

# National Recovery Plan for the Trailing Hop-bush *Dodonaea procumbens*

Oberon Carter



Australian Government



Government of South Australia

Department for Environment  
and Heritage



Environment,  
Climate Change  
& Water



Department of  
Sustainability  
and Environment

Prepared by Oberon Carter, Arthur Rylah Institute for Environmental Research, Department of Sustainability and Environment, Heidelberg, Victoria

Published by the Victorian Government Department of Sustainability and Environment (DSE) Melbourne, July 2010.

© State of Victoria Department of Sustainability and Environment 2010

This publication is copyright. No part may be reproduced by any process except in accordance with the provisions of the *Copyright Act* 1968.

Authorised by the Victorian Government, 8 Nicholson Street, East Melbourne.

ISBN 978-1-74242-009-7

This is a Recovery Plan prepared under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999, with the assistance of funding provided by the Australian Government Natural Heritage Trust.

This Recovery Plan has been developed with the involvement and cooperation of a range of stakeholders, but individual stakeholders have not necessarily committed to undertaking specific actions. The attainment of objectives and the provision of funds may be subject to budgetary and other constraints affecting the parties involved. Proposed actions may be subject to modification over the life of the plan due to changes in knowledge.

#### Disclaimer

This publication may be of assistance to you but the State of Victoria and its employees do not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for any error, loss or other consequence that may arise from you relying on any information in this publication.

An electronic version of this document is available on the Department of the Environment, Water, Heritage and the Arts website [www.environment.gov.au](http://www.environment.gov.au)

For more information contact the DSE Customer Service Centre 136 186

Citation: Carter, O. 2010. National Recovery Plan for Trailing Hop-bush *Dodonaea procumbens*. Department of Sustainability and Environment, Melbourne.

**Cover photograph:** Trailing Hop-bush *Dodonaea procumbens* by O. Carter.

# CONTENTS

<b>SUMMARY.....</b>	<b>3</b>
<b>SPECIES INFORMATION .....</b>	<b>3</b>
Description .....	3
Distribution .....	4
Habitat .....	4
Population Information .....	5
<b>DECLINE AND THREATS.....</b>	<b>5</b>
<b>RECOVERY INFORMATION.....</b>	<b>10</b>
Recovery Objectives .....	10
Program Implementation and Evaluation .....	10
Recovery Actions and Performance Criteria.....	10
Management Practices.....	11
Affected Interests .....	12
Role and Interests of Indigenous People .....	12
Biodiversity Benefits .....	12
Social and Economic Impacts .....	12
<b>ACKNOWLEDGMENTS.....</b>	<b>13</b>
<b>REFERENCES.....</b>	<b>13</b>
Priority, Feasibility and Estimated Costs of Recovery Actions .....	14
<b>Figure 1.</b> Distribution of <i>Dodonaea procumbens</i> .....	4
<b>Table 1.</b> Population and threat information for <i>Dodonaea procumbens</i> .....	7

## Summary

---

The Trailing Hop-bush *Dodonaea procumbens* is a poorly-known small prostrate shrub endemic to south-eastern Australia, where it occurs in South Australia, Victoria and New South Wales. There are an estimated 5,000 plants occurring in about 55 wild populations, although there is little current information available on the abundance of most populations. Current threats are believed to include weed invasion, habitat disturbance or destruction, grazing and altered fire regimes. The Trailing Hop-bush is listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, Vulnerable under South Australia's *National Parks and Wildlife Act 1972*, Threatened under the Victorian *Flora and Fauna Guarantee Act 1988* and Vulnerable under the New South Wales *Threatened Species Conservation Act 1995*. This national Recovery Plan for *D. procumbens* is the first recovery plan for the species, and details its distribution, habitat, threats and recovery objectives and actions necessary to ensure its long-term survival.

