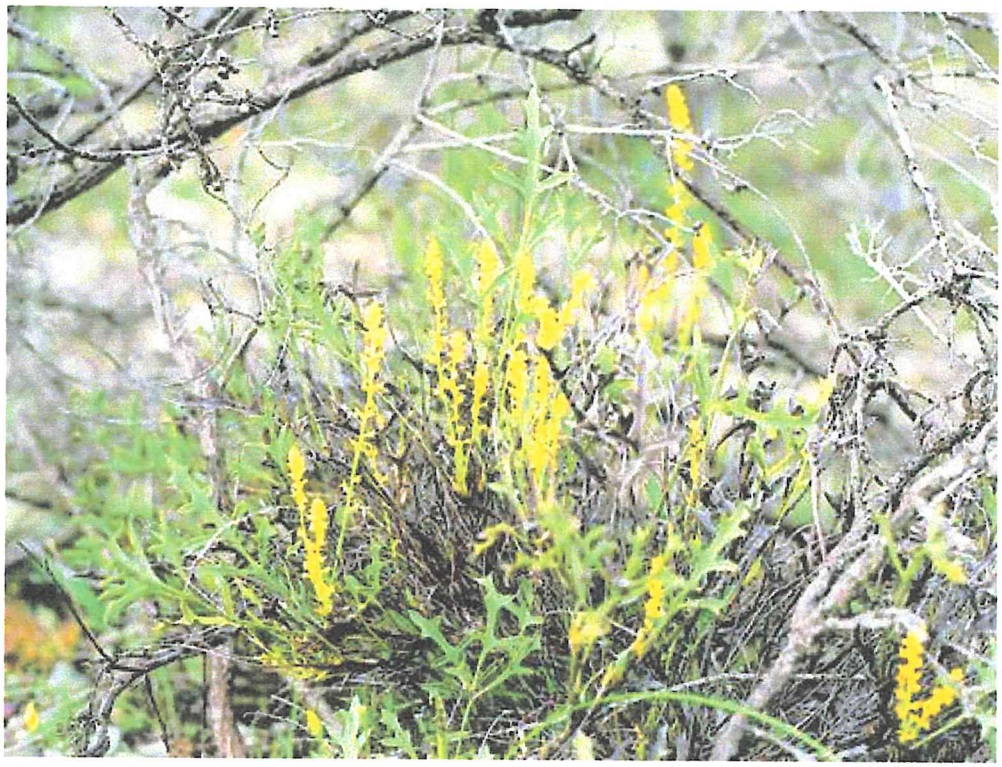
M RECOVERY PLAN NO.50

.OVING SYNAPHEA (*SYNAPHEA QUARTZITICA*) INTERIM RECOVERY PLAN 1999-2002

by
Gillian Stack and Val English



Photograph: Gillian Stack
December 1999

Department of Conservation and Land Management
Western Australian Threatened Species and Communities Unit (WATSCU)
PO Box 51, Wanneroo, WA 6946

Natural Heritage Trust
Helping Communities Helping Australia

Department of Conservation and Land Management

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This Interim Recovery Plan will operate from December 1999 to November 2002 but will remain in force until withdrawn or replaced.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 2 February 2000. 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 December 1999.

SUMMARY

Scientific Name: ***Synaphea quartzitica***
Common name: Quartz-loving synaphea
Family: Proteaceae
Flowering period: July-August
CALM Region: Midwest
CALM District: Moora
Shire: Moora
Recovery team: Moora District Threatened Flora Recovery Team (MDTFRT).

Illustrations and/or further information: George, A. S. (1995). Synaphea. *Flora of Australia* 16: 271-315. Australian Government Publishing Service, Canberra; Brown, A., Thomson-Dans, C. and Marchant, N. (eds.). (1998). *Western Australia's Threatened Flora*. Department of Conservation and Land Management, Western Australia.

Current status: *Synaphea quartzitica* was declared as Rare Flora in July 1998, and was ranked as Critically Endangered (CR) in November 1998. It currently meets World Conservation Union (IUCN) category 'CR' under criterion C1 (IUCN 1994) because of the low number of plants and scattered distribution within and between populations, and threats associated with growing in a specialised habitat and restricted range. The species is known from four populations, with a total of less than 200 plants. These populations occur over a range of approximately 40 km. The species is threatened by mining and quarrying, grazing, track maintenance activities and inappropriate fire regimes.

