INTERIM RECOVERY PLAN NO. 236

SELENA'S SYNAPHEA

(*Synaphea* sp. Fairbridge Farm)

INTERIM RECOVERY PLAN

2007 –2012

September 2007

Department of Environment and Conservation
Kensington

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. Note: the Department of CALM formally became the Department of Environment and Conservation (DEC) in July 2006. DEC will continue to adhere to these Policy Statements until they are revised and reissued.

IRPs outline the recovery actions that are required to urgently address those threatening processes most affecting the ongoing survival of threatened taxa or threatened ecological communities and begin the recovery process.

DEC is committed to ensuring that threatened taxa and threatened ecological communities are conserved through the preparation and implementation of Recovery Plans (RPs) or IRPs, and by ensuring that conservation action commences as soon as possible and, in the case of Critically Endangered (CR) taxa and communities, always within one year of endorsement of that rank by the Minister.

This IRP will operate from September 2007 to August 2012 but will remain in force until withdrawn or replaced. It is intended that, if the species is still ranked CR at the end of the five-year term, this IRP will be reviewed and the need for further recovery actions assessed.

This IRP was given regional approval on 3rd October 2007 and approved by the Director of Nature Conservation on 8th October 2007. The allocation of staff time and provision of funds identified in this IRP is dependent on budgetary and other constraints affecting DEC, as well as the need to address other priorities.

Information in this IRP was accurate as at September 2007.

IRP PREPARATION

This IRP was prepared by Amanda Fairs[1], Ryonen Butcher[2], Melissa Hoskins[3] and Robert Huston[4]

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ACKNOWLEDGMENTS

The following people have provided assistance and advice in the preparation of this IRP:

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Thanks also to the staff of the W.A. Herbarium for providing access to FloraBase and specimen information, and DEC's Species and Communities Branch for assistance.

Cover photograph by Wink Lindsay (DEC).

CITATION

This IRP should be cited as:

Department of Environment and Conservation (2007) Fairbridge Farm Synaphea (*Synaphea* sp. Fairbridge Farm) Interim Recovery Plan 2007-2012. Interim Recovery Plan No. #. Department of Environment and Conservation, Western Australia.

SUMMARY

Scientific Name:	***Synaphea* sp. Fairbridge Farm (D. Papenfus 696)**	**Common Name:**	Selena's synaphea
Family:	Proteaceae	**Flowering Period:**	September–November
DEC Region:	Swan, South West	**DEC District:**	Perth Hills, Swan Coastal, Wellington
Shire:	Murray, Serpentine-Jarrahdale, Dardanup	**Recovery Team:**	Swan and South West Region Threatened Flora and Communities Recovery Teams (SWNRTFCRT and SWRTFCRT).
NRM Region:	South West		

Illustrations and/or further information: Butcher (2004) *A Survey of Gazetted and Proposed Declared Rare species of Synaphea (Proteaceae) occurring on the Pinjarra Plain*. Unpublished report prepared for the Western Australian Threatened Species and Communities Unit, Department of Conservation and Land Management; DEC (2007) *Western Australian Herbarium FloraBase 2 – Information on the Western Australian Flora* (Accessed 2007). Department of Environment and Conservation, Western Australia. http://www.calm.wa.gov.au/science/.

Current status: *Synaphea* sp. Fairbridge Farm (D. Papenfus 696), hereafter referred to as *Synaphea* sp. Fairbridge Farm, was listed as Declared Rare Flora in 2004 under the Western Australian *Wildlife Conservation Act 1950* and is currently ranked as Critically Endangered (CR) under IUCN Red List Criteria B1ab(iii) due to its extent of occurrence being less than 100 km^2, the populations being severely fragmented and its habitat being highly disturbed with a continuing decline in habitat quality. Additional populations and mature plants have since been found and the species no longer meets CR under Criterion B1ab(iii). It is therefore proposed in Recovery Action 9 to recommend to the Threatened Species Scientific Committee (TSSC) that the ranking of *Synaphea* sp. Fairbridge Farm be amended from CR B1ab(iii) to CR B2ab(ii,iii) based on the area of occupancy to be less than 10 km^2, a severe fragmentation of populations and a continuing decline in habitat quality. The species is not currently listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999). The main threats to the species include habitat degradation from rail, road and highway maintenance, weed invasion, grazing, recreation, trampling, drainage line maintenance, diseases, small population size and changes in hydrology.

Synaphea sp. Fairbridge Farm is currently known from five populations totalling 471 mature plants.

Description: *Synaphea* sp. Fairbridge Farm is a dense, clumped, subshrub 25 to 65 cm tall, 20 to 80 cm wide. Leaves are tripartite to pinnatipartite, symmetrically divided with long narrow lobes, flat to folded along mid-line. Silvery-pubescent sheaths enclose the base of the straight peduncles. Inflorescences are erect axillary spikes 7 to 24 cm long. Flowers open narrowly, are yellow and puberulous and are openly spaced and angled upwards in the spike. The stigma is transversely lunate with broad lobes. Fruits are obovoid and pubescent with a short, erect, terminal beak and persistent enlarged apical hairs.

Habitat requirements: *Synaphea* sp. Fairbridge Farm occurs in areas of low woodland on grey, clayey sand with lateritic pebbles (Pinjarra Plain) near winter wet flats.

Habitat critical to the survival of the species, and important populations: Given that *Synaphea* sp. Fairbridge Farm is ranked as CR, it is considered that all known habitat for wild populations is critical to the survival of the species and that all wild populations are important populations. Habitat critical to the survival of *Synaphea* sp. Fairbridge Farm includes the area of occupancy of populations, areas of similar habitat surrounding and linking populations (these providing potential habitat for population expansion and for pollinators), additional occurrences of similar habitat that may contain undiscovered populations of the species or be suitable for future translocations and the local catchment for the surface and/or groundwater that maintains the habitat of the species.