## Species Information

---

### Description

The Trailing Hop-bush (or Creeping Hop-bush) *Dodonaea procumbens* is a small prostrate shrub in the Family Sapindaceae growing to about 1.5 m diameter and 20 cm tall. It has angular or flattened, sometimes weakly ribbed branches covered in minute, soft, erect hairs and often rooting at nodes. The leaves are 8–30 mm long and 4–9 mm wide, simple, sessile, flat to revolute, angular-obovate to oblanceolate, acute and sometimes tridentate, usually with two irregular teeth mostly on the distal half. They are glabrous or with minute, soft hairs, somewhat leathery and sticky to touch. The species is dioecious (i.e. male & females flowers on different plants) or polygamodioecious (i.e. having bisexual & male flowers on some plants; bisexual & female flowers on others). The tiny solitary or paired flowers appear in spring and summer. Flowers are terminal, the pedicels are 3–12 mm long, with 4–7 linear-lanceolate, often unequal sepals to 3 mm long and 8–10 stamens. Capsule are broadly oblong in outline, with undulate valves, 10–13 mm long and 8–10 mm wide, glabrous, and have 3–5 hard, thin and brittle wings extending from base to apex. Seed is 2–3 mm long, black and with no membranous or fleshy appendage covering (description from West 1984, 1986; Duretto 1999; Wilson & Scott 2002).

*Dodonaea procumbens* can be distinguished from other *Dodonaea* species by its prostrate habit, and from prostrate members of various pea genera (when not flowering or fruiting) by its generally toothed leaves and absence of stipules. Putative hybrids between *Dodonaea procumbens* and *Dodonaea viscosa* subsp. *cuneata* have been found in south-western Victoria and South Australia. *Dodonaea viscosa* is a spreading or erect shrub to c. 5 m tall and has wingless capsules.



Leaves and female flowers of *Dodonaea procumbens*

## Distribution

*Dodonaea procumbens* is widely but patchily distributed across south-eastern Australia, where it occurs in New South Wales, Victoria and South Australia (Figure 1, Table 1). In New South Wales *D. procumbens* is restricted to a small area between Tarago and Bungee Peak in the Southern Tablelands (Wilson & Scott 2002), in the South Eastern Highlands IBRA bioregion (*sensu* DEH 2000). In Victoria the species is confined largely to the south-west of the State, between Castlemaine and Dergholm and south to about Cressy (Duretto 1999), in the Naracoorte Coastal Plain, Victorian Volcanic Plains and Victorian Midlands bioregions. In late 2009, the species was discovered at Dutson Downs near Sale in central Gippsland (M. Burns Gippsland Water pers. comm.) in the South East Coastal Plain bioregion, the only current record in eastern Victoria. In South Australia the species occurs near Port Lincoln in the Eyre Yorke Block bioregion, near Clare and Burra in the Mt Lofty Range in the Flinders Lofty Block bioregion, on Kangaroo Island in the Kanmantoo bioregion and near Penola in the Naracoorte Coastal Plain bioregion (West 1986; DEH 2006; Adherb 2008). Maps showing the distribution of *D. procumbens* are available from the nature conservation agency of each range State.