Habitat requirements: Endemic to the Moora - Watheroo area of Western Australia on chert hills in tall shrubland of *Allocasuarina campestris* with *Xanthorrhoea* sp., *Melaleuca radula, Daviesia dielsii, Acacia aristulata, Stylidium* spp.and *Kunzea* species. It has also been located in sandy soils at the base of a chert slope.

Existing recovery actions
1. All appropriate people have been made aware of the existence of this species and its locations.
2. Staff of CALM's Threatened Flora Seed Centre (TFSC) attempted to collect seed in 1997 and again in 1998.
3. Dashboard stickers and posters describing the significance of DRF markers have been produced and distributed.
4. Declared Rare Flora (DRF) markers have been installed at Population 2.
5. Staff from CALM's Moora District Office regularly monitor the populations.
6. The MDTFRT is overseeing the implementation of this IRP.

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

Recommended recovery actions
1. Coordinate recovery actions
2. Preserve genetic diversity of the species
3. Control rabbits
4. Monitor populations
5. Investigate biology and ecology
6. Install DRF markers
7. Develop a fire management strategy
8. Ensure mining and quarrying do not impact Population1
9. Conduct further surveys
10. Promote awareness
11. Negotiate to acquire area that contains Population 1
12. Write full Recovery Plan

1. BACKGROUND

History

The first known collection of *Synaphea quartzitica* was from the Moora area in October 1908 by Dr. J. Burton Cleland and this specimen is now housed in New South Wales. Surveys conducted in August 1997 resulted in collection of a Synaphea specimen initially thought to be *Synaphea spinulosa*. However, this has now been positively identified as *S. quartzitica* by a taxonomist working on the genus. Surveys conducted in August 1998 located three additional populations nearby. However, all of the known populations are relatively small and isolated.

Description

The genus Synaphea is endemic to the south-west of Western Australia. Fifty species are currently recognised, but taxonomic work is continuing on the resolution of various complexes. The genus consists of low shrubs that have small yellow tubular flowers, and strikingly varied leaf morphology (George 1995).

Synaphea quartzitica is a low sub-shrub with several stems. The flattened leaves have 6-15 cm long petioles, and are pinnately divided with two or three pairs of lobes to 6 mm wide. The flowering spikes carry many bright yellow flowers, are 6-18 cm long and are often only a little taller than the foliage. This species can be distinguished by the leaf shape, the length of flower spikes and the very narrow stigma (George 1995).

Distribution and habitat

Synaphea quartzitica is endemic to the Moora - Watheroo area of Western Australia. It is known from four populations, that contain a total of less than 200 plants. It occurs on chert hills in tall shrubland of *Allocasuarina campestris* with *Xanthorrhoea* sp., *Melaleuca radula, Daviesia dielsii, Acacia aristulata, Stylidium* spp. and *Kunzea* species. It has also been found in sandy soil at the base of a chert slope.

Summary of population information

Pop. No. & Location	Land Status	Date / No. of Plants	Condition	Threats
1. North of Moora	Private property	09.96 45 08.98 69 (10)	Good	Mining, gravel extraction, inappropriate fire regimes, grazing by rabbits and/or kangaroos
2. Watheroo Nat Park	National Park	08.98 75+	Good	Track maintenance, inappropriate fire regimes
3. Watheroo Nat Park	National Park	08.98 3	Good	Track maintenance, inappropriate fire regimes
4. Watheroo Nat Park	National Park	08.98 29	Good	Track maintenance, inappropriate fire regimes

Note: No. of plants given = No. of adult plants (No. of seedlings)

Biology and ecology

Some Synaphea species have fire-tolerant rootstock that allows regeneration in the absence of seed. New growth has been observed resprouting from otherwise apparently dead plants of *Synaphea quartzitica*, so it is likely that this species has that capacity. Some species of this genus produce suckers, but it is not known if *S. quartzitica* can use this mechanism to reproduce.