Benefits to other species or ecological communities: Recovery actions implemented to improve the quality or security of the habitat of *Synaphea* sp. Fairbridge Farm will also improve the status of associated native vegetation. Additionally, two Critically Endangered, one Vulnerable and three Priority flora occur in association with *Synaphea* sp. Fairbridge Farm. These taxa are listed in the table below.

Conservation-listed flora species occurring in habitat of *Synaphea* sp. Fairbridge Farm

Species name	Conservation Status (WA)	Conservation Status (EPBC Act 1999)
Synaphea stenoloba	DRF, Critically Endangered	-
Synaphea sp. Pinjarra (R. Davis 6578)	DRF, Critically Endangered	-
Tetraria australiensis	DRF, Vulnerable	Vulnerable
Synaphea sp. Pinjarra Plain (A.S. George 17182)	Priority 1	-
Eryngium subdecumbens ms	Priority 3	-
Blennospora doleiformis	Priority 3	-

For a description of priority categories see Atkins (2006)

Synaphea sp. Fairbridge Farm occurs in two Threatened Ecological Communities (TECs).

Threatened Ecological Communities (TEC) in which *Synaphea* sp. Fairbridge Farm occurs in association

Community Name	Conservation status (WA)
Shrublands on dry clay flats	Endangered
Corymbia calophylla – Eucalyptus marginata woodlands on sandy clay soils of the southern Swan Coastal Plain	Vulnerable

For a description of TEC categories see DEC (2007)

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. *Synaphea* sp. Fairbridge Farm is not listed under any specific international treaty and this IRP does not affect Australia's obligations under any other international agreements.

Indigenous consultation: Involvement of the Indigenous community is being sought through the Indigenous Natural Resource Management Advisory Group (INRMAG) for the Swan Catchment Council to assist in the identification of cultural values for land occupied by *Synaphea* sp. Fairbridge Farm; to identify groups with a cultural connection to land that is important for the species' conservation and to determine whether there are any issues or interests identified in the plan. A search of the Department of Indigenous Affairs Aboriginal Heritage Inquiry System has identified that Subpopulations 1a and 1b co-occur with one culturally significant site - Gas Pipeline 86 (Site ID 4327). General advice will be sought from the INRMAG regarding management, conservation and recognition of the shared values at this site. The INRMAG recognises that DEC, through the Recovery Plan process, seeks to conserve and protect areas of natural remnant vegetation. The INRMAG recognises that together we share similar goals of seeking to manage these areas for conservation and seek to include and support Aboriginal interest and involvement in the management and planning processes

Social and economic impact: The implementation of this recovery plan is unlikely to cause significant adverse social and economic impact. However, as Subpopulation 1c occurs on private property the protection of it may potentially affect development and asset protection measures on this site.

Affected interests: Two populations occur on Westrail rail reserve, one on Main Roads reserve, one on Shire of Dardanup road reserve and one subpopulation occurs on private land. The protection of the species potentially impacts on Shire operations, road and rail maintenance activities, and the private landholder activities.

Evaluation of the plan's performance: DEC, in conjunction with the SWNRTFCRT and SWRTFCRT, will evaluate the performance of this IRP. In addition to annual reporting on progress and evaluation against the criteria for success and failure, the plan will be reviewed following four years of implementation.

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

1. Relevant land managers have been formally notified of the presence of the species, its location on land under their management and their legal obligations to protect it.
2. DEC's SWNRTFCRT and SWRTFCRT continue to monitor all known populations.
3. DRF Markers have been installed at Population 4 and Subpopulations 1a, b, c.
4. DEC's SWNRTFCRT and SWRTFCRT staff members are overseeing the implementation of this IRP and will include it in their annual report to DEC's Corporate Executive and funding bodies.

IRP objective: The objective of this IRP is to abate identified threats and maintain or enhance viable *in situ* populations to ensure the long-term preservation of the species in the wild.

Recovery criteria

Criteria for success: The number of populations have increased and/or the number of mature individuals in populations have increased by ten percent or more over the term of the plan.

Criteria for failure: The number of populations have decreased and/or the number of mature individuals in populations have decreased by ten percent or more over the term of the plan.

Recovery actions

1. Coordinate recovery actions
2. Liaise with relevant land managers and indigenous groups
3. Monitor populations
4. Install DRF markers
5. Collect seed to preserve genetic diversity
6. Undertake weed control and follow-up with additional control if required
7. Implement rabbit control
8. Obtain biological and ecological information
9. Propose change in ranking criteria
10. Promote awareness
11. Conduct further surveys
12. Develop and implement a fire management strategy
13. Map habitat critical to the survival of *Synaphea* sp. Fairbridge Farm
14. Review the plan and the need for further recovery actions

1. BACKGROUND

History

Synaphea sp. Fairbridge Farm (D. Papenfus 696), hereafter referred to as *Synaphea* sp. Fairbridge Farm, was first collected from the North Pinjarra area by D. Papenfus[1] in 1997 whilst undertaking surveys for *Synaphea stenoloba* (also listed as DRF). Further surveys by R. Davis[2] in 1998 located more plants growing near Serpentine.

Ryonen Butcher prepared a draft taxonomic description of the species in February 2005 under the manuscript name *Synaphea selenae* with formal publication expected soon. Morphological variation has been noted within the species with a variant found to the west of the Elgin siding requiring further study. The species is included in on-going morphometric analysis of Pinjarra Plain *Synaphea* species (Butcher 2004).

