

INTERIM RECOVERY PLAN NO. 262

# BROAD-FRUITED HALORAGIS

*(Haloragis platycarpa)*

INTERIM RECOVERY PLAN

2008-2013

April 2008

Department of Environment and Conservation  
Kensington



Australian Government



Department of  
Environment and Conservation

Our environment, our future



## 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 ecological communities, and begin the recovery process.

DEC is committed to ensuring that Threatened taxa 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, always within one year of endorsement of that rank by the Minister.

This IRP will operate from April 2008 to March 2013 but will remain in force until withdrawn or replaced. It is intended that, if the taxon is still ranked CR, this IRP will be reviewed after five years and the need for further recovery actions assessed.

This IRP was approved by the Director of Nature Conservation on 30 April 2008. 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 in April 2008.

This IRP was prepared with financial support from the Australian Government to be adopted as a National Recovery Plan under the provisions of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

## IRP PREPARATION

This IRP was prepared by Craig Douglas<sup>1</sup>, Wendy Johnston<sup>2</sup> and David Jolliffe<sup>3</sup>

<sup>1</sup> Project Officer, Species and Communities Branch, DEC, PO Box 51 Wanneroo, 6946.

<sup>2</sup> Flora Conservation Officer, Yilgarn District, DEC, PO Box 332, Merredin WA 6415.

<sup>3</sup> District Nature Conservation Officer, Yilgarn District, DEC, PO Box 332, Merredin WA 6415.

## ACKNOWLEDGMENTS

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

Andrew Crawford	Technical Officer, Threatened Flora Seed Centre, DEC.
Andrew Brown	Threatened Flora Coordinator, Species and Communities Branch, DEC.
Kelly Poultney	Threatened Flora Database Officer, DEC.
Bob Elkins	Technical Assistant, Botanic Gardens and Parks Authority
Mike Hislop	Contract Consultant, Western Australian Herbarium, DEC.

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

**Cover photograph** no image available..

## CITATION

This IRP should be cited as:

Department of Environment and Conservation (2008). Broad-Fruited Haloragis (*Haloragis platycarpa*) Interim Recovery Plan 2008-2013. Interim Recovery Plan No. 262. Department of Environment and Conservation, Western Australia.

**SUMMARY**

<b>Scientific Name:</b>	<i>Haloragis platycarpa</i>	<b>Common Name:</b>	Broad-Fruited Haloragis
<b>Family:</b>	Haloragaceae	<b>Flowering Period:</b>	October
<b>DEC Region:</b>	Wheatbelt	<b>DEC District:</b>	Avon Mortlock
<b>Shire:</b>	Dalwallinu	<b>Recovery Team:</b>	Avon Mortlock District Threatened Flora Recovery Team

**Illustrations and/or further information:** Atkins, K. (2008) *Declared Rare and Priority Flora List for Western Australia*. Department of Environment and Conservation, Western Australia; Brown, A., Thomson-Dans, C. and Marchant, N. (1998). *Western Australia's Threatened Flora*. Department of Conservation and Land Management, Western Australia. pp 209; Blackall, W.E. and Grieve, B.J. (1974). *How to Know Western Australian Wildflowers, parts I, II, and III*. Western Australia, University of Western Australia Press. pp 469; Bentham, G. (1864). *Flora Australiensis: A description of the plants of the Australian territory*. London, Lovell Reeve and Company. 2: 478; Orchard, A.E., Lepschi, B.J. and Hislop, M. (2005). New taxa a new record and a rediscovery in Western Australian *Haloragis* (Haloragaceae). *Nuytsia* **15**(3): 439-440; Western Australian Herbarium (2007) *FloraBase 2 – Information on the Western Australian Flora*. Department of Environment and Conservation, Western Australia; <http://www.calm.wa.gov.au/science/> (Accessed 2007).