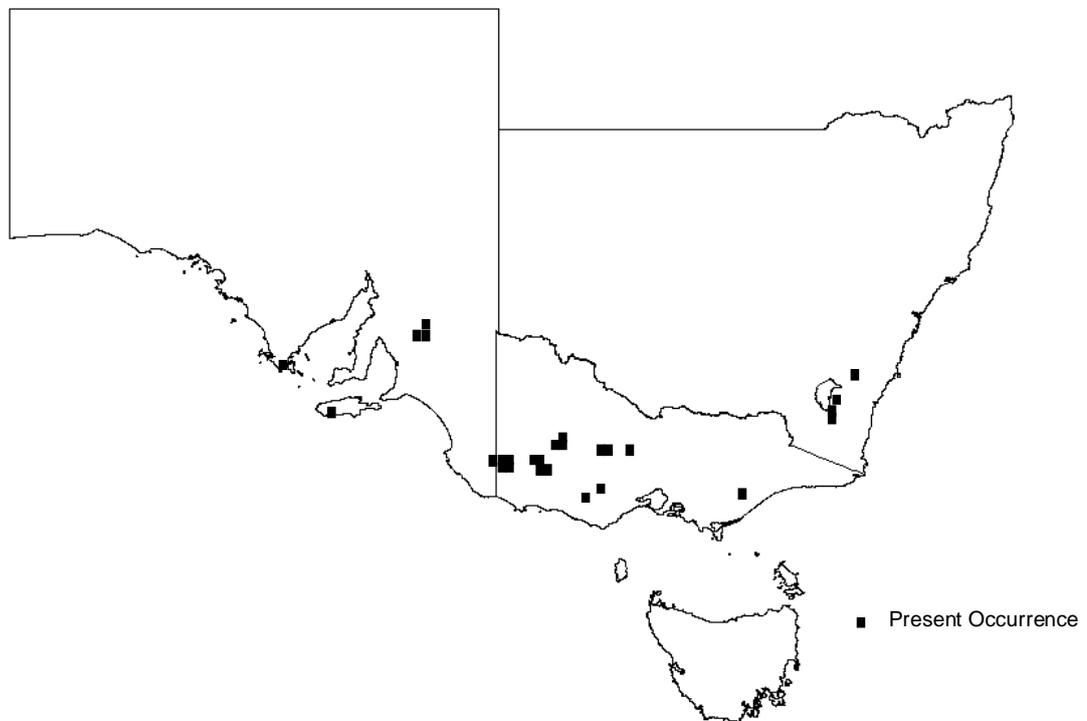


Figure 1. Distribution of *Dodonaea procumbens*

## Habitat

*Dodonaea procumbens* grows in low-lying, often winter-wet areas in woodland, low open forests, heathland and grasslands, on sands and clays (Duretto 1999). South Australian populations have been recorded in open *Eucalyptus camaldulensis*, *Eucalyptus fasciculosa* and *Eucalyptus leucoxylon* woodlands in low-lying areas (West 1986), and in native grasslands, where it grows with *Lepidosperma viscida*, *Themeda triandra*, *Austrodanthonia* spp., *Austrostipa* spp. and shrubs including *Acacia acinacea*, *D. viscosa* and *Bursaria spinosa* (Adherb 2008). At Mokota Conservation Park the species grows in *Austrodanthonia* low tussock grassland on rocky outcrops and in shallow soils, with *Vittadinia cuneata*, *Calocephalus citreus*, *Leptorhynchus tetrachaetus*, and *Triptilodiscus pygmaeus* (DEH 2006). On Kangaroo Island and near Penola, the species grows in *Eucalyptus baxterii* open forest, sometimes in

*Xanthorrhoea* thickets (Adherb 2008). Most populations in NSW occur either in natural grassland or grassy woodland of *Eucalyptus pauciflora*, usually on crests or slopes and on tilted sediments (R. Rehwinkel pers. comm.). A recently discovered population grows on the dry bed of Lake Bathurst near Tarago (G. Baines pers. comm.). Plants often occur on disturbed and exposed sites such as road verges and cuttings, with some populations on sandy rocky outcrops (J. Miles pers. comm.). Victorian populations have been recorded in various plant communities including grassy woodland dominated by *E. camaldulensis* in western Victoria, heathy dry forest in central Victoria, damp heath in far-western Victoria (Carter pers. obs.) and sedge wetland, heathy woodland and damp heathland in eastern Victoria (M. Burns pers. comm.).

## Population Information

There are thought to be about 50 populations of *D. procumbens* across its range, although there is accurate location and population data for only about 25 populations that contain about 3,000 plants (Table 1). The single largest population appears to be at Bear State Forest in western Victoria, which contains about 1,000 plants, with the second-largest in the Victoria Valley and containing about 500 plants. Several other populations contain 100–200 plants, although most populations are small, with 50 plants or less. Important populations are those where locations are precisely known and have recent abundance information. Further survey work is a critical action proposed in this Recovery Plan that will result in a better understanding of the location and status of populations that are important for the conservation of the species.

## Decline and Threats

---

The former distribution and abundance of *D. procumbens* is not known. However, based in its current broad distribution, the species was once probably common and widespread across the now depleted temperate grassy woodlands of south-eastern Australia. Records of some populations are several decades old, and most records lack recent information on location or abundance. At least 15 populations contain fewer than 100 plants, and many populations occur in highly vulnerable locations such as along roadsides and on private land where they are at high risk of damage and destruction. Current major threats to *D. procumbens* include:

### *Disturbance/destruction of habitat and plants*

Many populations of *D. procumbens* partially or entirely occur on roadsides, and are at risk from damage by vehicles and other disturbance during road construction and maintenance, utilities installation and maintenance, by herbicide spraying for weed control or firebreak construction. It appears, however, that some of these populations may have established recently on the bare batters of roadsides, where some soil disturbance and lack of competition have created conditions favourable for germination. This species appears to act as a coloniser of such bare sites in these situations. However, persistence at these sites will depend on future sympathetic management. *Dodonaea procumbens* sites on private land may suffer from changed land-use, including conversion of grazing land to cropping, or from clearing for residential development.

