INTERIM RECOVERY PLAN NO. 118

CLUB-LEAFED SYNAPHEA (*SYNAPHEA* SP. PINJARRA)

INTERIM RECOVERY PLAN

2002-2007

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Photograph: Val English

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Western Australian Threatened Species and Communities Unit (WATSCU)
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Government of Western Australia

DEPARTMENT OF Conservation AND LAND MANAGEMENT
Conserving the nature of WA

FOREWORD

Interim Recovery Plans (IRPs) are developed within the framework laid down in Department of Conservation and Land Management (the Department) 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.

The Department 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This Interim Recovery Plan will operate from September 2002 to August 2007 but will remain in force until withdrawn or replaced.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 reviewed after five years and the need for a full Recovery Plan assessed.

This IRP was approved by the Director of Nature Conservation on 11 July 2003. The provision of funds identified in this Interim Recovery Plan is dependent on budgetary and other constraints affecting the Department, as well as the need to address other priorities.

Information in this IRP was accurate at September 2002.

SUMMARY

Scientific Name:	*Synaphea* sp. Pinjarra	**Common Name:**	Club-leafed synaphea
Family:	Proteaceae	**Flowering Period:**	September – October
Departmental Region:	Swan	**Departmental District:**	Swan Coastal
Shire:	Murray	**Recovery Team:**	Swan Region Threatened Flora and Communities Recovery Team

Illustrations and/or further information: R. Butcher (In Draft) *Synaphea* sp. Pinjarra.

Current status: *Synaphea* sp. Pinjarra was declared as Rare Flora in August 2001, and ranked as Critically Endangered in August 2001. It currently meets World Conservation Union (IUCN, 2000) Red List Category 'CR' under criteria B1ab(iii)+2ab(iii) as it is only known from a single population and there is a continuing decline in the quality of habitat. The main threats are rail, track and fence maintenance, weed invasion, inappropriate fire regimes, damage by rabbits, the limited range of the species, and possibly dieback disease.

Critical habitat: The critical habitat for *Synaphea* sp. Pinjarra comprises the area of occupancy of the known population; similar habitat within 200 metres of the known population; and additional nearby occurrences of similar habitat that do not currently contain the species but may be suitable for translocations.

Habitat requirements: *Synaphea* sp. Pinjarra is currently known from a range of less than 3 km in an area south of Dandalup. It grows in white-grey clayey sand on the edges of seasonally wet low lying or swamp areas in dense wetland heath/shrubland of *Pericalymma ellipticum*, *Leptospermum* sp.and *Xanthorrhoea preissii* edged by marri and sheoak open woodland (Butcher, in draft).

Existing Recovery Actions: The following recovery actions have been or are currently being implemented:
1. Relevant land managers have been made aware of the location and threatened status of the species.
2. Rare flora markers have been installed at the population.
3. A taxonomic description has been drafted for this species.
4. Suitable habitat in the vicinity of the known population has been searched for additional populations.
5. Staff from the Swan Coastal District of the Department of Conservation and Land Management (the Department) regularly monitor the species.
6. The Swan Region Threatened Flora and Communities Recovery Team is overseeing the implementation of this IRP.

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. Formally notify adjacent land managers
3. Collect seed and cutting material
4. Implement track closure if feasible
5. Implement disease hygiene procedures
6. Undertake weed control
7. Stimulate germination of soil-stored seed
8. Conduct further surveys
10. Monitor the population
11. Liaise with land managers
12. Develop and implement a fire management strategy
13. Obtain biological and ecological information
14. Promote awareness
15. Rehabilitate habitat
16. Undertake translocation, if feasible
17. Review the need for a full Recovery Plan

1. BACKGROUND

History

Synaphea sp. Pinjarra was discovered in 1998 by R. Davis[1] whilst surveying for another species of *Synaphea* that occupies similar habitat near Pinjarra. A survey in 2001 indicated that the population extended further than was previously known and a total of 281 plants were located. All known similar habitat has been surveyed but no additional populations have been located.

The preferred wetland habitat of *Synaphea* sp. Pinjarra may place the species at future risk from dieback, and the track that bisects the population make it highly vulnerable to the establishment of this disease. The species also competes poorly with weeds.