**Current status:** *Haloragis platycarpa* was declared as Rare Flora under the Western Australian *Wildlife Conservation Act 1950* in 2002 and is currently ranked as Critically Endangered (CR) under World Conservation Union (IUCN 2001) Red List criteria B1ab(iii)+2ab(iii); D due to being known from less than 50 mature individuals and its area of occupancy being less than 10km<sup>2</sup> with a continuing decline in the extent and quality of habitat. The main threats to the species are weeds and inappropriate fire regimes. *H. platycarpa* is listed as Extinct under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The single known population numbered 30 mature individuals in 2000. However, no plants have been seen at this location since. The species appears to be a short lived disturbance opportunist and, as its habitat is undisturbed, it is presumed that a disturbance event is required for plants to reappear.

**Description:** *Haloragis platycarpa* is a short-lived perennial herb to 30 cm tall. The branches are numerous and more or less hairless, although some have single-celled transparent hairs. The leaves are stalkless, up to 45 mm long, and arranged alternatively along the stem. The leaves are lanceolate, with several large teeth towards the apex. Flowers are held in groups of one to three in the upper leaf axils but only the central flower is functional. Each flower has four petals, up to 2 mm long, eight stamens and four styles. A single fruit develops in each axil and is up to 2.5 mm long with a swollen, spongy covering. It has four compartments, four weak ribs, and is densely covered with minute, rounded projections (Brown *et al.* 1998).

*Haloragis platycarpa* resembles *Haloragis scoparia*, *Haloragis hamata* and *Haloragis foliosa*, but differs from all of these in its small fruit with inflated pericarp and densely papillose indumentum. In its inflated pericarp it resembles *Haloragis uncatipila* but this species is larger in all its parts including the fruit and the indumentum is of hooked rather than short papillose hairs as it is in *H. platycarpa* (Orchard *et al.* 2005).

**Habitat requirements:** *Haloragis platycarpa* occurs on brown, loamy soils supporting open woodland.

**Habitat critical to the survival of the species, and important populations:** Given that *Haloragis platycarpa* is listed as CR, it is considered that all known habitat is critical to the survival of the species, and that the wild population is an important population. Habitat critical to the survival of *H. platycarpa* includes the area of occupancy of the population, areas of similar habitat (i.e. brown loamy soils supporting open woodland) surrounding the population (this is necessary to provide habitat for pollinators and future population expansion) and additional occurrences of similar habitat that may contain the species or be suitable for future translocations.

**Benefits to other species or ecological communities:** Recovery actions implemented to improve the quality or security of the habitat of *Haloragis platycarpa* will also improve the status of remnant associated vegetation. The DRF species *Eremophila pinnatifida* grows near *H. platycarpa* and may benefit from recovery actions aimed at maintaining associated bushland.

**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. *Haloragis platycarpa* is not listed under any specific international treaty and this IRP does not affect Australia's obligations under any other international agreements.

**Indigenous consultation:** According to the Department of Indigenous Affairs Aboriginal Heritage Sites Register, no sites of Aboriginal significance are known at or near populations of the species covered by this IRP. However, the involvement

of the Indigenous community is currently being sought to determine whether there are any issues or interests identified in the Plan. If no role is identified for indigenous communities in the recovery of this species, opportunities may exist through cultural interpretation and awareness of the species.

The advice of the South West Aboriginal Land and Sea Council (SWALSC) and Department of Indigenous Affairs is being sought to assist in the identification of potential indigenous management responsibilities for land occupied by threatened species, or groups with a cultural connection to land that is important for the species' conservation.

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 IRP has the potential to cause significant adverse social and economic impacts as the known population is located in a Town Reserve, managed by the Shire of Dalwallinu.

**Affected interests:** Stakeholders potentially affected by the implementation of this plan include the Shire of Dalwallinu.

**Evaluation of the plan's performance:** DEC in conjunction with the Avon Mortlock District Threatened Flora Recovery Team (AMDTFRT) 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.

#### **Completed recovery actions**

1. Relevant authorities have been made aware of the threatened nature of this species, its location and their legal obligations to protect it.