### *Weed invasion*

Introduced weed species pose a threat at many sites, with continued high cover of perennial weeds is likely to suppress recruitment opportunities and growth of *D. procumbens*. High risk environmental weed threats include *Echium plantagineum*, *Avena barbata*, *Vulpia* spp. and *Aira* spp. at some sites in South Australia (D. Bickerton pers. comm.) and *Phalaris* spp. at some sites in Victoria.

### *Grazing*

Heavy grazing/browsing by native and introduced herbivores (notably rabbits) is a threat at several populations (Table 1). Grazing is likely to inhibit flowering and seed production and, and high levels, can eventually exhaust and kill plants. Populations on Travelling Stock Routes and on private land may be under threat by grazing and trampling by domestic stock.

### *Altered fire regimes*

The role of fire in maintaining populations of *D. procumbens* is not well understood. Some populations grow on naturally open sites such as on rocky outcrops, where fire may be infrequent or has minimal impact. Other populations in grassland or grassy woodlands such as in western Victoria may have historically experienced recurrent wildfire, but recent fire intervals,

notably on roadsides, may be much less frequent. Fire may be important for maintaining open vegetation and preventing over-dominance by grasses, which may lead to restricted growth (and possibly seed production) in *D. procumbens*. Plants are likely to resprout after fire. It is not known whether *D. procumbens* relies on disturbance such as fire for seed germination and establishment. Seeds of the related *D. viscosa* germinate in response to heat treatment (Clarke *et al.* 2000) and *D. procumbens* may experience a similar response.



*Dodonea procumbens* near Joyces Creek (Vic). This apparently old individual (judging by the width of the basal stems) has been grazed so heavily and repeatedly that it has few leaves present and probably rarely, if ever, produces seed.



Large plant of *D. procumbens* on rocky outcrop of roadside cutting near Bredbo, New South Wales (photo courtesy J. Miles).

**Table 1.** Population and threat information for *Dodonaea procumbens*

Location/site	Pop. size & year	Manager	Threats (H=High M=Medium L=Low)	Comments
<b>New South Wales</b>				
Michelago (private land)	~200 plants (2005)	private	?	
MacLaughlin Travelling Stock Route	~200 plants (2005)	Livestock Health & Pest Authority	?	
Bobundara (private land, Bobundara Road)	~200 plants (2005)	private	?	
Bredbo (private land, Rothlyn Rd)	~200 plants (2005)	Cooma-Monaro Shire	?	
Dartmoor Travelling Stock Route	~100 plants (2005)	Livestock Health & Pest Authority	?	
Numeralla (Diggers Hall)	~100 plants (2005)	Cooma-Monaro Shire	?	
Bredbo (private land, Bredbo-Jerangle Road)	~50 plants (2005)	private	?	
Michelago (private land, Micalago Road)	~50 plants (2005)	private	?	
Lake Bathurst (private land)	~25 plants	private	?	
Cooma (private land at Quartz Hill)	20 plants (2005)	private	?	
Bunyan (roadside, Monaro Highway)	20 plants (2005)	Cooma-Monaro Shire; Road Traffic Authority	?	
Jindabyne (roadside, Carinya Road)	20 plants (2005)	Cooma-Monaro Shire	?	
Bredbo (roadside, Rothlyn Rd)	20 plants (2005)	Cooma-Monaro Shire	?	
Bredbo (railway easement)	20 plants (2005)	?	?	
Bredbo (roadside, Monaro Highway, 1km S of Bredbo)	20 plants (2005)	Cooma-Monaro Shire; Road Traffic Authority	?	
Bredbo (roadside, Monaro Highway, 4km S of Bredbo)	20 plants (2005)	Cooma-Monaro Shire; Road Traffic Authority	?	
Bredbo Travelling Stock Route	20 plants (2005)	Livestock Health & Pest Authority	?	
Bobundara (private land, roadside & reserve)	20 plants (2005)	Snowy River Shire; private; Dept. Environment & Climate Change	?	most plants on roadside and adjacent private land; one plant in Bobundara Nature Reserve
Rose Valley (roadside, Rose Valley Road)	20 plants (2005)	Cooma-Monaro Shire	?	
Ando (roadside, Ando Road)	10 plants (2005)	Bombala Shire	?	
Numeralla, 'near cemetery'	5 plants (1999)	Cooma-Monaro Shire	?	
Michelago (E of railway line and N of Queanbeyan Road)	?	?	?	recorded in 2001; precise location & abundance unknown