Seed set is low in most Synaphea species, including many that are fire-sensitive. Staff of CALM's TFSC noted in October 1998 that virtually all the potential seed produced after flowering in August-September had aborted. The pollinators of Synaphea species are unknown, but are thought to be insects.

The single *Synaphea quartzitica* seed collected in October 1998 germinated approximately 10 weeks after treatment with gibberellic acid and nicking of the seed coat. The more frequent occurrence of this species along existing tracks and on long overgrown tracks suggests that disturbance stimulates germination. However, as it appears to set very little seed, this alone will not ensure its success.

Threats

Due to the small population sizes, restricted distribution and threats associated with growing in a specialised habitat, *Synaphea quartzitica* was declared as Rare Flora in July 1998, and ranked as Critically Endangered in November 1998. It currently meets World Conservation Union (IUCN) Red List Category 'CR' under criterion C1 (IUCN 1994) due to the low number of plants and scattered distribution within and between populations, and the threats associated with growing in a specialised habitat over a restricted range.

Synaphea quartzitica occurs in an unusual habitat type, and so was probably naturally restricted. Its rarity has been exacerbated by the extensive clearing for agriculture that has occurred in the Moora - Watheroo area, including clearing of the known habitat. In addition, the known populations are small and threatened by mining and gravel extraction, grazing, fire, and track maintenance activities.

- **Mining** and gravel extraction and associated activities threaten this species. A mining tenement occurs over the land on which Population 1 occurs, and quartzite and gravel extraction currently occur downslope of that population.

- **Grazing** by rabbits (*Oryctolagus cuniculus*) and/or kangaroos (*Macropus fuliginosus*) has had an impact on the plants at Population 1. In addition, disturbance of soil by rabbit warren construction, increased nutrient levels and the introduction of weeds from their droppings are impacting on the habitat of the species. Grazing would have an impact on the establishment of young shoots of *Synaphea quartzitica* thereby limiting natural recruitment.

- **Inappropriate fire regimes** are likely to impact the viability of populations. Mature plants probably respond to fire by resprouting from lignotubers and frequent fire would then deplete lignotuber reserves. In addition, *Synaphea quartzitica* may be capable of reproduction from seed. If this is the case, soil stored seed may germinate following fire and the soil seed bank would be rapidly depleted if fires recurred before regenerating or juvenile plants reached maturity and replenished the soil seed bank. However, occasional fires may be required to stimulate germination of soil stored seed.

- **Track maintenance activities** have the potential to threaten plants and habitat at Populations 2, 3 and 4.

2. RECOVERY OBJECTIVE AND CRITERIA

Objective

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

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

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

3. RECOVERY ACTIONS

Existing recovery actions

All appropriate people have been made aware of the existence of this species and its locations. The Shire of Moora and owners of private land on which the species occurs were formally notified of the presence of *Synaphea quartzitica* populations in August 1998. These notifications detailed the Declared Rare status of the species and associated legal responsibilities. Appropriate CALM staff have also been notified of the species' presence.

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.

Dashboard stickers and posters describing the significance of DRF markers have been produced and distributed.

DRF markers have been installed at Population 2.

Staff from CALM's Moora District office regularly monitor the populations.

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.

Future recovery actions

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

1. Coordinate recovery actions

The MDTFRT will continue to oversee the implementation of the recovery actions for *Synaphea quartzitica.*

Action:	Coordinate recovery actions
Responsibility:	CALM (Moora District) through the MDTFRT
Cost:	$4,900 per year

2. Preserve genetic diversity of the species

No seed of *Synaphea quartzitica* has yet been stored, due to the extremely low seed set. It will therefore be necessary to preserve the genetic diversity of this species through the use of other techniques such as cuttings, tissue culture and maintenance of living plants in cultivation.

Action:	Preserve genetic diversity of the species
Responsibility:	CALM (Moora District, TFSC), Botanic Gardens and Parks Authority (BGPA) through the MDTFRT
Cost:	$6,100 per year

3. Control rabbits

Population 1 is affected by rabbits and/or kangaroos. There is evidence of grazing on the plants themselves, and young shoots are extremely vulnerable to grazing. In addition, the soil is being disturbed by rabbit warren construction, and this combined with the increased nutrient levels and the presence of weed seed in their droppings is introducing weeds into the habitat. Rabbit baiting will be undertaken in and around this area.