#### **Ongoing and future recovery actions**

1. The AMDTFRT is overseeing the implementation of this IRP and will include it in their annual report to DEC's Corporate Executive and funding bodies.
2. Staff from DEC's Avon Mortlock District office are monitoring the known population.

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

#### **Recovery criteria**

**Criteria for success:** Further populations are located and/or mature individuals are found over the term of the plan.

**Criteria for failure:** No mature individuals are found over the term of the plan.

#### **Recovery actions**

1. Coordinate recovery actions
2. Monitor population
3. Undertake weed control
4. Collect seed
5. Promote awareness
6. Conduct further surveys
7. Obtain biological and ecological information
8. Investigate options for long-term protection of habitat
9. Map habitat critical to the survival of *Haloragis platycarpa*
10. Review the plan and need for further recovery actions

## 1. BACKGROUND

### History

George Bentham described *Haloragis platycarpa* in 1864 from specimens collected by James Drummond.

In July 2000 the species was listed as Extinct under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) due to it not having been seen for over 150 years.

In October 2000 Mike Hislop, a Consultant with the former Department of CALM, discovered thirty mature individuals of the species near the Dalwallinu townsite.

The population was resurveyed in June 2001 by DEC staff, however only dead plants were found. Several surveys undertaken since then have failed to locate live plants.

*Haloragis platycarpa* was declared as Rare Flora in April 2002 and is currently ranked as Critically Endangered (CR) under World Conservation Union (IUCN 2001) Red List criteria.

### Description

*Haloragis platycarpa* is a perennial herb to 30 cm tall. The branches are numerous and mainly hairless, although some have single-celled transparent hairs. The leaves, which are stalkless, up to 45 mm long, and arranged alternatively along the stem, are lanceolate with several large teeth towards the apex. Flowers are held in groups of one to three in the upper leaf axils but only the central flower is functional. Each flower has four petals, up to 2 mm long, eight stamens and four styles. A single fruit develops in each axil and is up to 2.5 mm long with a swollen, spongy covering. It has four compartments, four weak ribs, and is densely covered with minute, rounded projections (Brown *et al.* 1998).

*Haloragis platycarpa* resembles *Haloragis scoparia*, *H. hamata* and *H. foliosa*, but differs in its small fruit with an inflated pericarp and densely papillose indumentum. In its inflated pericarp it resembles *Haloragis uncatipila* but this species is larger in all its parts including the fruit and the indumentum consists of hooked rather than short papillose hairs (Orchard *et al.* 2005).

### Distribution and habitat

The single known population occurs at Dalwallinu, growing in brown loamy soil in an area of tall, open woodland. Associated species include *Acacia acuminata*, *Grevillea levis* and *Pimelea avonensis*.

### Summary of population land vesting, purpose and manager

Pop. No. & Location	DEC District	Shire	Vesting	Purpose	Manager
<b>1. Dalwallinu</b>	Avon Mortlock	Dalwallinu	DLI	Unallocated Crown Land	Shire of Dalwallinu

Populations in **bold text** are considered to be Important Populations.

### Biology and ecology

*Haloragis platycarpa* is a short lived perennial herb that is thought to germinate from soil-stored seed in winter or spring, possibly following wet summers (Mike Hislop pers. comm.).

The only recorded flowering of *Haloragis platycarpa* is in October 2000, when plants were observed to be in early flower. Mature fruit has been reported to be seen in late November (Orchard *et al.* 2005).

### Threats

*Haloragis platycarpa* was declared as Rare Flora under the *Western Australian Wildlife Conservation Act 1950* in 2002 and is currently ranked as Critically Endangered (CR) under World Conservation Union (IUCN 2001) Red List criteria B1ab(iii)+2ab(iii); D, due to being known from less than 50 mature individuals and the area of occupancy being less than 10km<sup>2</sup> with a continuing decline in the extent and quality of habitat. The main threats



species, its habitat or potential habitat or on the local surface hydrology, such that drainage in the habitat of the species would be altered.