Location/site	Pop. size & year	Manager	Threats	Comments
<b>NSW (cont.)</b>				
Michelago (private land, Tinderry Rd)	?	private	?	
Numeralla (private land)	?	private	?	
Dairymans Plains (roadside, Dry Plains Rd, private land)	?	Cooma-Monaro Shire; private	?	at least two sites with plants on roadside and adjacent private land
Tinderry (Tinderry Rd; private land)	?	Cooma-Monaro Shire; private	?	plants on roadside and adjacent private land
Chakola (private land)	?	private	?	plants on 3 separate properties; abundance unknown
<b>Victoria</b>				
Dutson Downs Western Bush Block 1 (private land)	~2,000 plants (2009)	Gippsland Water	• disturbance/destruction by vehicles (M)	plants on/adjacent to vehicle track
Dutson Downs Western Bush Block 2 (private land)	10 plants (2009)	Gippsland Water	• disturbance/destruction by vehicles (M)	plants on/adjacent to vehicle track
Dutson Downs Delray Bush Block (private land)	~370 plants (2009)	Gippsland Water	• disturbance/destruction by vehicles (M)	plants on/adjacent to vehicle track
Bear State Forest, Hallam's Track	~1000 plants (2001)	DSE	• grazing/disturbance by rabbits (M)	
Victoria Valley (roadside, Victoria Valley Road)	~500 plants (2004)	Southern Grampians Shire	• weed invasion (M) • disturbance/destruction (M)	
Wickliffe (roadside, Willaura-Wickliffe Road)	77 plants (2001)	Rural City of Ararat	• weed invasion (H)	
Joyces Creek (roadside, Pyrenees Highway)	30 plants (2004)	Mount Alexander Shire	• weed invasion (H) • grazing by introduced herbivores (L)	
Werneth (roadside Wilgul-Werneth Road)	7 plants (2001)	Golden Plains Shire	• weed invasion (H) • disturbance/destruction (M)	c. 2 km west of Urches Rd intersection
White Elephant Reserve, Rowsley	5 plants (2000)	Parks Victoria	• grazing/disturbance by rabbits (M) • weed invasion (M)	
Werneth (roadside, Pitfield-Cressy Road)	4 plants (2002)	Golden Plains Shire	• weed invasion (H) • disturbance/destruction (M)	c. 3 km north of Gilletts Rd on west side
Stawell (roadside, Western Highway)	3 plants (2004)	Northern Grampians Shire	• weed invasion (H) • disturbance/destruction (M)	
Illabrook (roadside, Rokewood-Skipton Road)	?	Golden Plains Shire	?	recorded in 1990; abundance unknown
Glenisla	?	?	?	recorded in 1988; precise location & abundance unknown
Grampians National Park (Asses Ears Road)	?	Parks Victoria	?	recorded in 1986; abundance unknown