Leaf material has been collected from Populations 1 to 3, from the affiliated population west of Elgin and from allied taxa for future genetic analysis (Butcher 2004).

Synaphea sp. Fairbridge Farm is known from five populations (including 8 subpopulations), totalling 471 mature and 39 juvenile plants.

Description

Synaphea sp. Fairbridge Farm is a dense, clumped subshrub 25 to 65 cm tall by 20 to 80 cm wide. Leaves are tripartite to pinnatipartite, symmetrically divided with long narrow lobes, flat to folded along mid-line. Silvery-pubescent sheaths enclose the base of the straight peduncles. Inflorescences are erect axillary spikes 7 to 24 cm long. Flowers open narrowly, are yellow and puberulous and are openly spaced and angled upwards in the spike. The stigma is transversely lunate with broad lobes. Fruits are obovoid and pubescent with a short, erect, terminal beak and persistent enlarged apical hairs (DEC 2007).

Morphological variation in populations of *Synaphea* sp. Fairbridge Farm has been noted with plants from the type locality (Subpopulation 1b) being compact dwarf shrubs with highly dissected, narrowly lobed leaves and contracted inflorescences while plants from Populations 2 and 3 have a more erect habit, less dissected, larger leaves with broader lobes and longer inflorescences. Morphological differences between populations may be the result of random genetic differences related to their disjunction or it may be related to habitat differences (Butcher 2004).

Synaphea sp. Fairbridge Farm is similar to and is located in the same geographic area as *Synaphea stenoloba, S.* sp. Pinjarra (R. Davis 6578), *S. petiolaris, S. odocoileops, S. gracillima, S. spinulosa* and *S.* sp. Pinjarra Plain (A.S. George 17182).

Synaphea sp. Fairbridge Farm is distinguished from other *Synaphea* species by its flattened, nearly symmetrically divided tripartite, leaf lobes with short petioles relative to the lamina, short peduncles and straight flowering spikes. Flowers of *S.* sp. Fairbridge Farm are larger than related species, pubescent externally and held in a very upright position in the flowering spike and the stigma is shallowly emarginate with broad lateral lobes. Stems of this species are green and the sheaths enclosing the bases of the spikes are usually pale coloured and appressed pubescent (Butcher 2004).

In contrast to *Synaphea* sp. Fairbridge Farm, *S. stenoloba* possesses ultimate lobes that point in many directions, often irregularly divided leaves with very slender terminal lobes which are often strongly concave and the petioles are usually sinuous, with the apex curved downwards. Flowers of *S. stenoloba* are small glabrous and gently curved, and the stigma is lunate (+/- crescent moon shaped). Stems and the sheathing bases of this species are usually red (Butcher 2004).

Synaphea sp. Pinjarra is distinguished from *S.* sp. Fairbridge Farm, in having dull, pale bluish-green leaves which typically possess three, broad, rounded lobes and pilose hairs on the petioles. Inflorescences are erect at

[1] Diane Papenfus, Project Officer, Department of Conservation and Land Management
[2] Robert Davis, Technical Officer, Science Division, Herbarium, Department of Environment and Conservation

the base and then sinuous through the flowering region, and are approximately one to three times longer than the leaves. Flowers of *S.* sp. Pinjarra are much smaller and densely arranged. Stigmas possess short, slender erect apical lobes and pilose hairs at the base of the petioles (Butcher 2004).

Synaphea petiolaris also differs from *Synaphea* sp. Fairbridge Farm in having broadly rounded apices to leaf lobes and stigma with long, narrow apical lobes and widely opening flowers.

Distribution and habitat

Synaphea sp. Fairbridge Farm is endemic to the Pinjarra Plain with a geographic range of approximately 870 km^2 in the Shires of Murray, Serpentine-Jarrahdale and Dardanup.

Habitat is grey, clayey sand with lateritic pebbles in low woodland areas near winter wet flats.

Distribution is severely fragmented, with the majority of subpopulations being restricted to narrow road and rail reserves, with some surrounded by farmland.

Associated species include *Kennedia prostrata, Xanthorrhoea preissii, Conostylis* sp. and *Synaphea stenoloba*. Populations 2 and 3 occur in seasonally wet *Pericalymma ellipticum* dominated shrubland, with *Leptospermum* sp., *Lechenaultia biloba, Mesomelaena tetragona, Adenanthos meisneri, Hypocalymma angustifolium* and *Allocasuarina humilis.* Common associated weeds include *Watsonia meriana* var. *bulbillifera, Briza maxima* and *Eragrostis curvula* (DEC 2007).

Summary of population land vesting, purpose and management

Pop. No. & Location	DEC District	Shire	Vesting	Purpose	Manager
1a. NE of Pinjarra,	Swan Coastal	Murray	Main Roads WA	Road Reserve	Main Roads WA
1b. NE of Pinjarra	Perth Hills	Murray	Main Roads WA	Road Reserve	Main Roads WA
1c. NE of Pinjarra	Perth Hills	Murray	Freehold	Private Property	Private (Alcoa World Alumina Australia Ltd)
2. NE of Pinjarra (W of North Dandalup)	Swan Coastal	Murray	Public Transport Authority of WA	Railway Reserve	Public Transport Authority
3a. S of Serpentine	Swan Coastal	Serpentine - Jarrahdale	Public Transport Authority of WA	Railway Reserve	Public Transport Authority
3b. S of Serpentine	Swan Coastal	Serpentine – Jarrahdale	Public Transport Authority of WA	Railway Reserve	Public Transport Authority
3c. S of Serpentine	Swan Coastal	Serpentine – Jarrahdale	Public Transport Authority of WA	Railway Reserve	Public Transport Authority
3d. S of Serpentine	Swan Coastal	Serpentine – Jarrahdale	Public Transport Authority of WA	Railway Reserve	Public Transport Authority
3e. S of Serpentine	Swan Coastal	Serpentine - Jarrahdale	Public Transport Authority of WA	Railway Reserve	Public Transport Authority
4. E of Dardanup	Wellington	Dardanup	Shire of Dardanup	Road Reserve	Shire
5. NE of Pinjarra (Nature Reserve)	Swan Coastal	Murray	Conservation Commission of WA	Conservation of Flora and Fauna	DEC

Note: All populations are considered to be important populations

Biology and ecology

Very little is known about the biology and ecology of *Synaphea* sp. Fairbridge Farm.