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

Given that *Haloragis platycarpa* is listed as CR, it is considered that all known habitat for the wild population is critical to the survival of the species, and that the wild population is an important population. Habitat critical to the survival of *H. platycarpa* includes the area of occupancy of the population, areas of similar habitat (i.e. brown loamy soils supporting open, tall woodland) surrounding the population (this is necessary to provide habitat for pollinators and possible future population expansion) and additional occurrences of similar habitat that may contain the species or be suitable for future translocations.

### **Benefits to other species or ecological communities**

Recovery actions implemented to improve the quality or security of the habitat of *Haloragis platycarpa* will also improve the status of remnant associated vegetation. The DRF species listed in the table below grows near *H. platycarpa* and may benefit from recovery actions aimed at maintaining associated bushland.

### **Conservation-listed flora species occurring in habitat of *Haloragis platycarpa***

<b>Species name</b>	<b>Conservation Status (WA)</b>	<b>Conservation Status (EPBC Act)</b>
<i>Eremophila pinnatifida</i> DRF – Declared Rare Flora.	DRF; Critically Endangered	Endangered

### **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. *Haloragis platycarpa* 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**

According to the Department of Indigenous Affairs Aboriginal Heritage Sites Register, no sites of Aboriginal significance are known at or near populations of the species covered by this IRP. However, the involvement of the Indigenous community is currently being sought to determine whether there are any issues or interests identified in the Plan. If no role is identified for indigenous communities in the recovery of this species, opportunities may exist through cultural interpretation and awareness of the species.

The advice of the South West Aboriginal Land and Sea Council (SWALSC) and Department of Indigenous Affairs is being sought to assist in the identification of potential indigenous management responsibilities for land occupied by threatened species, or groups with a cultural connection to land that is important for the species' conservation.

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 IRP has the potential to cause adverse social and economic impacts as the known population is located in a Town Reserve, managed by the Shire of Dalwallinu. Protection of the population and its associated habitat may impact on future townsite expansion.

### **Affected interests**

A stakeholders potentially affected by the implementation of this plan is the Shire of Dalwallinu.

### **Evaluation of the plan's performance**

DEC in conjunction with the Avon Mortlock District Threatened Flora Recovery Team (AMDTFRT) 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 five 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:** Further populations are located and/or mature individuals are found over the term of the plan.

**Criteria for failure:** No mature individuals are found over the term of the plan.

## 3. RECOVERY ACTIONS

### Completed recovery actions

Relevant authorities have been made aware of the threatened nature of this species, its location and their legal obligations to protect it.

### Ongoing and future recovery actions

The AMDTFRT is overseeing the implementation of this IRP and will include it in their annual report to DEC's Corporate Executive and funding bodies.

Staff from DEC's Avon Mortlock District office regularly monitor the known population.

The following recovery actions are roughly in order of descending priority, influenced by their timing over the term of the plan. However this should not constrain addressing any of the recovery actions if funding is available for 'lower' priorities and other opportunities arise. Should populations be found on lands other than those managed by DEC, permission will be sought from the appropriate land managers prior to recovery actions being undertaken.

### 1. Coordinate recovery actions

The AMDTFRT will continue to coordinate the implementation of recovery actions for *Haloragis platycarpa* and will include information on progress in their annual reports to DEC's Corporate Executive and funding bodies.

**Action:** Coordinate recovery actions.  
**Responsibility:** AMDTFRT  
**Cost:** \$1,400 per year

### 2. Monitor population

Monitoring of factors such as weed invasion, habitat degradation, population stability (expansion or decline), pollinator activity, seed production, recruitment, and longevity is essential.

**Action:** Monitor population  
**Responsibility:** DEC (Avon Mortlock District) through the AMDTFRT  
**Cost:** \$600 per year

### 3. Undertake weed control

Weeds are noted as a major threat to the known population of *Haloragis platycarpa*. The following actions will be implemented:



1. Select an appropriate herbicide after determining which weeds are present.
2. Control invasive weeds by hand removal or spot spraying around *Haloragis platycarpa* when they first emerge.
3. Schedule weed control to include spraying at other threatened flora populations within the District.

