INTERIM RECOVERY PLAN NO. 33

TRIGWELL'S RULINGIA

(*RULINGIA* SP. TRIGWELL BRIDGE)

INTERIM RECOVERY PLAN

1999-2002

by

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Photograph: Andrew Brown

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FOREWORD

Interim Recovery Plans (IRPs) are developed within the framework laid down in Department of Conservation and Land Management (CALM) Policy Statements Nos. 44 and 50.

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

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

This Interim Recovery Plan will operate from July 1999 to June 2002 but will remain in force until withdrawn or replaced. It is intended that, if the taxon is still ranked as 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 1 September 1999. 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 July1999.

SUMMARY

Scientific Name: ***Rulingia* sp. Trigwell Bridge**
Common Name: Trigwell's Rulingia
Family: Sterculiaceae
Flowering Period: August
CALM Region: Central Forest
CALM District: Mornington
Shire: West Arthur
Recovery Team: Central Forest Region Threatened Flora Recovery Team (CFRTFRT).

Illustrations and/or further information:. Brown, A., Thomson-Dans, C. and Marchant, N. (eds) (1998). *Western Australia's Threatened Flora*. Department of Conservation and Land Management, Western Australia; Marchant, N.G., Wheeler, J. R., Rye, B. L., Bennett, E. M., Lander, N. S. and Macfarlane, T. D. (1987). *Flora of the Perth Region.* Western Australian Herbarium and Department of Agriculture, Western Australia; Western Australian Herbarium (1999). FloraBase - Information on the Western Australian Flora. Department of Conservation and Land Management, Western Australia. http://www.calm.wa.gov.au/science/.

Current status: *Rulingia* sp. Trigwell Bridge was declared as Rare Flora in November 1993 and ranked as Critically Endangered (CR) in 1995. It currently meets World Conservation Union (IUCN) Red List category 'CR' under criteria B1+2c,e, C2b and D (IUCN 1994), as it is only known from a single wild population, with continued decline in the quality of the habitat. The species is known from one adult and two juvenile plants in the wild population, and three translocated populations. The species appears to have very specific habitat requirements and the restricted distribution of the species is a major threat to its survival. Other threats include grazing, inappropriate fire regimes and weeds.

Habitat requirements: Trigwell's Rulingia is found in small fissures in the rock on a lateritic ridge supporting open low jarrah (*Eucalyptus marginata*) and marri (*Corymbia calophylla*) woodland. It is not known whether this is the plant's preferred habitat or if these plants have survived because they were less accessible to grazing animals. Associated species include *Banksia grandis, Xanthorrhoea preissii, Macrozamia riedlii, Sollya heterophylla* and *Acacia pulchella.*

Existing Recovery Actions: The following recovery actions have been or are currently being implemented:
1. Relevant land managers notified of presence of *Rulingia* sp. Trigwell Bridge.
2. CALM's Threatened Flora Seed Centre (TFSC) has over 20,000 seeds in storage.
3. Kings Park and Botanic Garden (KPBG) conducted germination trials in April 1995.
4. KPBG hold 12 plants propagated from cuttings in their nursery.
5. In 1997 KPBG conducted experimental micropropagation trials to establish long term cryostorage of the species.
6. In 1995 tests for the presence of *Phytophthora cinnamomi* (dieback) in the habitat were negative.
7. Tests undertaken by CALMScience staff indicate that the species is not susceptible to dieback.
8. Soil sample analyses have indicated high organic matter and average nutrient levels at Population 1.
9. A ringlock fence was erected in 1992 to exclude sheep from Population 1.
10. A netting cage was erected in 1994 to exclude rabbits and 'twenty eight' parrots from Population 1.
11. Phase 1 and 2 of an approved Translocation Proposal have been completed and implementation of the third phase is in progress.
12. CFRTFRT is overseeing the implementation of this IRP.
13. CALM staff regularly monitor all populations.

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

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.

