of Albany	National Park	2000 (100)	Healthy	Disease, inappropriate fire
2. NW of Albany	Private property	1990 1 1999 0		Disease, inappropriate fire
3a. WSW of Albany	Non vested reserve (Defence Purposes)	1992 60 (1) 2000 *40 (5) [5 dead]	Poor	Disease (canker), inappropriate fire, recreational activities
3b. WSW of Albany	Shire reserve (Parks and recreation)	1995 *60 2000 *40 (5) [5 dead]	Poor	Disease (canker), inappropriate fire, recreational activities
4a. S of Albany	National Park	1992 *110 (30+) 1997 *50 [200 dead]	Healthy (burnt 1997)	Disease, inappropriate fire
4b. S of Albany	National Park	1992 *110 (30+) 1997 *50 [200 dead] 1999 20 (230)	Healthy (burnt 1997)	Disease, inappropriate fire
4c. S of Albany	National Park	1992 *110+ (30+) 1997 *50 [200 dead] 1999 (75)	Healthy (burnt 1997)	Disease, inappropriate fire
4d. S of Albany	National Park	1992 *110+ (30) 1997 *50 [200 dead] 1999 20 (350) [10 dead]	Healthy (burnt 1997)	Disease, inappropriate fire
4e. S of Albany	National Park	1999 (100+)	Healthy (burnt 1997)	Disease, inappropriate fire
4f. S of Albany	National Park	1999 (30+)	Healthy (burnt 1997)	Disease, drought, inappropriate fire
4g. S of Albany	National Park	1999 4	Healthy (burnt 1997)	Disease, drought, inappropriate fire
5. S of Albany	Shire reserve (Recreation)	1993 9 1999 0		Disease (dieback), inappropriate fire
6. E of Albany	Unvested National Park	1995 8 (19) [7 dead] 2000 4 (27) [1 dead]	Moderate (plants appear stressed)	Disease (dieback upslope of site), drought, inappropriate fire, grazing
7a. S of Albany	National Park	1999 13 [1 dead] 2000 9 (1) [1 dead]	Moderate (plants appear stressed)	Disease, inappropriate fire, drought
7b. S of Albany	National Park	1999 2	Moderate	Disease, inappropriate fire
7c. S of Albany	National Park	2000 4	Moderate	Disease, inappropriate fire
8. S of Albany	National Park	2000 1 [1 dead]	Moderate	Disease (dieback), inappropriate fire
9. S Niggerhead Rock	National Park	2000 (131+)	Healthy	Disease, inappropriate fire

Note: * total for both subpopulations combined. Numbers in brackets () = seedlings.

Guide for decision-makers

Section 1 provides details of current and possible future threats. Developments in the immediate vicinity of any of the populations or within the defined critical habitat of *Isopogon uncinatus* require assessment. Developments should only be approved if the proponents can demonstrate that they will not have an impact on the species, its habitat or potential habitat, or have the potential to spread or amplify dieback disease.

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 species in the wild.

Criteria for success: The number of individuals within populations and/or the number of populations have increased.
Criteria for failure: The number of individuals within populations and/or the number of populations have decreased.

3. RECOVERY ACTIONS

Existing recovery actions

Land managers have been informed of the threatened nature *Isopogon uncinatus* and its location. Private property owners and the City of Albany have been formally notified of the presence of populations on their land. Liaison between CALM's Albany District, the City of Albany and landowners is ongoing.

Seed was collected from Subpopulation 3a in December 1992 and is stored at CALM's TFSC. Approximately 1819 seeds are being stored at –18°C. TFSC staff tested the viability of *Isopogon uncinatus* seed after one year in storage and again after five years. Initial seed germination was 40%, with 52% germination after one year in storage. Further seed collections were made in January 1995 and February 1996 from Subpopulations 4b, c and d. Approximately 1270 seeds were collected in 1995 with an initial germination from 39 to 79%, and 0 to 58% after one year in storage. The 0% germination was a result of trialing different methods for treating seeds. In 1996, 376 seeds were collected with an initial germination of 30% (unpublished data A. Cochrane).

The BGPA had five plants of *Isopogon uncinatus* in 1994, of which only one remains alive. The TFSC gave a further nine seedlings to the BGPA in 1996 but all died within two years (personal communication A. Shade).