Description

Synaphea sp. Pinjarra is a small compact shrub, up to 50 cm tall and 50 to 70 cm wide, with few dark smooth stems up to 10 cm long. The leaves are hairless, blue-green in colour with a pale whitish bloom. They are three lobed to irregularly lobed, 2.5 – 9 cm long and 3 - 10 cm wide. The inflorescence spike is up to 24 cm long, extending well past the leaves, and has fairly crowded, small (3-3.5 mm long) bright yellow flowers at the end of a long red, occasionally green, peduncle. Flowering has been observed from September to October. Fruit are seen in October and are +/- cylindrical and smooth, 5-7 mm long and 2-2.5 mm wide on a long slender neck (Butcher, in draft).

The taxon can be distinguished by the shape of its young leaves, which resemble 'clubs' from a deck of cards, and by its red petioles. The flowers are also smaller than those of *Synaphea petiolaris, S. stenoloba*, *S. odocoileops* and other unnamed *Synaphea* species, which share similar habitat preferences (Butcher, in draft).

Distribution and habitat

Synaphea sp. Pinjarra is currently known from a linear range of less than 3 km in an area south of Dandalup. It grows in white grey clayey sand on the edges of seasonally wet low lying or swamp areas in dense wetland heath/shrubland of *Pericalymma ellipticum*, *Leptospermum* sp. and *Xanthorrhoea preissii* edged by marri and sheoak open woodland (Butcher, in draft).

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 (Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999).

The critical habitat for *Synaphea* sp. Pinjarra comprises:

- the area of occupancy of the known population;
- areas of similar habitat within 200 metres of the known population; i.e. clayey sandy soils in dense heath/shrubland on the edges of low lying or swampy areas (these provide potential habitat for natural range extension); and
- additional occurrences of similar habitat that do not currently contain the species but represent possible translocation sites.

[1] Rob Davis, Consultant, the Department's Western Australian Herbarium

Biology and ecology

Little is known about the biology or ecology of this species as it was only recently discovered. Adult plants of *Synaphea* species are known to resprout after fire or mild mechanical disturbance, but are also known to regenerate from seed following disturbance. The production of viable seed is low in many species, possibly due to unavailability of pollinators, as well as high levels of seed abortion and parasitism (R.Butcher[2] personal communication).

Most *Synaphea* species are either not susceptible, or only mildly susceptible, to dieback disease caused by the plant pathogen *Phytophthora* spp. The low-lying generally swampy habitat of *Synaphea* sp. Pinjarra combined with the vehicular access makes the site very vulnerable to infection, which may affect the quality of habitat, regardless of whether *Synaphea* sp. Pinjarra is resistant to the disease.

Monitoring has indicated that weeds out-compete both adult and seedling plants of *Synaphea* sp. Pinjarra.

Synaphea sp. Pinjarra was observed (during the 1998-1999 flowering season) to produce a high number of fruits with an unusually low level of seed abortion and seed parasitism when compared to many other Synaphea species (Butcher, in draft).

Threats

Synaphea sp. Pinjarra was declared as Rare Flora in August 2001, and currently meets World Conservation Union (IUCN, 2000) Red List Category 'CR' under criteria B1ab(iii)+2ab(iii) as it is only known from a single population, with continuing decline in the quality of habitat. The main threats are rail, track and fence maintenance, weeds, rabbits, inappropriate fire regimes, the limited range of the species and possibly dieback disease.

- **Rail, track and fence maintenance** are major threats to this species. Maintenance of other services may also impact the habitat of the species. Threats include grading, chemical spraying, construction of drainage channels and other trenches, and mowing of vegetation. Many of these actions also encourage weed invasion.

- **Weed competition** threatens this species, with ***Eragrostis curvula* (African lovegrass) one of the major weeds present. 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 the easy ignition of high fuel loads, which are produced annually by many grass weed species.

- **Grazing and digging** by rabbits could damage *Synaphea* sp. Pinjarra plants directly, and also serve to degrade the habitat, introducing weed seeds and providing good germination conditions for them.

- **Inappropriate fire regimes** may affect the viability of the species. It is not known how the species responds to fire, but too frequent fire is likely to deplete soil-stored seed reserves and reduce vigor, if the species responds to fire through resprouting. Too frequent fire can also cause general degradation of habitat by increasing weed invasion and alter habitat structure by favoring species that are obligate resprouters. Alternatively, the species may require disturbance such as fire to aid regeneration, and too great an interval between fires may also threaten the population.

- **Limited range of the species** increases the risk of a single catastrophic event causing severe damage to the only known population.