The tolerance of associated native plant species to herbicides at the site of *Haloragis platycarpa* is not known and weed control programs will be undertaken in conjunction with research.

**Action:** Undertake weed control.  
**Responsibility:** DEC (Avon Mortlock District, Science Division) through the AMDTFRT  
**Cost:** \$1,000 per year.

#### 4. Collect seed

Currently, no seed has been collected by the Botanic Gardens and Parks Authority (BGPA) or DEC's Threatened Flora Seed Centre (TFSC). Collection of seed is essential to guard against extinction of the species if the wild population is lost and it is recommended that, if mature plants are located, seed be collected while ensuring sufficient seed is retained in the population for natural regeneration. The "Germplasm Conservation Guidelines for Australia" produced by the Australian Network for Plant Conservation (ANPC) should be used to guide this process.

**Actions:** Collect seed  
**Responsibility:** DEC (Avon Mortlock District, TFSC), and BGPA through the AMDTFRT.  
**Cost:** \$2,800 in years 1, 3 and 5 if plants are located.

#### 5. Promote awareness

The importance of biodiversity conservation and the protection of *Haloragis platycarpa* will be promoted to the public. This will be achieved through an information campaign using the local print and electronic media and by setting up poster displays. This is especially important as there is only one known population of the species and increased awareness may result in the discovery of others. The fact that the population currently has no extant plants will need to be addressed through this publicity, with promotion of an understanding of the ephemeral nature of populations and the need to maintain areas of habitat.

It is recommended that an A4 sized information sheet which includes a description of the plant, its habitat type, status, threats, management actions and photos be developed and distributed to local land owners, relevant authorities and volunteer organizations, libraries and schools. Formal links with local naturalist groups and interested individuals is encouraged.

**Action:** Promote awareness  
**Responsibility:** DEC (Avon Mortlock District, Species and Communities Branch (SCB) and Strategic Development and Corporate Affairs Division) through the AMDTFRT.  
**Cost:** \$1,600 in the first year, \$1,000 in years 3 and 5

#### 6. Conduct further surveys

It is suggested that surveys be conducted in areas of suitable habitat (i.e. flat, brown, loamy soils supporting tall, open woodland) within the Shire of Dalwallinu and adjacent Shires and include similar habitat on private land if possible. Given the short-lived nature of the plants, such surveys may be targeted at periods after known disturbance, such as fires or track maintenance within areas of suitable habitat. Volunteers from the local community, wildflower societies and naturalists clubs could be involved in surveys supervised by DEC staff.

**Action:** Conduct further surveys  
**Responsibility:** DEC (Avon Mortlock District) through the AMDTFRT  
**Cost:** \$2,200 in years 2 and 4.

## 7. Obtain biological and ecological information

Improved knowledge of the biology and ecology of *Haloragis platycarpa* will provide a better scientific basis for management of the wild population. An understanding of the following is particularly necessary for effective management:

1. Pollination biology.
2. Size of soil seed banks and rate of seed set.
3. Seed viability and germination success.
4. Germination requirements.
5. Appropriate disturbance regimes to maximise recruitment and population health.
6. Life history characteristics.
7. Phylogenetic relationship to other species in the genus *Haloragis*.

**Action:** Obtain biological and ecological information  
**Responsibility:** DEC (Science Division, Avon Mortlock District) through the AMDTFRT  
**Cost:** \$5,600 in the first year, \$9,500 in years 2 and 3, \$11,200 in year 4

## 8. Investigate options for long-term protection of habitat

As *Haloragis platycarpa* is located on Unallocated Crown Land managed by the Shire of Dalwallinu it is recommended that options for including the land in the conservation reserve system, or an appropriate alternative protection option, be investigated.