CALM staff have undertaken numerous surveys for the species in areas of suitable habitat.

Aerial spraying of Population 5 with phosphite commenced in 1996 and was repeated in 1999. Spraying of Population 6 commenced in 1999. This program also covered another threatened species - *Banksia brownii*. The following table outlines dates during which populations were sprayed with phosphite.

Population	Location	Area sprayed	Dates	Date of next proposed spray
5	Vancouver Peninsula	1 hectare	30 April 1996 8 May 1996 19 March 1999 19 April 1999	2001
6	Gull Rock (up slope from *Isopogon uncinatus* population)	1.35 hectares	19 March 1999 19 April 1999	2001

Due to the continuing threat of dieback CALM's Albany District staff will spray these areas as part of CALM's phosphite spraying program. The next spray is scheduled for autumn 2001 (personal communication R. Smith[6]).

Staff from CALM's Albany District Office monitor all populations, including the effectiveness of phosphite application and the impact of *Phytophthora cinnamomi* where appropriate.

[6] Russell Smith, Ecologist, CALM Central Forest

The Albany District Threatened Flora Recovery Team (ADTFRT) is overseeing the implementation of this IRP and will include it in its annual report to CALM's Corporate Executive and funding bodies.

Future recovery actions

Where populations occur on lands other than those managed by CALM, permission has been or will be sought from the appropriate land managers prior to recovery actions being undertaken.

1. Coordinate recovery actions

The ADTFRT is overseeing the implementation of recovery actions for *Isopogon uncinatus* and will include information on progress in its annual report to CALM's Corporate Executive and funding bodies.

Action: Coordinate recovery actions
Responsibility: CALM (Albany District) through the ADTFRT
Cost: $400 per year

2. Apply phosphite

The habitat in which *Isopogon uncinatus* grows is either severely impacted or has the potential to become severely impacted by *Phytophthora cinnamomi*. CALM will apply phosphite to those areas that are currently infected with the disease. These areas were last sprayed in 1999 and are due to be sprayed again in 2001. Where other populations of *I. uncinatus* show signs of dieback infection, phosphite will also be applied. Application to the associated habitat will also protect other threatened plant species.

Action: Apply phosphite
Responsibility: CALM (Albany District, Dieback Disease Coordinator) through the ADTFRT
Cost: $1,800 in second year

3. Monitor the impact of phosphite

Following the application of phosphite, monitoring its impact on *Phytophthora cinnamomi* and any detrimental effects on the *Isopogon uncinatus* is required.

Action: Monitor the impact of phosphite
Responsibility: CALM (Albany District, Dieback Disease Coordinator) through the ADTFRT
Cost: $900 per year

4. Conduct further surveys

Further surveys by CALM staff with the assistance of local naturalists and wildflower society members will be conducted during the species' flowering period (October to December).

Action: Conduct further surveys
Responsibility: CALM (Albany District) through the ADTFRT
Cost: $3,200 per year

5. Develop and implement a fire management strategy

Fire kills adult plants of the species, with regeneration largely from soil-stored seed. Frequent fire may prevent the accumulation of sufficient seed for the long-term viability of populations and should therefore be prevented from occurring if possible. A fire management strategy will be developed to determine fire control measures and fire frequency.

Action: Develop and implement a fire management strategy
Responsibility: CALM (Albany District) through the ADTFRT
Cost: $2,300 in first year and $1,000 in subsequent years

6. Notify and liaise with land managers

The Department of Defence needs to be officially notified of the species (Subpopulation 3a) on land it leases. Staff from CALM's Albany District will liaise with land managers and adjacent landowners to ensure that populations are not damaged or destroyed accidentally.

Due to the susceptibility of the habitat of *Isopogon uncinatus* to dieback, the need for dieback hygiene procedures will be included in information provided to land managers.

Action: Notify and liaise with land managers
Responsibility: CALM (Albany District) through the ADTFRT
Cost: $800 per year

7. Monitor populations

Annual monitoring of habitat degradation (including the impact of dieback), population stability (expansion or decline), weed invasion, pollination activity, seed production, recruitment, and longevity is essential. Herbivores may also be having some impact on Population 6 and it requires monitoring to assess if action is required.