Location/site	Pop. size & year	Manager	Threats	Comments
<b>Victoria (cont.)</b>				
Edenhope Oval	?	West Wimmera Shire	?	recorded in 1985; abundance unknown
Bullawin Flora Reserve	?	Parks Victoria	?	recorded in 1984; abundance unknown
Tullich	?	?	?	recorded in 1983; precise location & abundance unknown
Deep Lead Nature Conservation Reserve	?	Parks Victoria	?	recorded in 1981; precise location & abundance unknown
Paddys Ranges State Forest	?	Dept. Sustainability & Environment	?	recorded in 1981; abundance unknown
Victoria Valley Hall	?	?	?	recorded in 1978; abundance unknown
Dorodong (roadside, Dorodong Road)	?	West Wimmera Shire	?	recorded in 1978; precise location & abundance unknown
Lake Fyans	?	?	?	recorded in 1966; precise location & abundance unknown
<b>South Australia</b>				
Holm Hill Council (Plantation) Reserve	~30 plants (2005)	Dept. Transport, Energy Infrastructure	<ul style="list-style-type: none"> <li>weed invasion (H)</li> <li>disturbance/destruction from recreational activities (H)</li> </ul>	
Julia Creek (roadside)	~10 plants (1994)	?	?	
Mokota Conservation Park	?	Dept. Environment & Heritage	<ul style="list-style-type: none"> <li>grazing/trampling by livestock (M)</li> <li>weed invasion (M)</li> </ul>	recorded in 2000; abundance unknown
Mintaro Cemetery	?	Clare & Gilbert Valley Council	?	'several low clumps' recorded in 2000; current abundance unknown
Kangaroo Island (private property)	?	?	?	recorded in 1987; current abundance unknown
Pines Picnic Ground, Port Lincoln	?	?	?	recorded in 1987, plants reported as extending c. 1 km along highway
Barrier Highway (10 km S of Burra)	?	?	?	3 small patches recorded in 1982; current abundance unknown
Penola (roadside, Penola–Dergholm Road)	?	?	?	recorded in 1980; current abundance unknown

## Recovery Information

### Recovery Objectives

The overall objective of recovery is to minimise the probability of extinction of *Dodonaea procumbens* in the wild and to increase the probability of important populations becoming self-sustaining in the long term. Within the life span of this Recovery Plan (5 years), the specific objectives of recovery for *D. procumbens* are to:

1. Determine taxonomy, distribution, abundance and population structure
2. Determine habitat requirements
3. Ensure that all populations and their habitat are protected and managed
4. Identify and manage threats to populations
5. Identify key biological functions
6. Determine growth rates and viability of populations
7. Establish a seed bank
8. Build community support for conservation

### Program Implementation and Evaluation

This Recovery Plan guides recovery actions for *D. procumbens* and will be implemented, managed and reviewed by the relevant nature conservation agency in each State, supported by other agencies, educational institutions, regional natural resource management authorities and community groups as appropriate. Technical, scientific, habitat management or education components of the Recovery Plan will be referred to specialist groups on research, *in situ* management, community education and cultivation as required. Contact will be maintained between the State agencies on recovery issues concerning *D. procumbens*. The Recovery Plan will run for a maximum of five years from the date of its adoption under the EPBC Act, and will be reviewed and revised within five years of the date of its adoption.

### Recovery Actions and Performance Criteria

Action	Description	Performance Criteria
<b>Specific Objective 1: Determine taxonomy, distribution, abundance and population structure</b>		
1.1	Clarify taxonomy of populations <b>Responsibility: RBG</b>	<ul style="list-style-type: none"> <li>• Clarify taxonomic status of purported hybrid population at Joyce's Creek Cutting, Vic.</li> </ul>
1.2	Undertake surveys to determine the area and extent of populations, the number, size and structure of populations, and inference or estimation of population change. <b>Responsibility: DECC, DEH, DSE</b>	<ul style="list-style-type: none"> <li>• Population sites mapped for population size, condition and habitat.</li> </ul>
<b>Specific Objective 2: Determine habitat requirements</b>		
2.1	Survey known habitat and collect floristic and environmental information relevant to community ecology and condition. <b>Responsibility: DECC, DEH, DSE</b>	<ul style="list-style-type: none"> <li>• Species/habitat specific survey design prepared.</li> <li>• Habitat critical to survival mapped for any extant populations.</li> </ul>
2.2	Identify and survey potential habitat, using ecological and bioclimatic information that may indicate habitat preference. <b>Responsibility: DECC, DEH, DSE</b>	<ul style="list-style-type: none"> <li>• Potential habitat at four new sites surveyed.</li> <li>• Predictive model for potential habitat developed &amp; tested at four sites.</li> </ul>
<b>Specific Objective 3: Ensure that all populations and their habitat are protected and managed appropriately</b>		
3.1	Protect populations on public land. <b>Responsibility: DEH, DSE, DECC</b>	<ul style="list-style-type: none"> <li>• Public Authority Management Agreements or similar in place for following populations on public land (Vic): Hallams Track (Bear Block); Victoria Valley Rd, Dunkeld; Wickliffe–Ararat Rd; Joyces Creek Cutting; Western Hwy Stawell</li> </ul>