- **Dieback disease** caused by *Phytophthora* spp. kills susceptible plants by invading their root system and severely reducing their ability to take up water and nutrients. The susceptibility of *Synaphea* sp. Pinjarra to the disease is not known, and while many other Proteaceous species are highly susceptible, most *Synaphea*

[2] Ryonen Butcher, PhD student, Department of Plant Biology (Botany), University of Western Australia

species tend to be only mildly susceptible. Dieback may also severely degrade the habitat of a species. It is frequently transferred through transport of infected soil from another site.

Summary of population information and threats

Pop. No. & Location	Land Status	Year / No. plants	Condition	Threats
1a+1b. Dandalup	Rail Reserve, Shire Road Reserve	1998 *50 2001 *281	Healthy but disturbed	Rail, track and fence maintenance, maintenance of other services, weed competition, grazing/digging, inappropriate fire and possibly dieback disease

* = total for both subpopulations combined.

Guide for decision-makers

Section 1 provides details of current and possible future threats. Any on-ground works (clearing, firebreaks, roadworks etc) in the immediate vicinity of *Synaphea* sp. Pinjarra will require assessment. On ground works should not be approved unless the proponents can demonstrate that they will not have an impact on the species, its habitat or potential habitat.

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

The relevant land managers have been notified of the location and threatened status of *Synaphea* sp. Pinjarra, and the associated legal responsibilities.

Declared Rare Flora (DRF) markers were installed at Population 1 in January 2002. These serve to alert people working in the area to the presence of DRF, and the need to avoid damage to the site. DRF markers are normally placed at the extremities of populations, but as this population extends over about two kilometres, a number of pairs of DRF markers now mark the population. Markers have been placed on both the rail and road reserves.

R. Butcher has drafted the taxonomic description of the species, which is currently awaiting completion of the descriptions of other *Synaphea* species with close affinity to *Synaphea* sp. Pinjarra from the same region.

R. Davis has extensively surveyed for new populations of *Synaphea* sp. Pinjarra in likely habitat in the Pinjarra area as part of a survey for *Synaphea stenoloba*.

Staff from the Department's Swan Coastal District regularly monitor the known population of this species.

The Swan Region Threatened Flora and Communities Recovery Team (SRTFCRT) is overseeing the implementation of this IRP and will include information on progress in its annual report to the Department's Corporate Executive and funding bodies.

Future recovery actions

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

1. Coordinate recovery actions

The SRTFCRT will continue to oversee the implementation of the recovery actions for *Synaphea* sp. Pinjarra and will include information on progress in its annual report to the Department's Corporate Executive and funding bodies.

Action: Coordinate recovery actions
Responsibility: The Department (Swan Coastal District) through the SRTFCRT
Cost: $400 per year

2. Formally notify adjacent land managers

The managers of private property adjacent to Population 1 will be formally notified of the presence of this taxon near their land so that they can avoid impacts to the population.

Action: Formally notify adjacent land managers
Responsibility: The Department (Nature Protection Branch)
Cost: $100 in first year

3. Collect seed and cutting material

Preservation of germplasm is essential to guard against extinction if wild populations are lost. Such collections are also needed to propagate plants for translocations. No seed has been collected to date, so collection is urgently required. Cuttings will also be collected to establish a living collection at the Botanic Gardens and Parks Authority (BGPA).

Action: Collect seed and cutting material
Responsibility: The Department (Threatened Flora Seed Centre, Swan Coastal District) and BGPA through the SRTFCRT
Cost: $1,500 per year for seed collection and processing; $2,000 in second year for collection and processing of cuttings

4. Implement track closure if feasible

Synaphea sp. Pinjarra occurs on either side of a track through an unmade road reserve on the east side of a rail line. There is a well maintained rail access track to the west of the rail line, and the road reserve is not ideal for road construction due to poor drainage in the swampy habitat. The possibility of closing the track on which the population occurs will be investigated, in liaison with relevant stakeholders.

If track closure is feasible, the track will be rehabilitated and weed control undertaken at the site.

Action: Implement track closure if feasible
Responsibility: The Department (Swan Coastal District) through the SRTFCRT
Cost: $600 in first year for closure of track, $8,300 for rehabilitation in second year

5. Implement disease hygiene procedures

Dieback hygiene procedure will be implemented in this area to help combat the spread or amplification of disease, including dieback disease (caused by *Phytophthora* spp.).