**Actions:** Investigate options for the long-term protection of habitat  
**Responsibility:** DEC (Avon Mortlock District) through AMDTFRT  
**Cost:** \$1,700 in the first year

## 9. Map habitat critical to the survival of *Haloragis platycarpa*

It is a requirement of the EPBC Act that spatial data relating to habitat critical to the survival of *Haloragis platycarpa* be determined. Although habitat critical to the survival of *Haloragis platycarpa* is described in Section 1 it has not been fully mapped and this will be done under this action.

**Action:** Map habitat critical to the survival of *Haloragis platycarpa*  
**Responsibility:** DEC (Avon Mortlock District) through the AMDTFRT  
**Cost:** \$2,500 in year 3.

## 10. Review the plan and need for further recovery actions

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

**Action:** Review the plan and need for further recovery actions  
**Responsibility:** DEC (Avon Mortlock District) through the AMDTFRT  
**Cost:** \$1,500 in the fifth year.

### Summary of recovery actions

Recovery Actions	Priority	Responsibility	Completion date
Coordinate recovery actions	High	AMDTFRT	Ongoing
Monitor population	High	DEC (Avon Mortlock District) through the AMDTFRT	Ongoing
Undertake weed control	High	DEC (Avon Mortlock District, Science Division) through the AMDTFRT	Ongoing
Collect seed	High	DEC (Avon Mortlock District, TFSC), and BGPA through the AMDTFRT	2013
Promote awareness	High	DEC (Avon Mortlock District, SCB and Strategic Development and Corporate Affairs Division) through the AMDTFRT.	2013
Conduct further surveys	High	DEC (Avon Mortlock District) through the AMDTFRT	2012
Obtain biological and ecological	High	DEC (Science Division, Avon Mortlock District) through the	2012

information		AMDTFRT	
Investigate options for the long-term protection of habitat	Moderate	DEC (Avon Mortlock District) through AMDTFRT	2009
Map habitat critical to the survival of <i>Haloragis platycarpa</i>	Moderate	DEC (Avon Mortlock District) through the AMDTFRT	2011
Review the plan and need for further recovery actions	Moderate	DEC (Avon Mortlock District) through the AMDTFRT	2013

#### 4. TERM OF PLAN

##### Western Australia

This IRP will operate from April 2008 to March 2013 but will remain in force until withdrawn or replaced. If the species is still ranked CR after five years, the need for further recovery actions and an update of this IRP will be assessed.

##### Commonwealth

In accordance with the provisions of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) this adopted recovery plan will remain in force until revoked.

The recovery plan must be reviewed at intervals of not longer than 5 years.

#### 5. REFERENCES

- Atkins, K. (2008). *Declared Rare and Priority Flora List for Western Australia*. Department of Environment and Conservation, Western Australia.
- Australian Network for Plant Conservation. (1997). *Germplasm Conservation Guidelines for Australia, An introduction to the principles and practices for seed and germplasm banking of Australian Species*. Canberra, Australian Network for Plant Conservation Germplasm Working Group.
- Brown, A., Thomson-Dans, C. and Marchant, N. (1998). *Western Australia's Threatened Flora*. Department of Conservation and Land Management, Western Australia. pp 209.
- Beeston, G., Mlodowski, G., Sanders, A. and True, D. (1996). *Remnant Vegetation Inventory on the Southern Agricultural Areas of Western Australia*. Department of Agriculture, Western Australia. Resource Management Report No. 149
- Bentham, G. (1864). *Flora Australiensis: A description of the plants of the Australian territory*. London, Lovell Reeve and Company. 2: 478.
- Blackall, W.E. and Grieve, B.J. (1974). *How to Know Western Australian Wildflowers, parts I, II, and III*. Western Australia, University of Western Australia Press. pp 469.
- Department of Conservation and Land Management (1994) Policy Statement No. 50 *Setting Priorities for the Conservation of Western Australia's Threatened Flora and Fauna*. Department of Conservation and Land Management, Western Australia.
- Department of Conservation and Land Management (1992) Policy Statement No. 44 *Wildlife Management Programs*. Department of Conservation and Land Management, Western Australia.
- Department of Environment and Conservation (2007) *Threatened Flora Database* (DEFL). Department of Environment and Conservation, Western Australia.
- Department of Environment and Conservation (2007) *Western Australian Herbarium FloraBase 2 – Information on the Western Australian Flora*. Department of Environment and Conservation, Western Australia. Accessed 2007. <http://www.calm.wa.gov.au/science/>.
- World Conservation Union (2001) *IUCN Red List Categories: Version 3.1*. Prepared by the IUCN Species Survival Commission. IUCN, Gland, Switzerland and Cambridge, UK.
- Orchard, A.E., Lepschi, B.J. and Hislop, M. (2005). New taxa a new record and a rediscovery in Western Australian *Haloragis* (Haloragaceae). *Nuytsia* **15**(3): 439-440.