Action:	Control rabbits
Responsibility:	CALM (Moora District) through the MDTFRT
Cost:	$1,100 p.a. in years 1 and 2

4. Monitor populations

Monitoring of factors such as weed encroachment, habitat degradation, population stability (expansion or decline), pollination activity, seed production, recruitment and longevityis essential. For Populations 2, 3 and 4, monitoring will include inspection of the visibility of DRF markers. The paint on markers may become dull with time, or vegetation growth may obscure markers, rendering them ineffective.

Populations will be inspected annually.

Action:	Monitor populations
Responsibility:	CALM (Moora District) through the MDTFRT
Cost:	$500 per year

5. Investigate biology and ecology

Research designed to increase an understanding of the biology of the species will provide a scientific basis for management of *Synaphea quartzitica* in the wild. Research would ideally include:

1. Determination of reproductive strategies, phenology and seasonal growth
2. Investigation of the soil seed bank dynamics and the role of various factors (disturbance, competition, rainfall, grazing) in recruitment and seedling survival
3. Investigation of the mating system and pollination biology
4. Investigation of population genetic structure, levels of genetic diversity and minimum viable population size

Action:	Investigate biology and ecology
Responsibility:	CALM (CALMScience) through the MDTFRT
Cost:	$14,300 per year

6. Install Declared Rare Flora markers

Declared Rare Flora markers are required for Populations 3 and 4 that occur in Watheroo National Park. Their purpose is to alert people operating in the area (e.g., CALM operational staff, Shire staff and contractors, and the Bush Fire Brigade) to the presence of DRF to help prevent accidental damage.

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

7. Develop a fire management strategy

Synaphea quartzitica probably has a lignotuber, and may regenerate from this after fire. There may also be some recruitment from soil stored seed. If this is the case, frequent fires may be detrimental to the long-term survival of the species, especially through causing depletion of lignotuber reserves. Fire also promotes the introduction of weed species. The fire response of *S. quartzitica* will be determined.

A fire management strategy will be developed by the MDTFRT in consultation with relevant parties.

Action:	Develop a fire management strategy
Responsibility:	CALM (Moora District) through the MDTFRT
Cost:	$3,400 in the first year

8. Ensure mining and quarrying do not impact Population 1

Population 1 occurs on land covered by a mineral lease. An active quartzite mine and gravel quarry occur in close proximity to this population. The population needs to be mapped accurately to ensure mining and quarrying do not impact plants or habitat. This is particularly important as this species has a very low rate of seed set, and regeneration from seed may be poor.

Action:	Ensure mining and quarrying do not impact Population 1
Responsibility:	CALM (Moora District) through the MDTFRT
Cost:	$600 in the first year

9. Conduct further surveys

Further survey will be conducted for this species during its flowering period in appropriate habitat in Watheroo National Park, and on private lands wherever possible. For example, an area of private property adjacent to Population 1 has been identified as suitable habitat. Areas considered suitable for translocation will also be noted. Volunteers from the local community, Wildflower Societies and Naturalist Clubs will be encouraged to be involved in surveys supervised by CALM staff.

Action:	Conduct further surveys
Responsibility:	CALM (Moora District) through the MDTFRT
Cost:	$2,400 p.a. for years 1 and 2

10. Promote awareness

The importance of biodiversity conservation and the protection of the Critically Endangered *Synaphea quartzitica* will be promoted to the public. An information sheet for *S. quartzitica* will also be produced. This will include photographs, a description of the plant, its habitat type, threats and management actions. Formal links with local naturalist groups and interested individuals will also be encouraged.

Action:	Promote awareness
Responsibility:	CALM (Moora District, Corporate Relations) through the MDTFRT
Cost:	$2,400 in year 2

11. Negotiate to acquire area that contains Population 1

CALM will seek to acquire the private property at Population 1 to be managed for the purpose of conservation. This area contains an unusual habitat type that is recognised by CALM as a Threatened Ecological Community and contains populations of an additional two taxa of Declared Rare Flora - *Acacia aristulata* and *Daviesia dielsii* (ranked Endangered and Vulnerable respectively). *Synaphea quartzitica* only exists outside of this area in small and scattered populations.