Action: Implement disease hygiene procedures
Responsibility: The Department (Swan Coastal District) through the SRTFCRT

Cost: $1,500 per year for first two years

6. Undertake weed control

Weeds including **Eragrostis curvula* (African lovegrass) threaten the only known populations. Weed control will be undertaken in consultation with the land managers. This will be by hand weeding or localised application of herbicide during the appropriate season to minimise the effect of herbicide on the species and the surrounding native vegetation. There will be follow-up reporting on weed control that will include details of method, timing and success of the treatment, and the effect on *Synaphea* sp. Pinjarra and associated native plant species.

Action: Undertake weed control
Responsibility: The Department (Swan Coastal District, Science Division) through the SRTFCRT
Cost: $1,100 per year

7. Stimulate the germination of soil-stored seed

Soil disturbance, application of smoke water or other techniques may be effective in stimulating the germination of soil-stored seed. These trials will be conducted near the existing population in areas newly cleared of weeds. This will serve to increase the population at its current location.

Action: Stimulate the germination of soil-stored seed
Responsibility: The Department (Swan Coastal District) through the SRTFCRT
Cost: $4,100 in third and fourth years, $1,000 in subsequent years

8. Conduct further surveys

Community volunteers will be encouraged to be involved in further surveys conducted by Departmental staff during the species' flowering period (September to October).

Surveys will be conducted near the known population, targeting areas of seasonally wet and low lying habitat. One area for further survey has been identified by R. Davis, who suggested that some small areas of bushland near Serpentine contained similar habitat.

Action: Conduct further surveys
Responsibility: The Department (Swan Coastal District and Science Division) through the SRTFCRT
Cost: $1,600 per year

9. Monitor population

Annual monitoring of factors such as habitat degradation (including weed invasion, plant diseases such as *Phytophthora cinnamomi* and salinity), population stability (expansion or decline), pollination activity, seed production, recruitment, longevity and predation is essential. Disturbance and grazing by rabbits will be monitored at the population, and if necessary numbers will be controlled through baiting or alternative methods in consultation with the land managers.

Action: Monitor population
Responsibility: The Department (Swan Coastal District) through the SRTFCRT
Cost: $1,000 per year. Rabbit control - $500 per year in second, third and fifth year, if required

10. Liaise with land managers

Staff from the Department's Swan Coastal District will continue liaison with Westrail, the Shire of Murray and other stakeholders to ensure that the population is not accidentally damaged or destroyed through rail or road use or maintenance. The population occurs very close to the boundary of private property, so continued liaison with the adjacent land managers is also required to protect the population from herbicide drift and grazing.

Action: Liaise with land managers
Responsibility: The Department (Swan Coastal District) through the SRTFCRT
Cost: $200 per year

11. Develop and implement a fire management strategy

A fire management strategy will be developed to determine recommended fire control measures, fire frequency and intensity. This will be developed and implemented in liaison with all relevant stakeholders including the Shire of Murray and Westrail, and will be adjusted as information about this species' fire response becomes available.

Action: Develop and implement a fire management strategy
Responsibility: The Department (Swan Coastal District), Shire of Murray, and Westrail through the SRTFCRT
Cost: $600 in first year for development and $900 in subsequent years for implementation

12. Obtain biological and ecological information

Improved knowledge of the biology and ecology of *Synaphea* sp. Pinjarra will provide a better scientific basis for its management in the wild. 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 species.
3. The requirements of pollinators.
4. The reproductive strategies, phenology and seasonal growth of the species.
5. The population genetic structure, levels of genetic diversity and minimum viable population size.
6. The impact of dieback disease and control techniques on *Synaphea* sp. Pinjarra and its habitat.

Action: Obtain biological and ecological information
Responsibility: The Department (Science Division, Swan Coastal District) through the SRTFCRT
Cost: $20,900 per year in the second, third and fourth years

13. Promote awareness

The importance of biodiversity conservation and the need for the long-term protection of the wild population of this species will be promoted to the community through poster displays and the local print and electronic media. Formal links with local naturalist groups and interested individuals will also be encouraged. An information sheet will be produced, and will include a description of the plant, its habitat, threats, recovery actions and photos.

A reply paid postal drop illustrating *Synaphea* sp. Pinjarra and describing its distinctive features and habitat will be produced and distributed to residents in Shires that contain possible habitat. 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: The Department (Swan Coastal District) through the SRTFCRT
Cost: $1,900 in first year, $1,200 in second year and $900 in subsequent years

14. Rehabilitate habitat

Habitat restoration will be undertaken around *Synaphea* sp. Pinjarra following weed control. Germination of soil-stored seed using smoke water or other techniques will be trialed at the site. Rehabilitation may also include addition of local provenance seeds or plants of species native to that site, particularly if species can be identified that provide other needs of pollinators (for example, habitat).