#### 6. TAXONOMIC DESCRIPTION

Excerpt from: Orchard, A.E., Lepschi, B.J. and Hislop, M. (2005). New taxa, a new record and a rediscovery in Western Australian *Haloragis* (Haloragaceae). *Nuytsia* **15**(3): 439-440.

Sprawling, much branched perennial *herb* 30-40 cm, with vegetative parts effectively glabrous except for scattered, papillose hairs 0.1-0.2 mm long on the stems. *Branchlets* 4-5 ribbed, angular-terete, becoming more or less terete with age, green, aging reddish. *Leaves* alternate to subopposite (predominantly alternate in upper portion of plant), sessile, narrowly to very narrowly elliptic or narrowly to very-narrowly obovate, (10-) 15-45 mm long, 2-5 (-10) mm wide; *base* attenuate; *apex* acute; *margin* with (1-) 3-5 teeth in distal c. 2/3; *teeth* triangular to narrowly triangular, sometimes incurved, 1-3 mm long. *Inflorescence* an indeterminate spike of 1-3 flowered dichasia in the axils of the primary bracts. *Auxillary inflorescences* borne in the axils of the upper leaves. Only the central flower of the dichasium is functional. *Primary bracts* leaf like, narrowly to very narrowly elliptic, 8-10 mm long, 1-2 mm wide; *base* attenuate; *apex* acute; *margin* with (0-) 1-2 teeth in distal c. 2/3 to 1/2; *teeth* triangular to narrowly triangular, sometimes incurved, 0.1-0.4 mm long. *Secondary bracts* herbaceous, with a broad scarios margin, concave, elliptic to narrowly elliptic, 0.9-1.1 mm long, 0.2-0.3 mm wide; *margin* with 0-3 vestigial teeth. *Tertiary bracts* scarios, concave, narrowly to very narrowly ovate, 0.3-0.5 mm long, 0.1-0.15 mm wide; *margin* entire. *Flowers* 4-merous, pedicellate; *pedicel* 0.2-0.3 mm long in flower and fruit. *Sepals* 4, ovate to broadly ovate, 0.6-0.8 mm long, 0.4-0.5 mm wide, minutely papillose abaxially and on margins, persistent to fruiting stage. *Petals* 4, herbaceous, with a broad scarios margin, hooded, concave and keeled narrowly oblong, 1.6-2 mm long, 0.5-0.6 mm wide, glabrous or (more usually) minutely papillose on keel. *Stamens* 8; *filaments* 0.2 mm long; *anthers* yellow, non-apiculate, narrowly oblong, 1.4-1.5 mm long, 0.3-0.4 mm wide. *Styles* 4, narrowly ovoid, minutely papillate (especially proximally); *stigmas* capitate. *Ovary* depressed pyriform to depressed globular, 0.4-0.6 mm long, 0.8 mm wide, not ribbed, densely minutely papillose, 4-locular. *Fruits* 1 per axil, depressed globose, 1.7-2.5 mm long, 2.2-4 mm wide, 4-locular, weakly 8-ribbed, especially distally, appearing more or less rugose overall, densely minutely papillose; *endocarp* and *septa* woody; *exocarp* swollen, more or less spongy.