Fruit set seems relatively high in the species but, like many other species of *Synaphea*, *Synaphea* sp. Fairbridge Farm has a high level of seed abortion. Preliminary examination of fruits collected from plants at Population 2 by R. Butcher in 2004 and 2005 have shown that darkly coloured fruits of good weight are likely to contain a viable seed. Additional fruits from Population 2 are currently stored at the DEC Threatened Flora Seed Centre.

Variation in leaf form is evident across the range of the species. Specimens from near Fairbridge Farm have more folded and more divided leaves with shorter, narrower ultimate lobes. These specimens also have more obtuse bracts and slightly shorter, broader stigmatic lobes.

Synaphea sp. Fairbridge Farm flowers from September to November.

Threats

Synaphea sp. Fairbridge Farm was declared as Rare Flora in 2004 under the Western Australian *Wildlife Conservation Act 1950* and ranked as Critically Endangered (CR) under the World Conservation Union (IUCN 2001) Red List criteria B1ab(iii), due to its extent of occurrence being less than 100 km^2, the populations being severely fragmented and its habitat being highly disturbed with continuing threat of decline in habitat quality. Additional populations and mature plants have since been found and the species no longer meets CR under Criterion B1ab(iii). It is proposed in Recovery Action 9 to recommend to the Threatened Species Scientific Committee (TSSC) that the ranking of *Synaphea* sp. Fairbridge Farm be amended from CR B1ab(iii) to CR B2ab(ii,iii) based on the area of occupancy to be less than 10 km^2, a severe fragmentation of populations and a continuing decline in habitat quality. The species is not currently listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999). The main threats to the species are habitat degradation from rail, road and highway maintenance, weed invasion, grazing, recreation, trampling, drainage line maintenance, disease, small population size and changes in hydrology.

- **Rail, track, road and drainage line maintenance.** All populations are threatened by road and track maintenance.
- **Weed invasion.** Weed species recorded in the vicinity of *Synaphea* sp. Fairbridge Farm populations include *Watsonia meriana* var. *bulbillifera, Briza maxima, Eragrostis curvula* and *Arctotheca calendula*. Weed species compete for space, nutrients, water and light. Weed competition is likely to reduce recruitment.
- **Grazing and rabbit activity.** All populations are threatened by grazing and digging by rabbits. Grazing flower spikes reduces reproductive output. Rabbit faeces increase soil nutrient levels and introduce weed seeds. Soil disturbance provides good germination conditions for weeds.
- **Disease.** Population 2 and Subpopulations 3a and 3b are threatened by scale insect infestations.
- **Recreation.** Populations 3 (Railway Reserve) and 5 (Nature Reserve) are threatened by disturbance and trampling from trail bike and horse riding activities.
- **Inappropriate fire regimes.** Although it is believed that the species requires fire or other disturbance to recruit, plants are thought to be damaged or killed by fire during their active growing phase. Frequent fire is likely to deplete soil stored seed reserves and can cause general degradation of habitat by increasing weed invasion and altering habitat structure by favouring native species that are obligate resprouters. Alternatively, too great an interval between fires may also threaten populations of the species through senescence of mature plants and a lack of recruitment.
- **Small population size.** As the total population size of *Synaphea* sp. Fairbridge Farm is small and populations are severely fragmented the likelihood of the species being adversely impacted by chance demographic or environmental events is increased. Small populations are also at a greater risk of loss of genetic diversity and inbreeding depression.

The intent of this plan is to provide actions that will deal with immediate threats to *Synaphea* sp. Fairbridge Farm. Although climate change may have a long-term effect on the species, actions taken directly to prevent the impact of climate change are beyond the scope of this plan.

Summary of population information and threats

Pop. No. & Location	Land Status	Year	No. plants	Condition	Threats
1a. NE of Pinjarra	Main Roads WA Road Verge	2003	8 [1]	Poor (habitat) Healthy (plants)	Road maintenance, grazing, weed invasion, small population size.
1b. NE of Pinjarra	Main Roads WA Road Verge	2003	26 [1]	Poor (habitat) Healthy (plants)	Road maintenance, grazing, weed invasion, vehicle damage, fence-line and drainage channel maintenance, small population size.
1c. NE of Pinjarra	Private Property, Alcoa Australia Ltd	2003	Unknown	Poor	Road maintenance, grazing, weed invasion, small population size.
2. W of North Dandalup, NE of Pinjarra	Westrail Railway Reserve	1998 2003 2003	30 66 [1] 79 (18) [9]	Moderate	Road, track and railway maintenance, grazing, weeds, insects, disease, small population size, changes in hydrology.