Action: Rehabilitate habitat
Responsibility: The Department (Swan Coastal District) through the SRTFCRT
Cost: $2,900 in third and fourth years and $1,000 in subsequent years

15. Undertake translocation, if feasible

The range of distribution is limited and number of extant plants is low, so that the only known population of *Synaphea* sp. Pinjarra is extremely vulnerable to a number of threats in its current location. However, there are currently no known sites suitable for translocation. If habitat near Serpentine or elsewhere appears suitable, the feasibility of translocating *Synaphea* sp. Pinjarra to the site will be investigated. Ethical considerations will include possible disruption to populations of some other *Synaphea* species which are likely to occur in those areas of bush already, and the possibility of hybridisation between the two.

Information on the translocation of threatened animals and plants in the wild is provided in the Department's Policy Statement No. 29 *Translocation of Threatened Flora and Fauna*. All translocation proposals require endorsement by the Director of Nature Conservation.

Monitoring of translocations is essential and if a translocation is required, it will be undertaken according to the timetable that will be developed for the Translocation Proposal.

Action: Undertake translocation, if feasible
Responsibility: The Department (Swan Coastal District) through the SRTFCRT
Cost: $5,500 in the third year; $24,000 in the fourth year and $4,000 in the fifth year

16. Review the need for a full Recovery Plan

At the end of the fourth year of its five-year term this Interim Recovery Plan will be reviewed and the need for further recovery actions will be assessed. If the species is still ranked as Critically Endangered at that time a full Recovery Plan may be required.

Action: Review the need for further recovery actions and/or a full Recovery Plan
Responsibility: The Department (WATSCU, Swan Coastal District) through the SRTFCRT
Cost: $20,300 in the fifth year (if full Recovery Plan required)

4. TERM OF PLAN

This Interim Recovery Plan will operate from September 2002 to August 2007 but will remain in force until withdrawn or replaced. If the taxon is still ranked Critically Endangered after five years, the need to review this IRP or to replace it with a full Recovery Plan will be determined.

5. ACKNOWLEDGMENTS

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

Rob Davis	Contract Consultant, WA Herbarium, the Department
Ryonen Butcher	Ph.D. Student, Department of Plant Biology (Botany), University of Western Australia.
Anne Cochrane	Manager, the Department's Threatened Flora Seed Centre

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

6. REFERENCES

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Department of Conservation and Land Management (1992) Policy Statement No. 44 *Wildlife Management Programs*. Department of Conservation and Land Management, Western Australia.
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Department of Conservation and Land Management (1995) Policy Statement No. 29 *Translocation of Threatened Flora and Fauna*. Department of Conservation and Land Management, Western Australia.
Department of Conservation and Land Management (1998) Western Australian Herbarium FloraBase – Information on the Western Australian Flora. Department of Conservation and Land Management, Western Australia. http://www.calm.wa.gov.au/science/
World Conservation Union (2000) *IUCN red list categories prepared by the IUCN Species Survival Commission, as approved by the 51st meeting of the IUCN Council*. Gland, Switzerland.

7. TAXONOMIC DESCRIPTION

Butcher, R. (In Draft) *Synaphea sp. "Pinjarra"*. University of Western Australia, Perth WA.