Recovery actions
1. Control grazing.
2. Maintain weed control.
3. Maintain dieback hygiene.
4. Monitor wild population.
5. Develop a fire management strategy.
6. Preserve genetic diversity of the species.
7. Implement approved Translocation Proposal.
8. Obtain biological and ecological information.
9. Disseminate information.
10. Write a full Recovery Plan.

1. BACKGROUND

History

Trigwell's Rulingia was first collected by R. Smith in 1989, and the population located at this time is still the only known naturally occurring wild population. It is known from cracks in a laterite ridge on private property, in a paddock used for grazing sheep until 1992. A translocation project is underway, and includes translocation of plants back into the wild population, but also aims to establish up to six other self-sustaining populations. This is being coordinated by the CFRTFRT.

Due to the extremely small population size, restricted distribution and threats associated with growing in a specialised habitat, *Rulingia* sp. Trigwell Bridge was declared as Rare Flora in November 1993, and ranked as Critically Endangered in September 1995.

Description

The full taxonomic description for the species was written by Dr. Gordan Guymer, Senior Botanist, Queensland Herbarium, however the description is not currently available.

Rulingia sp. Trigwell Bridge is a small shrub up to 1.5 m tall and 1 m wide covered in the star-shaped hairs that are typical of the genus. The narrow stipules are deciduous and the upper stipules are divided into thin lobes. The terminal flowers are creamy white, and petals are equal or shorter in length than the sepals. The broad-based petals embrace the stamens and the upper portion of the petals forms a ligule (Brown *et al.* 1998).

Distribution and habitat

Rulingia sp. Trigwell Bridge is endemic to Western Australia. It is known from a single wild population, and is apparently confined to the West Arthur area, having a known range of less than 1 km. New populations are being established near the original population through translocations.

The species is found on a lateritic ridge supporting open low jarrah (*Eucalyptus marginata*) and marri (*Corymbia calophylla*) woodland, with the plants growing in small fissures in the rock. It is not known whether this is the species' preferred habitat or whether these plants have survived because they were less accessible to grazing animals, including sheep and rabbits. Associated species include *Banksia grandis, Xanthorrhoea preissii, Macrozamia riedlii, Sollya heterophylla,* and *Acacia pulchella*.

The associated species at the translocation sites are very similar to taxa associated with the wild population, but the soils are laterite rich rather than laterite ridge. The translocated plants appear to be surviving well at these new sites.

Biology and ecology

KPBG have had success with the propagation of *Rulingia* sp. Trigwell Bridge through tissue culture, cuttings, and grafting, and the transition into soil has been successful.

KPBG have conducted research to determine seed viability and seed production capability of the existing plants. They found that 60% of flowers produce capsules, with an average of 6.5 seeds per capsule. This gave a seed production

capacity of approximately 5000 seeds in 1995. Laboratory analysis of the collected seeds indicated 100% germination in a nutrient enriched medium.

Threats

Rulingia sp. Trigwell Bridge is ranked as Critically Endangered. It meets IUCN Red List Criteria B1+B2c+B2e, C2b, and D (IUCN 1994), as it is only known from a single wild population, with continued decline in the quality of the habitat.

- **Lack of natural recruitment** is a threat to Rulingia sp. Trigwell Bridge. Only two juvenile plants exist in the wild population. The reasons for this low level of recruitement are not known.

- **Poor genetic diversity** may result from the low number of plants in the wild population. There is now just 1 adult plant and two juvenile plants in the known wild population and this represents an extremely limited gene pool (although there may be additional genetic variation in the soil-stored seed bank). Low genetic diversity may lower the species'ability to adapt to changes in its environment.

- **Grazing** by rabbits (*Oryctolagus cuniculus*), sheep, kangaroos and 'twenty eight' parrots (*Barnardius zonarius semitorquatus*) has previously been a major threat to Population 1. Steps have been taken to reduce this threat (see Section 3), and routine annual rabbit control is required. Insects also impact *Rulingia* sp. Trigwell Bridge and populations may require protection from this threat.