3a. S of Serpentine	Westrail Railway Reserve	2003	160 (6)	Healthy	Recreation (trail bike and horse riding), road and rail maintenance, vehicle movement, grazing, rabbits, weeds, insects and disease.
3b. S of Serpentine	Westrail Railway Reserve	2003	16 (5)	Moderate	Recreation (trail bike and horse riding), road and rail maintenance, vehicle movement, grazing, weeds, insects and disease.
3c. S of Serpentine	Westrail Railway Reserve	2003	7	Moderate	Recreation (trail bike and horse riding), road, track and rail maintenance, vehicle movement, grazing, weeds and disease.
3d. S of Serpentine	Westrail Railway Reserve	2003	33 (4)	Healthy	Recreation (trail bike and horse riding), road, track and rail maintenance, vehicle movement, grazing, weeds and disease.
3e. S of Serpentine	Westrail Railway Reserve	2003	36 (7) [3]	Healthy	Recreation (trail bike and horse riding), road, track and rail maintenance, vehicle movement, grazing, weeds and disease.
4. ESE of Dardanup	Shire Road Verge, Shire of Dardanup	2006	11	Moderate	Firebreaks, roadworks and weeds
5. NE of Pinjarra (Nature Reserve)	Conservation Commission Nature Reserve (DEC)	2004	100	Moderate	Recreation, roadworks, track maintenance, grazing, weeds, disease.

Note: All populations are considered to be important populations, [ ] = dead plants, ( ) = seedlings.

Guide for decision-makers

Section 1 provides details of current and possible future threats. Development and/or land clearing in the immediate vicinity of *Synaphea* sp. Fairbridge Farm populations require assessment. Developments or clearing should not be approved unless the proponents can demonstrate that their actions will have no significant impact on the species, its habitat or potential habitat or on the local surface hydrology, such that drainage in the habitat of the subspecies would be altered.

Habitat critical to the survival of the species, and important populations

Given that *Synaphea* sp. Fairbridge Farm is ranked as CR, it is considered that all known habitat for wild populations is critical to the survival of the species, and that all wild populations are important populations. Habitat critical to the survival of *Synaphea* sp. Fairbridge Farm includes the area of occupancy of populations, areas of similar habitat surrounding and linking populations (these providing potential habitat for population expansion and for pollinators), additional occurrences of similar habitat that may contain undiscovered populations of the species or be suitable for future translocations and the local catchment for the surface and/or groundwater that maintains the habitat of the species.

Benefits to other species or ecological communities

Recovery actions implemented to improve the quality or security of the habitat of *Synaphea* sp. Fairbridge Farm will also improve the status of associated native vegetation.

Two Critically Endangered, one Vulnerable and three Priority flora taxa occur in association with *Synaphea* sp. Fairbridge Farm. These taxa are listed in the table below:

Conservation-listed flora species occurring in habitat of *Synaphea* sp. Fairbridge Farm

Species name	Conservation Status (Western Australia)	Conservation Status (EPBC Act 1999)
Synaphea stenoloba	DRF, Critically Endangered	-
Synaphea sp. Pinjarra (R. Davis 6578)	DRF, Critically Endangered	-
Tetraria australiensis	DRF, Vulnerable	Vulnerable
Synaphea sp. Pinjarra Plain (A.S. George 17182)	Priority 1	-
Eryngium subdecumbens ms	Priority 3	-
Blennospora doleiformis	Priority 3	-

For a description of the priority categories see Atkins (2006)

Synaphea sp. Fairbridge Farm occurs in association with two Threatened Ecological Communities (TECs).

Threatened Ecological Communities (TECs) in which *Synaphea* sp. Fairbridge Farm occurs in association

Community Name	Conservation status (WA)
Shrublands on dry clay flats	Endangered
Corymbia calophylla – Eucalyptus marginata woodlands on sandy clay soils of the southern Swan Coastal Plain	Vulnerable

For a description of the TEC categories see DEC (2007)

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. *Synaphea* sp. Fairbridge Farm is not listed under any specific international treaty however, and this IRP does not affect Australia's obligations under any other international agreements.

Indigenous consultation

Involvement of the Indigenous community is being sought through the Indigenous Natural Resource Management Advisory Group (INRMAG) of the Swan Catchment Council to assist in the identification of cultural values for land occupied by *Synaphea* sp. Fairbridge Farm; to identify groups with a cultural connection to land that is important for the species' conservation and to determine whether there are any issues or interests identified in the plan. A search of the Department of Indigenous Affairs Aboriginal Heritage Inquiry System has identified that Subpopulations 1a and 1b co-occur with one culturally significant site - Gas Pipeline 86 (Site ID 4327). General advice will be sought from the INRMAG regarding management, conservation and recognition of the shared values at this site. The INRMAG recognises that DEC, through the Recovery Plan process, seeks to conserve and protect areas of natural remnant vegetation. The INRMAG recognises that together we share similar goals of seeking to manage these areas for conservation and seek to include and support Aboriginal interest and involvement in the management and planning processes. Continued liaison between DEC and the indigenous community will identify areas in which collaboration will assist implementation of recovery actions.

Social and economic impact

The implementation of this recovery plan is unlikely to cause significant adverse social and economic impact. However, as *Synaphea* sp. Fairbridge Farm Subpopulation 1c occurs on private property the protection of the species at that site may potentially affect development and asset protection measures. Recovery actions refer to continued liaison between stakeholders with regard to populations located on private property.

Affected interests

Two populations occur on Westrail rail reserve, one on Main Roads reserve, one on Shire of Dardanup road reserve and one subpopulation occurs on private land. The protection of the species may potentially impact on Shire operations, road and rail maintenance activities and the private landholder activities.