***Synaphea* sp. "Pinjarra" = *Synaphea trifolina* m.s.** R. Butcher sp. nov.

Caespitose subshrub to 40-50 cm tall, 50-70 cm wide. *Stems* few, to 10 cm long, bark smooth (appressedpubescent over bark), glabrous (on newer stems). *Petiole* 3-10 cm long, glabrous but sparsely pilose towards sheathing base; sheath glabrous to appressed puberulous in centre region externally, villous internally. *Leaves* three-lobed to pinnatipartite; lowest pair of lobes simple, irregularly bilobed or trilobed; ultimate lobes oblong to oblanceolate, 4-10 mm wide; apices acute to obtuse (mostly obtuse to rounded) with short, blunt mucro; 2.5-9 cm long, 3-10 cm wide, surface glabrous, lightly glaucous, slightly discolorous; reticulation shallow, fine. *Inflorescence* of axillary spikes, 10-24 cm long at maturity, 2-3 x longer than leaves; flowers +/- crowded, internodes 0.5-1 x flower length in mid-region; peduncles red, rarely green, 5-34 cm long, simple to once branched, glabrous, puberulous at base; basal sheath pinkish-light brown, 7-14 mm long, glabrescent to appressed puberulous externally with tufted hairs at apex, appressed pubescent internally, becoming glabrescent towards margins and base; rachis yellow-green, infused with red, appressed puberulous; bracts ovate, ascending, acute to obtuse, 1.2-1.4 mm long, glabrous externally and internally with shortly ciliate margin. *Perianth* ascending, opening narrowly, glabrescent externally; adaxial tepal gently concave, 3-3.5 mm long, 1.5-1.9 mm wide, apex angled 45-90 degrees, margins reflexed, hairs present internally behind and above stigma; abaxial tepal +/- flat, 2-2.4 mm long, 1.1-1.3 mm wide, the apex strongly reflexed to 0.3-0.4 mm of length, hairs present internally behind anther; lateral tepals gently falcate, 2.6-2.8 mm long, the apex reflexed to 0.4 mm of length, hairs present internally behind and above anthers. *Stigma* transversely elliptic to transversely oblong with slightly reflexed then erect, narrow apical horns, 0.8-1 mm long (horns 0.3-0.5 mm long), 1-1.2 mm wide, convex ventrally; ovary orbicular with truncate apical beak to 0.15 mm long (after style separates), 0.6 mm long, 0.5 mm wide, long, dense hairs at base becoming sparser towards almost glabrous apex, beak glabrous, with a ring of translucent, enlarged trichomes at apex, trichomes compressed, curved at base. *Fruit* cylindrical to obelliptic, smooth, with a thickened ridge on the adaxial edge, 5.4-6.6 mm x 2.1-2.5 mm wide on a long, slender neck (1.7-2.6 mm of length), sparsely pubescent, beak glabrous to sparsely puberulous at base, 0.2-0.3 mm long. *Seed* narrowly ovate with acute apex, 3.2-3.6 mm long, 1.4-1.7 mm wide; testa white-cream, smooth.

Other specimens examined. Railway line, S of Dandalup, 22 Sep. 1998, *R. Davis* 6578.

Distribution. *Synaphea trifolina* is known from only one population south of Dandalup on the Swan Coastal Plain of Western Australia. Extensive fieldwork carried out during surveys for *S. stenoloba* in this region by R. Davis in 1998 brought this new species, which occupies a similar habitat, to light, but failed to locate any additional populations.

Habitat. The taxon has been collected from a seasonally wet lowland site, growing in white-grey clayey sand on the margin of open *Allocasuarina* sp. and *Corymbia calophylla* woodland. Associated vegetation includes *Leptospermum* dominated low shrubland with *Xanthorrhoea preissii*, *Dasypogon bromeliifolius,* and species of *Lambertia*, *Hakea,* and *Eragrostis.*

Phenology. Flowering material of *Synaphea trifolina* has been collected during September and October with fruits collected in October.

Etymology. *Synaphea trifolina* is named for the shape of its young leaves, which bear resemblance to the suit "clubs" in a standard deck of cards. The current English figure is taken from the French, where the name is *trefle*, the symbol being derived from the trefoil leaf (e.g. *Trifolium*, *Medicago*). Common name: "club-leafed *Synaphea*".

Affinities. Habitat requirements of *Synaphea trifolina* are +/- the same as those of *S. petiolaris*, *S. stenoloba*, *S. selenae* m.s. and *S. odocoileops* and its affiliates in this area, though *S. trifolina* appears to prefer more clay soils (R. Davis personal communication). *S. trifolina* is also similar in floral and stigma morphology to each of these, though flowers in the taxon are small, crowded and numerous. Leaf form of *S. trifolina* makes the taxon immediately distinguishable. Leaves are short, three-lobed to pinnatipartite and commonly have broadly rounded apices to leaf lobes, pale dull-green in colour and have very shallow, fine reticulation, in combination with pilose hairs at the base of the petiole.

Notes. It has been noted (George 1995) that a number of species of *Synaphea* appear reluctant to set fruit, and when fruits are present there is frequently a high level of seed abortion and seed parasitism (R. Butcher pers. obs.). *S. trifolina*, by comparison, produces a high number of fruits, and, of 20 fruits opened from one specimen, 70% contained a mature seed. This observed fecundity may prove valuable in the management of this rare species.