- **Weed invasion** is a minor threat to Population 1. Weeds suppress early plant growth by competing for soil moisture, nutrients, and light. However, as Population 1 occurs on rocky exposed habitat, relatively few weeds establish. Those that do are currently managed by hand weeding. In addition, native flora that occurs very close to existing *Rulingia* sp. Trigwell Bridge plants is also removed or annually pruned to prevent undue competition.

- **Inappropriate fire regimes** have the potential to impact the viability of populations, as seeds of *Rulingia* sp. Trigwell Bridge probably germinate following fire. If this is the case, the soil seed bank would rapidly be depleted if fires recurred before regenerating or juvenile plants reached maturity and replenished the soil seed bank. However, it is likely that occasional fires are needed for reproduction of the species. Population 1 is afforded some protection from fire by the surrounding exposed rock, and through naturally low fuel levels associated with the habitat.

Summary of population information and threats

Pop. No & Location	Land Status	Year / No. Plants	Condition	Threats
1 North east of Boyup Brook (**wild population**)	Private property	1995 4 1997 1 (2) 1998 1 (2)	Healthy	Lack of natural recruitment, inappropriate fire regimes, weeds, grazing
1a North East of Boyup Brook (**translocated population** adjacent to wild population)	Private property	1998 45	Healthy	Inappropriate fire regimes, weeds, grazing
2a North east of Boyup Brook (**translocated population**)	Nature reserve	1997 33 1998 32	Healthy	Inappropriate fire regimes, grazing by native fauna
2b North east of Boyup Brook (**translocated population**)	Nature reserve	Translocation in progress	Healthy	Inappropriate fire regimes, grazing by native fauna
3. East south east of Collie (**translocated population**)	Proposed Conservation Park	Translocation in progress	Healthy	Inappropriate fire regimes, grazing by native fauna

No. of plants = No. of adult plants (No. of seedlings) in wild population. For translocated populations, No. = total numbers of plants i.e. juveniles and adults not differentiated.

2. RECOVERY OBJECTIVES 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

The landowner has been formally notified of the presence of the wild *Rulingia* sp. Trigwell Bridge population and the associated legal responsibilities.

A total of 608 seeds were collected from 4 plants in Population 1 in November 1994. These are being stored in CALM's TFSC at -18°C. After 12 months storage, the material collected had a germination rate of 95%. Another 20,000 seeds were collected from the wild population and translocated sites in October and November 1998. These seeds had a viability of over 95% and an initial germination rate of 56-85%. CALM's TFSC now has over 13,000 seeds stored at 4°C available for direct seeding trials at translocation sites, and over 7,000 seeds in long-term storage at -20°C.

KPBG conducted smoke and smoke water germination trials immediately under and around the parent plants at Population 1 in April 1995. Site number 1 (0.9 m x 4.5 m) was treated with smoked water (two litres per square metre). Site number 2 (1 m x 5 m) was saturated with smoke. The sites were inspected in October 1995, but there was no evidence of germination.

The presence of dieback was suspected on the northwest slopes of Population 1 in April 1995. Two samples were sent for dieback analysis, but results were negative. Recent research by CALMScience staff to determine the species' susceptibility to *Phytophthora* spp. indicates that *Rulingia* sp. Trigwell Bridge is not susceptible to this plant pathogen.

Soil samples were collected from the wild population in 1995, and sent to the WA Chemistry Centre for analysis. The analysis indicated that the soil is very high in organic content, with levels of nitrogen and phosphorus higher than those expected in the locality. This is attributed to the fact that the plants grow in deep fissures in laterite outcrops, that accumulate leaf litter. Soil samples were collected from the proposed *ex situ* sites in 1996, for comparison with samples

taken from the site of the wild population. The results were consistent with average nutrient levels for most southwestern soils.

With the permission of the landowner, a ringlock fence was erected around Population 1 in 1992. This excluded sheep from the north west corner of the paddock, which contains all of the lateritic ridges. A netting cage was erected over and around the existing plants in 1994. This cage completely covered the plants, and protected them from rabbits, sheep and 'twenty eight' parrots, which were previously a major threat to the survival of the species.

In May 1999, KPBG held 12 plants in excellent condition in its nursery. The rooting success rate of cuttings taken from Population 1 was over 70%.