Action: Monitor populations
Responsibility: CALM (Albany District) through the ADTFRT
Cost: $1,800 per year

8. Collect seed and cutting material

Seed and cutting collections are essential to guard against the possible extinction of wild populations and can be used to propagate plants for future translocations. A small quantity of seed has been collected from Populations 3 and 4 but further collections are required from all populations.

Action: Collect seed and cutting material
Responsibility: CALM (Albany District, TFSC) and the BGPA, through the ADTFRT
Cost: $3,300 per year

9. Vest reserve #27107 with the Conservation Commission

Population 6 is not currently vested but has the purpose of National Park. Staff from CALM's Albany District are continuing negotiations to have the reserve vested in the Conservation Commission.

Action: Vest reserve #27107 in the Conservation Commission
Responsibility: CALM (Albany District) through the ADTFRT
Cost: $500 in the first year

10. Obtain biological and ecological information

Increased knowledge of the biology and ecology of the species will provide a scientific basis for management of *Isopogon uncinatus* in the wild. Investigations will include:

1. Determination of reproductive strategies, phenology and seasonal growth.
2. A study of soil seed bank dynamics and the role of various factors including disturbance (eg fire), competition, rainfall and grazing on recruitment and seedling survival.
3. Investigation of population genetic structure, levels of genetic diversity and minimum viable population size.
4. Investigation of the impacts of dieback disease and control techniques on *Isopogon uncinatus* and its habitat.

Action: Obtain biological and ecological information

Responsibility: CALM (CALMScience, Albany District) through the ADTFRT
Cost: $17,700 per year

11. Promote awareness

The importance of biodiversity conservation and the need for the long-term protection of *Isopogon uncinatus* in the wild will be promoted to the community by a publicity campaign through the local print and electronic media and poster displays. Formal links with local naturalist groups and interested individuals will also be encouraged. An information sheet, which includes a description of the plant, its habitat type, threats, management actions and photos, will be produced.

Action: Promote awareness
Responsibility: CALM (Albany District, Corporate Relations) through the ADTFRT
Cost: $1,100 in first year and $700 in subsequent years

12. Write a full Recovery Plan

At the end of the second-year of this IRP, the need for further recovery will be assessed. If the species is still ranked Critically Endangered at that time a full Recovery Plan will be developed that prescribes actions required for its long-term recovery.

Action: Write a full Recovery Plan
Responsibility: CALM (WATSCU, Albany District) through the ADTFRT
Cost: $18,100 in third year

4. TERM OF PLAN

This Interim Recovery Plan will operate from January 2001 to December 2003 but will remain in force until withdrawn or replaced. It is intended that, if the taxon is still ranked Critically Endangered, this IRP will be replaced by a full Recovery Plan after three years.

5. ACKNOWLEDGMENTS

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

Sarah Barrett	Flora Conservation Officer, CALM Albany District
Anne Cochrane	Manager, CALM Threatened Flora Seed Centre
Alan Danks	Regional Program Leader Nature Conservation, CALM South Coast Region
Rebecca Evans	Former Project Officer, WA Threatened Species and Communities Unit
Mal Grant	Environmental Officer, CALM Albany District
Greg Keighery	Principal Research Scientist, CALMScience
Amanda Shade	Horticulturalist, Botanic Garden and Parks Authority
Russell Smith	Ecologist, CALM Central Forest
Gillian Stack	Former Project Officer, WA Threatened Species and Communities Unit
Francis Tay	Manager Vegetation Health Service, CALMScience

We would like to thank the staff of the W.A. Herbarium for providing access to Herbarium databases and specimen information, and CALM's Wildlife Branch for their extensive assistance.

6. REFERENCES

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7. TAXONOMIC DESCRIPTION

Brown, R. (1830) *Prodromus Florae Novae Hollandiae*. London

Isopogon uncinatus has entire and sword-like leaves with a curved apex. The stem is short and flowerheads are aggregated.

Sainsbury, R.M. (1987) A Field Guide to *Isopogons* and *Petrophiles*. University of Western Australia Press, Western Australia.

A small shrub, 15 cm to 30 cm high and across, with very short stems. Leaves are linear to lanceolate, young ones are hooked (uncinate) and topped with small points, the mature leaves are petiolate and can be up to 30 cm long. Flower heads are normally found in sessile clusters at ground level. Outer bracts are few and glabrous, and the cone scales are lanceolate and villous- the outer scales broad and the inner ones narrow. The small yellow flowers emerge in early November.