Action:	Negotiate to acquire area that contains Population 1
Responsibility:	CALM (Land Administration, Moora District) through the MDTFRT
Cost:	$500 in the first year

12. Write full Recovery Plan

At the end of the three-year term of this Interim Recovery Plan, the need for further recovery will be assessed. If the species is still ranked Critically Endangered, a full Recovery Plan will be developed to enable the full recovery of this species. A Recovery Plan will be prepared with the benefit of knowledge gained over the time frame of this Interim Recovery Plan.

Action:	Write full Recovery Plan
Responsibility:	CALM (Moora District, WATSCU) through the MDTFRT
Cost:	$19,400 for the third year

4. TERM OF PLAN

This Interim Recovery Plan will operate from December 1999 to November 2002 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 valuable assistance and advice in the preparation of this Interim Recovery Plan:

Ms. Ryonen Butcher	Ph.D. Student - taxonomy of Synaphea, University of Western Australia
Mr. Martin Caldwell	Geologist
Ms. Anne Cochrane	Manager, CALM Threatened Flora Seed Centre
Mr. Scott Godley	Reserves Officer, CALM Moora District
Ms. Sophie Juszkiewicz	Propagator, Botanic Gardens and Parks Authority
Ms. Diana Papenfus	Botanist, previously W.A. Herbarium
Mr. John Riley	Rare Flora Technical Officer, CALM Wildlife Branch

Thank also to CALMScience and Herbarium staff for providing access to Herbarium databases and specimen information, and the staff of CALM's Wildlife Branch for extensive assistance.

6. REFERENCES

Brown, A., Thomson-Dans, C. and Marchant, N. (eds.). (1998). *Western Australia's Threatened Flora.* Department of Conservation and Land Management, Western Australia.

CALM (1992). Policy Statement No. 44 *Wildlife Management Programs*. Department of Conservation and Land Management, Western Australia.

CALM (1994). Policy Statement No. 50 *Setting Priorities for the Conservation of Western Australia's Threatened Flora and Fauna*. Department of Conservation and Land Management, Western Australia.

CALM (1999). W.A. Herbarium Databases - WAHerb, WACensus and WALib.

George, A.S. (1995). Synaphea. *Flora of Australia* 16: 271-315. Australian Government Publishing Service, Canberra.

IUCN (1994). *IUCN red list categories prepared by the IUCN Species Survival Commission, as approved by the 40th meeting of the IUCN Council.* Gland, Switzerland.

7. TAXONOMIC DESCRIPTION

George, A. S. (1995). Synaphea. *Flora of Australia* 16: 271-315. Australian Government Publishing Service, Canberra.

Synaphea quartzitica

Stems several, to 7 cm long, branched, silky but covered by leaf bases. Leaves pinnatipartite with 2 or 3 pairs of lobes, gently undulate; petiole 6-15 cm long, pilose, glabrescent; lamina 6.5-8 cm long, 8-9 cm wide, pilose to pubescent, glabrescent; primary lobes 3-6 mm wide, tripartite, the upper ones simple; ultimate lobes triangular, abruptly pungent; reticulation very fine, shallow. Inflorescence not or shortly exceeding foliage; spikes 6-18 cm long; flowers rather openly spaced; peduncle 2-10 cm long, branched, tomentose to puberulous, prominently striate; rachis puberulous; bracts ascending, 1-2 mm long, broad, acute, puberulous to hirsute in lower half. Perianth spreading, opening moderately widely, glabrous; adaxial tepal 4.5-5 mm long, 1.5-2 mm wide, strongly curved; abaxial tepal 2.5-3.5 mm long. Stigma narrowly oblong, slightly broadened at base, emarginate, 0.8-1 mm long, 0.3-0.4 mm wide, straight to gently sigmoid, thick; ovary pubescent. Fruit narrowly obovoid, 4 mm long, pubescent.

Flowers July-Aug.

Distinguished by the leaf shape, long spikes, prominently curved adaxial tepal with much shorter abaxial tepal and very narrow stigma. The tip of the abaxial tepal is slightly recurved.