During 1997, KPBG undertook research into micropropagation, *in vitro* physiology, slow growth, germplasm maintenance and cryostorage. They have had success in propagation of the species through tissue culture, cuttings and grafting. Propagated plants were also transferred into the soil successfully. There is clonal material in cryostorage at KPBG, as well as some seed-derived stock.

A Translocation Proposal was prepared by R. Fitzgerald and K. Williams (CALM, Bunbury District). This was approved by the Director of Nature Conservation in September 1997. The aim of the Translocation Proposal is to establish self-sustaining populations at up to six locations. The seedlings for this translocation are being propagated by KPBG. For Phase 1, *Rulingia* sp. Trigwell Bridge seedlings were translocated into 4 plots. Plot 1 occurs alongside the only known wild population. Plots 2 and 3 occur on a nature reserve and Plot 4 occurs in a conservation park near Population 1.

Phase 2 of the Translocation Proposal involved more plantings in June 1998. In addition to further supplementing the wild population and the previously established populations on a nature reserve and a conservation park, another population was established near Population 1 Phase 2 is now complete and the third phase of monitoring and additional planting has commenced.

The CFRTFRT is overseeing the implementation of this IRP and will include information on progress in its annual report to CALM's Corporate Executive.

Staff from CALM's Central Forest Region regularly monitor the wild and translocated populations.

Future recovery actions

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

1. Control grazing

The populations are threatened by grazing. While the adult plants at Population 1 have been enclosed within a fence, any regenerating plants that could occur outside the fence are likely to be grazed. A fence will be erected around Population 1, the adjacent translocated population and a suitable buffer area to prevent grazing by rabbits and kangaroos. Individual translocated plants in Populations 2 and 3 have been enclosed in cages to prevent grazing.

Action: Control grazing
Responsibility: CALM (Mornington District) through the CFRTFRT
Cost: $6,500 in year 1, $500 in years 2 and 3.

2. Maintain weed control

Weeds threaten Population 1, but the exposed rocky habitat prevents major encroachment. To prevent adverse impacts on natural recruitment, these weeds will be hand pulled. CALM will maintain weed control at Population 1 and all translocation sites.

Action: Maintain weed control
Responsibility: CALM (Mornington District, CALMScience) through the CFRTFRT
Cost: $400 per year.

3. Maintain dieback hygiene

Although research indicates *Rulingia* sp. Trigwell Bridge is not susceptible to *Phytophthora* spp., hygiene measures will be maintained to protect the habitat of Population 1 and the habitat at all translocation sites.

Action: Maintain dieback hygiene
Responsibility: CALM (Mornington District) through the CFRTFRT
Cost: $300 per year.

4. Monitor wild population

Monitoring of factors such as weed invasion, habitat degradation, population stability (expansion or decline), pollinator activity, seed production, recruitment and longevity is essential. The naturally occurring wild population will be inspected at least twice annually (see also Action 7 for monitoring of all translocated populations).

Action: Monitor wild population
Responsibility: CALM (Mornington District) through the CFRTFRT
Cost: $ 1,200 per year.

5. Develop a fire management strategy

It is likely that the species requires occasional fire for recruitment from soil-stored seed, but that frequent fires would be detrimental to its long-term survival. Fire also promotes the introduction and proliferation of weed species. A fire management strategy will be developed by CALM's Mornington District in consultation with relevant land managers and the Central Forests Region Threatened Flora Recovery Team.

Action: Develop a fire management strategy
Responsibility: CALM (Mornington District), relevant landholders, Bush Fires Board through the CFRTFRT
Cost: $1,900 in the first year and $1,100 in years 2 and 3.

6. Preserve genetic diversity of the species

Preservation of germplasm is essential to guard against extinction if the wild population is lost, and for propagation of plants for use in translocations. Seed of *Rulingia* sp. Trigwell Bridge is currently held in CALM's TFSC. Further collections from as many plants as possible will be undertaken as required and the seed lodged with the TFSC and at KPBG.