Evaluation of the plan's performance

DEC in conjunction with the Swan Region Threatened Flora and Communities Recovery Team (SWNRTFCRT) and the South West Region Threatened Flora and Communities Recovery Team (SWRTFCRT) will evaluate the performance of this IRP. In addition to annual reporting on progress and evaluation against the criteria for success and failure, the plan will be reviewed following four years of implementation.

2. RECOVERY OBJECTIVE AND CRITERIA

Objectives:

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

Criteria for success: The number of populations have increased and/or the number of mature individuals in populations have increased by ten percent or more over the term of the plan.
Criteria for failure: The number of populations have decreased and/or the number of mature individuals in populations have decreased by ten percent or more over the term of the plan.

3. RECOVERY ACTIONS

Existing recovery actions

Relevant land managers have been formally notified of the presence of the DRF species, its location on land under their management and their legal obligations to protect the species.

R. Butcher collected leaf material from plants in Populations 1 to 3 in 2003 to use for future genetic analysis. A comparison will be made of genetic variation in the species against observed morphological variation (Butcher 2004).

R. Butcher and M. Byrne[3] have undertaken a genetic assessment of *Synaphea* sp. Fairbridge Farm and other species of *Synaphea* found on the Pinjarra Plain. Laboratory work has been completed and the data is currently being analysed. A report on the work will be prepared.

DEC's Threatened Flora Seed Centre (TFSC) holds one seed collection of *Synaphea* sp. Fairbridge Farm, comprising fruits collected by R. Butcher from 26 plants at Population 2 in December 2004 and January 2005. The number of viable seeds has yet to be quantified.

Staff from DEC's Swan Region and South West Region will continue to monitor all known populations.

Declared Rare Flora (DRF) markers have been erected to mark the extent of Populations 1 and 4.

The SWNRTFCRT and the SWRTFCRT will oversee the implementation of this IRP in their respective regions and will include information on progress in their annual report to DEC's Corporate Executive and funding bodies.

Future recovery actions

Where recovery actions are implemented on lands other than those managed by DEC, permission has been or will be sought from the appropriate land managers prior to actions being undertaken. The following recovery actions are ranked in order of descending priority, influenced by their timing over the term of the plan. However this should not constrain addressing any recovery action if funding is available and other opportunities arise.

1. Coordinate recovery actions

The SWNRTFCRT and the SWRTFCRT will coordinate the implementation of recovery actions for *Synaphea* sp. Fairbridge Farm and other Declared Rare Flora in their respective Regions. They will include information on progress in their annual reports to DEC's Corporate Executive and funding bodies.

Action: Coordinate recovery actions
Responsibility: DEC (Swan Region and South West Region) through SWNRTFCRT and SWRTFCRT
Cost: $1,500 annually.

2. Liaise with relevant land managers and indigenous groups

Staff from DEC's Swan Region and South West Region (Wellington District) will liaise with appropriate land managers to ensure that populations of *Synaphea* sp. Fairbridge Farm are not accidentaly damaged or destroyed. Input and involvement will also be sought from indigenous groups that have an active interest in areas that are habitat for *Synaphea* sp. Fairbridge Farm.

[3] Dr Margaret Byrne, Principal Research Scientist, Science Division, Department of Environment and Conservation

Action: Liaise with relevant land managers and Indigenous groups
Responsibility: DEC (Swan Region and South West Region) through SWNRTFCRT and SWRTFCRT
Cost: $1,500 annually.

3. Monitor populations

Annual monitoring of factors such as habitat degradation (including the effects of roadside grading and spraying, weed invasion, grazing), population stability (expansion or decline), pollination activity, seed production, recruitment, and longevity and predation is essential and will be met under this action. Populations will be inspected annually and Rare Flora Report Forms completed. Note that not all populations will be monoitored each year.

Action: Monitor populations
Responsibility: DEC (Swan Region and South West Region) through SWNRTFCRT and SWRTFCRT
Cost: $1,000 annually.

4. Install Declared Rare Flora (DRF) markers

Declared Rare Flora markers need to be installed at populations 2 and 3 a, b, c, d and e.

Action: Install DRF markers
Responsibility: DEC (Swan Region and South West Region) through SWNRTFCRT and SWRTFCRT
Cost: $1,000 in year 1.

5. Collect seed to preserve genetic diversity

Preservation of genetic material is essential to guard against extinction of the species if wild populations are lost. It is therefore recommended that seed be collected and stored. Collections should aim to sample and preserve the maximum range of genetic diversity possible from all populations (determined by an appropriate molecular technique such as genetic fingerprinting if possible). The *Germplasm Conservation Guidelines for Australia* produced by the Australian Network for Plant Conservation (ANPC) should be used to guide this process (ANPC 1997).

Action: Collect seed to preserve genetic diversity
Responsibility: DEC (Swan Region and South West Region) and BGPA through SWNRTFCRT and SWRTFCRT
Cost: $3,000 in years 1, 3 and 5.

6. Undertake weed control and follow-up with additional control if required

Weeds are a major threat to all populations of *Synaphea* sp. Fairbridge Farm. The following actions will be implemented in consultation with relevant land managers.

1. Select an appropriate herbicide after determining which weeds are present.
2. Control invasive weeds by hand removal or spot spraying around *Synaphea* sp. Fairbridge Farm plants when weeds first emerge.
3. Schedule weed control to include spraying at other threatened flora populations within the District.
4. Regularly monitor weeds and implement additional weed control if required.

The tolerance of associated native plant species to herbicides at the site of *Synaphea* sp. Fairbridge Farm is not known and weed control programs will be undertaken in conjunction with research following Adaptive Management principles.

Action: Undertake weed control and follow-up with additional control if required
Responsibility: DEC (Swan Region and South West Region) through SWNRTFCRT and SWRTFCRT
Cost: $4,000 annually.