3.2	Protect populations on private land.	<ul style="list-style-type: none"> <li>Options for legal protection of NSW Travelling Stock Routes and roadside reserves investigated and implemented at 5 sites.</li> <li>Erect 'Significant Roadside Site' signage for important populations in NSW.</li> <li>Conservation agreements negotiated with landowners for protection of 5 populations.</li> </ul>
<b>Specific Objective 4: Identify and manage threats to populations</b>		
4.1	Control threats from pest plants. <b>Responsibility: DECC, DEH, DSE</b>	<ul style="list-style-type: none"> <li>Reduction in cover of weeds at 10 sites.</li> </ul>
4.2	Control threats from stock/pest animal grazing. <b>Responsibility: DECC, DEH, DSE, CMA, LHPA</b>	<ul style="list-style-type: none"> <li>Reduction in grazing pressure at 10 sites.</li> <li>Measurable seedling recruitment in protected populations.</li> </ul>
4.3	Control the threat of direct damage by human activities. <b>Responsibility: DECC, DEH, DSE, GW</b>	<ul style="list-style-type: none"> <li>Signposting of all roadside sites (and fencing if required).</li> </ul>
4.4	Investigate and assess threats. <b>Responsibility: DECC, DEH, DSE, GW</b>	<ul style="list-style-type: none"> <li>Threat assessments undertaken for 10 populations.</li> </ul>
<b>Specific Objective 5: Identify key biological functions</b>		
5.1	Evaluate current reproductive status, seed bank status, longevity, fecundity and recruitment levels. <b>Responsibility: DEH, DSE, DECC</b>	<ul style="list-style-type: none"> <li>Reproductive ecology and regenerative potential quantified for four representative sites.</li> <li>Seed bank potential quantified for five representative sites.</li> </ul>
5.2	Identify key stimuli for seed germination requirements. <b>Responsibility: DECC, DEH, DSE</b>	<ul style="list-style-type: none"> <li>Stimuli for recruitment identified.</li> <li>Management strategies identified to maintain, enhance or restore processes fundamental to reproduction and survival.</li> </ul>
5.3	Identify optimal fire regimes to maintain habitat. <b>Responsibility: DSE, DEH, DECC</b>	<ul style="list-style-type: none"> <li>Preparation and implementation of management prescriptions at two sites.</li> </ul>
<b>Specific Objective 6: Determine the growth rates and viability of populations</b>		
6.1	Measure population trends and responses against recovery actions by collecting demographic information including recruitment and mortality, timing of life history stages and morphological data. <b>Responsibility: DECC, DEH, DSE</b>	<ul style="list-style-type: none"> <li>Techniques for monitoring developed and implemented.</li> <li>Population growth rates determined and Population Viability Analysis completed for all populations.</li> </ul>
<b>Specific Objective 7: Establish a seed bank</b>		
7.1	Establish a seed bank and determine seed viability. <b>Responsibility: RBG</b>	<ul style="list-style-type: none"> <li>Seed from 10 populations in storage.</li> </ul>
<b>Specific Objective 8: Build community support for conservation</b>		
8.1	Identify opportunities for community involvement in the conservation of <i>D. procumbens</i> . <b>Responsibility: DECC, DEH, DSE, CMA</b>	Community nature conservation groups, Landcare groups and conservation management networks aware of the species and support its conservation.