Action: Preserve genetic diversity of the species
Responsibility: CALM (TFSC, Central Forest Region), KPBG through the CFRTFRT
Cost: $2,400 in years 1 and 3.

7. Implement approved Translocation Proposal

A Translocation Proposal in accordance with CALM Policy Statement No. 29 (CALM 1995) has been approved for the species. This consists of three phases. Phase 1 aimed to trial appropriate establishment techniques to supplement Population 1, and to establish a population on a secure conservation reserve with the intention of further supplementation in Phase 2. Phase 2 aims to establish 5 self-sustaining populations on secure conservation reserves over the period 1998-2000. During Phase 3 monitoring will be continued, fences will be erected to prevent grazing of the seedlings by kangaroos and rabbits where necessary (refer Action 1), and further translocations undertaken until the level of threat to the species has been reduced. Phases 1 and 2 have been completed, and Phase 3 has commenced. Monitoring is ongoing for all translocated populations.

Action: Implement approved Translocation Proposal
Responsibility: CALM (Central Forest Region), KPBG through the CFRTFRT
Cost: $29,700 in year 1 and $15,600 in subsequent years.

8. Obtain biological and ecological information

Information will be gathered to increase understanding of the biology of the species. This will provide a scientific basis for management of *Rulingia* sp. Trigwell Bridge in the wild. Research will ideally include:

1. Response of *R.* sp. Trigwell Bridge and its habitat to fire.
2. Role of disturbance in regeneration.
3. Pollination biology and seed set.
4. Size and viability of soil seed bank.
5. Level of invertebrate grazing or removal of seed.
6. Seed germination requirements of *R.* sp. Trigwell Bridge.
7. Factors determining level of flower and fruit abortion.
8. Longevity of plants, and time taken to reach maturity.

Action: Obtain biological and ecological information
Responsibility: CALM (CALMScience, Central Forest Region, Mornington District) through the CFRTFRT
Cost: $17,200 per year.

9. Disseminate information

The importance of biodiversity conservation and the protection of the Critically Endangered *Rulingia* sp. Trigwell Bridge will be promoted to the public. This will be achieved through an information campaign using the local print and electronic media and by poster displays. This is especially important as there is only one known wild population of the species and increased awareness may result in the discovery of others.

An information sheet, that includes a description of the plant, its habitat type, threats, management actions and photos, will be produced. Formal links with local naturalist groups and interested individuals will also be encouraged.

Action: Disseminate information
Responsibility: CALM (WATSCU, Central Forest Region, Corporate Relations Division) through the CFRTFRT
Cost: $800 in year 2 and $400 in years 1 and 3.

10. Write a 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 prepared with the benefit of knowledge gained over the period of this Interim Recovery Plan.

Action: Write a full Recovery Plan
Responsibility: CALM (WATSCU, Central Forest Region) through the CFRTFRT
Cost: $19,000 once in year 3.

4. TERM OF PLAN

This Interim Recovery Plan will operate from July 1999 to June 2002 but will remain in force until withdrawn or replaced. It is intended that, if the taxon is still ranked as Critically Endnagered, this IRP will be replaced by a full Recovery Plan after three years.

5. ACKNOWLEDGMENTS

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

Rob Brazell	District Conservation Officer, Mornington District
Robert Fitzgerald	Regional Wildlife Officer, Central Forest Region
Gordan Guymer	Senior Botanist, Queensland Herbarium
Ray Smith	Regional Wildlife Officer, Central Forest Region
Kim Williams	Program Leader Nature Conservation, Central Forest Region

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

6. REFERENCES

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7. TAXONOMIC DESCRIPTION

Brown *et al*. (1998).

***Rulingia* sp. Trigwell Bridge**

This small shrub or undershrub can grow up to 1.5 m high and 1 m wide. Star-shaped hairs are visible. Stipules are deciduous, narrow, with the upper stipules often divided into slender lobes. Leaves are entire. There is a terminal inflorescence of creamy-white flowers. The petals are shorter than or as long as the sepals, with a short broad base embracing the stamens and a linear or broad upper portion known as the ligule.