7. Implement rabbit control

Rabbits (*Oryctolagus cuniculus*) are a threat to all populations of *Synaphea* sp. Fairbridge Farm. Methods of control will be developed and implemented in consultation with relevant land managers.

Action: Implement rabbit control
Responsibility: DEC (Swan Region and South West Region) through SWNRTFCRT and SWRTFCRT
Cost: $3,000 in year 1 and $2,500 in years 2 to 5.

8. Obtain biological and ecological information

Improved knowledge of the biology and ecology of *Synaphea* sp. Fairbridge Farm will provide a better scientific basis for management of wild populations. An understanding of the following is particularly necessary for effective management:

1. Investigate the species 'response to disturbance, including fire, following Adaptive Management principles.
2. Investigate the species pollination biology.
3. Investigate the levels of flower and fruit production.
4. Investigate seed longevity and viability.
5. Investigate conditions necessary for germination.
6. Determine longevity of plants and time taken to reach maturity.
7. Investigate genetic diversity.

Action: Obtain biological and ecological information
Responsibility: DEC (Swan Region, South West Region, Science Division) through SWNRTFCRT and SWRTFCRT
Cost: $13,000 in years 1 to 3 and $18,000 in year 4.

9. Propose change in ranking criteria

Propose to the next meeting of the Threatened Species Scientific Committee (TSSC) that the ranking of *Synaphea* sp. Fairbridge Farm be amended from CR B1ab(iii) to CR B2ab(ii,iii). The species no longer meets Criteria for B1ab(iii) as it is now known from an extent of occurrence greater than 100km^2.

Action: Propose change in ranking criteria
Responsibility: DEC (Species and Communities Branch)
Cost: $1,000 in year 1.

10. Promote awareness

The importance of biodiversity conservation and the protection of *Synaphea* sp. Fairbridge Farm will be promoted to the public. This will be achieved through an information campaign using local print and electronic media and by setting up poster displays. An information brochure that provides a description of the species with information about threats and recovery actions will be developed for this species and will be distributed to local land owners, relevant authorities and volunteer organisations. Promotion and awareness raising activities may result in the discovery of new populations. Formal links with local naturalist groups and interested individuals should also be encouraged.

To minimise the risk of site interference, it is recommended that the exact location of *Synaphea* sp. Fairbridge Farm populations be kept from the general public. Such information should, however, be provided to the relevant Shires, private landholders and government authorities to prevent accidental damage to sites.

Action: Promote awareness
Responsibility: DEC (Swan Region and South West Region, SCB and Strategic Development and Corporate Affairs Division) through SWNRTFCRT and SWRTFCRT
Cost: $1,500 in year 1 and $1,000 in years 2 to 5.

11. Conduct further surveys

It is recommended that areas of potential habitat be surveyed for the presence of *Synaphea* sp. Fairbridge Farm during its flowering period between September and November. In particular, the habitat surrounding Population 5 requires surveying. All surveyed areas will be recorded and the presence or absence of the species documented to increase survey efficiency and reduce unnecessary duplicate surveys. Where possible, volunteers from the local community, wildflower societies and naturalist clubs should be invited to assist.

Summaries of areas surveyed will be sent to Species and Communities Branch and also retained at relevant District Office.

Action: Conduct further surveys
Responsibility: DEC (Swan Region, South West Region) through SWNRTFCRT and SWRTFCRT
Cost: $4,000 in year 1, 3 and 5.

12. Develop and implement a fire management strategy

The response of *Synaphea* sp. Fairbridge Farm to fire is currently unknown but it is possible that the species requires fire or other disturbance to recruit. However, as frequent fires may kill seedlings and exhaust the seed bank, reducing future recruitment, a fire management strategy will be developed by DEC's Swan Region and South West Region in consultation with the respective Threatened Flora and Communities Recovery Teams and relevant land managers. This will include the maintenance of firebreaks and actions to reduce the impact of frequent wildfires on populations.

Action: Develop and implement a fire management strategy
Responsibility: DEC (Swan Region and South West Region) through SWNRTFCRT and SWRTFCRT and relevant authorities
Cost: $3,000 in year 1.

13. Map habitat critical to the survival of *Synaphea* sp. Fairbridge Farm

It is a requirement of the EPBC Act to determine spatial data relating to habitat critical to the survival of *Synaphea* sp. Fairbridge Farm. The areas described in Section 1 have not yet been mapped and that will be addressed under this recovery plan. If any additional populations are located, then habitat critical to their survival will also be determined and mapped.

Action: Map critical habitat critical to the survival of *Synaphea* sp. Fairbridge Farm
Responsibility: DEC (Swan Region, South West Region and SCB) through SWNRTFCRT and SWRTFCRT
Cost: $3,500 in year 1.

14. Review the plan and need for further recovery actions

At the end of the five-year term this IRP, the plan will be reviewed and the need for further recovery actions will be assessed.

Action: Review the plan and the need for further recovery actions
Responsibility: DEC (SCB, Swan Region and South West Region) through SWNRTFCRT and SWRTFCRT
Cost: $1,500 in year 5.

Summary of recovery actions

Recovery Actions	Priority	Responsibility	Completion Date
Coordinate recovery actions	High	DEC (Swan Region and South West Region) through SWNRTFCRT and SWRTFCRT	Ongoing

Liaise with relevant land managers and Indigenous groups	High	DEC (Swan Region and South West Region) through SWNRTFCRT and SWRTFCRT	Ongoing
Monitor populations	High	DEC (Swan Region and South West Region) through SWNRTFCRT and SWRTFCRT	2012
Install DRF markers	High	DEC (Swan Region and South West Region) through SWNRTFCRT and SWRTFCRT	2008
Collect seed to preserve genetic diversity	High	DEC (Swan Region and South West Region) and BGPA through SWNRTFCRT and SWRTFCRT	2012
Undertake weed control and follow-up with additional control if required	High	DEC (Swan Region and South West Region) through SWNRTFCRT and SWRTFCRT	2012
Implement rabbit control	High	DEC (Swan Region and South West Region) through SWNRTFCRT and SWRTFCRT	2012
Obtain biological and ecological information	High	DEC (Swan Region, South West Region, Science Division) through SWNRTFCRT and SWRTCRT	2011
Propose change in ranking criteria	Moderate	DEC (Species and Communities Branch) through SWNRTFCRT and SWRTFCRT	2008
Promote awareness	Moderate	DEC (Swan Region and South West Region, SCB and Strategic Development and Corporate Affairs Division) through SWNRTFCRT and SWRTFCRT	2012
Conduct further surveys	Moderate	DEC (Swan Region, South West Region) through SWNRTFCRT and SWRTFCRT	2012
Develop and implement a fire management strategy	Moderate	DEC (Swan Region and South West Region) through SWNRTFCRT and SWRTFCRT and relevant authorities	2008
Map habitat critical to the survival of *Synaphea* sp. Fairbridge Farm	Moderate	DEC (Swan Region, South West Region and SCB) through SWNRTFCRT and SWRTFCRT	2008
Review the plan and need for further recovery actions	Moderate	DEC (SCB, Swan Region and South West Region) through SWNRTFCRT and SWRTFCRT	2012

4. TERM OF PLAN

This IRP will operate from September 2007 to August 2012 but will remain in force until withdrawn or replaced. If *Synaphea* sp. Fairbridge Farm is still ranked CR after five years, the need for further recovery actions and an update of this IRP will be assessed.

5. REFERENCES

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DEC (2007) *Western Australian Herbarium FloraBase 2 – Information on the Western Australian Flora*. Department of Environment and Conservation, Perth, Western Australia. (Accessed 2007. http://www.calm.wa.gov.au/science/

DEC (2007) *Definitions, categories and criteria for Threatened and Priority Ecological Communities*. Department of Environment and Conservation, Western Australia (Accessed 2007). http://www.naturebase.net/content/view/273/1208/

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6. TAXONOMIC DESCRIPTION

Excerpt from: DRAFT Taxonomic Description, R. Butcher (2007).

***Synaphea* sp. Fairbridge Farm = *Synaphea selenae* ms R. Butcher sp. nov.**

Typus: South West Hwy, c. 1.2km N of South Dandalup River, 17 October 1998, *R. Butcher & J. Mahoney* RB 569 (*holo:* PERTH **DB#;** *iso:* AD, CANB, K, MEL)

Caespitose subshrub 25-65 cm tall, 20-80 cm wide. *Stems* several, to 5 cm long, bark smooth, sparsely pubescent. *Petiole* 4.5-17 cm long, glabrous to sparsely puberulous, puberulous at base; sheath appressed pubescent at base and towards mid-line, glabrous at margins. *Leaves* tripartite to pinnatipartite, +/- symmetrical; multiplanar, ultimate lobes linear, flat to concave, 2-5.5 mm wide; acute to obtuse, pungent; 7-16 cm wide, sparsely pubescent to glabrous, not glaucous, slightly discolorous; reticulation fine to open, prominent; lowest pair of lobes tripartite to pinnatipartite; uppermost lobe tripartite to pinnatipartite. *Inflorescence* an axillary spike, 7-24cm long, equal to-1 x greater than leaves; flowers openly spaced, internodes 1-2 x flower length in mid-region with rachis elongating during development of spike; peduncle 10-32 cm long, simple to branched, green or green and red to red, puberulous to pubescent, +/- tomentose at base, basal sheath light brown to pink, appressed pubescent along mid-line and at base externally, appressed silky along mid-line internally, 7.9-9.5 mm long; rachis green or green and red to red, puberulous; bracts ovate to broadly ovate, acute to obtuse, ascending, 1.7-2.5 mm long, pubescent in lower half and along mid-line externally with ciliate margin, glabrous internally. *Perianth* strongly ascending, opening narrowly, sparsely pubescent externally with hairs more concentrated in upper half; adaxial tepal scarcely concave, apex reflexed to *c*. 45 degrees, margins scarcely reflexed, 4.2-4.7 mm long, 1.8-2 mm wide, pubescent internally; abaxial tepal concave behind anthers, 3.6-3.8 mm long, 1.2-1.4 mm wide, apex shortly reflexed to 0.2-0.3 mm of its length, densely pubescent internally behind and above anther; lateral tepals slightly falcate, 3.7-4.1 mm long, 1.5 mm wide, the apex reflexed to 0.2-0.3 mm of length, densely pubescent internally behind and above anther. *Stigma* transversely oblong to square with short apical lobes (*c*. 0.3 mm long), convex ventrally, 0.8-0.9 mm long, 1,2-1.4 mm wide; ovary cylindrical, with apical beak to 0.3 mm long (after style separates), pubescent, 1 mm long, 0.8 mm wide, with a ring of translucent, +/- terete, straight, enlarged trichomes at apex. *Fruit* obovoid, more curved and thickened along adaxial edge and with a thickened rim at apex where elongated trichomes attach, coarsely ribbed, shortly pilose, 6.2-7.5 mm long (neck 2–2.5 mm), 2.9 mm wide with a puberulous beak to 0.4-0.6 mm long. *Seed* not seen.