**Abbreviations:** DECC – Department of Environment and Climate Change (NSW); DEH – Department of Environment and Heritage (SA); DSE – Department of Sustainability and Environment (Victoria); RBG – Royal Botanic Gardens, Melbourne; CMA – Catchment Management Authorities (NSW); GW – Gippsland Water; NGO – non-government agencies; LHPA – Livestock Health & Pest Authorities (NSW);

## Management Practices

The philosophy of the strategy for recovery is habitat conservation, restoration and management combined with an understanding of the ecological and biological requirements of *Dodonaea procumbens*. The emphasis is on using knowledge to better implement *in situ* management techniques that protect populations and promote regeneration and recruitment. To achieve this, recovery actions are primarily structured to (i) acquire baseline data, (ii) assess habitat condition including ecological and biological function, (iii) protect populations to maintain or improve population growth and (iv) to engage the community in recovery actions.

On-ground site management will aim to mitigate threatening processes and thereby insure against extinction. Major threats requiring management include accidental destruction, competition from pest plants, inappropriate fire regimes and grazing by pest animals. A range of strategies will be necessary to alleviate these threats including weed control, fire management, fencing, and control of pest animals.

Broad-scale protection measures applicable to all populations include legal protection of sites, habitat retention and liaison with land managers including private landholders. In addition, searches of known and potential habitat should continue to better define the distributions and size of populations.

The Recovery Plan also advocates strategies to fill some of the major gaps in our knowledge to date. These include an understanding of the mechanisms underlying recruitment and regeneration. Successful *in situ* population management will be founded on understanding the relationships between *D. procumbens* and associated flora, and its response to environmental processes. These are directly linked to biological function and are thus vital to recovery. Demographic censusing will be necessary to gather life history information and to monitor the success of particular management actions. Community participation in recovery actions will be sought, particularly in regard to recovery team membership and implementation of on-ground works.

### **Affected Interests**

Important populations of *D. procumbens* occur on land managed by a variety of State and local government organisations including the Department of Sustainability and Environment (Vic), Parks Victoria, Gippsland Water, Department for Environment and Heritage (SA), Department of Environment and Climate Change (NSW), Department of Transport, Energy and Infrastructure (SA) and several local councils. Some populations occur on private land. State government agencies have been contacted and have approved the actions outlined in this recovery plan subject to availability of sufficient funding. Other land managers will be contacted upon implementation of this recovery plan. Private landholders will be contacted during implementation of the Recovery Plan.

### **Role and Interests of Indigenous People**

Indigenous communities on whose traditional lands *D. procumbens* occurs have been advised, through the relevant regional Indigenous facilitator, of the preparation of this Recovery Plan and invited to provide comments and be involved in the implementation of the plan.

### **Biodiversity Benefits**

The Recovery Plan includes a number of potential biodiversity benefits for other species and vegetation communities in Victoria, New South Wales and South Australia. Principally, this will be through the protection and management of habitat. The adoption of broad-scale management techniques and collection of baseline data will also benefit a number of other plant species growing in association with *D. procumbens*, particularly those species with similar life forms and/or flowering responses. A number of threatened flora and fauna co-occur with *D. procumbens*, including Dwarf Kerraung *Rulingia prostrata* (Endangered), Striped Legless Lizard *Delma impar* (Vulnerable), Clover Glycine *Glycine latrobeana* (Vulnerable), Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens* (Critically Endangered) and Lowly Greenhood *Pterostylis despectans* (Endangered). In New South Wales, *D. procumbens* grows within the endangered ecological community *Natural Temperate Grasslands of the Southern Tablelands (NSW and ACT)* that is listed under the EPBC Act. These species and community will potentially benefit from recovery actions for *D. procumbens*. The Recovery Plan will also provide an important public education role as threatened flora have the potential to act as 'flagship species' for highlighting broader nature conservation and biodiversity issues such as land clearing, grazing, weed invasions and habitat degradation.

### **Social and Economic Impacts**

The implementation of this recovery plan is unlikely to cause significant adverse social and economic impacts. Most populations occur on public land, either crown land reserved for

various public purposes, or on road reserves, managed by a variety of local and State government agencies. Any protection measures required at these sites (eg. fencing, signage, track closures) will have minimal impact on current recreational and commercial activities. Protection of these populations has been negotiated with the relevant land manager. Protection of the few populations on private land or on land managed by other authorities will be achieved through voluntary agreements with landowners and managers.

## Acknowledgments

I would like to thank the following people who provided information, critical comment or assisted with field work during the preparation of this recovery plan: Andy Arnold, Michael Duncan and Jenni Thomas (Department of Sustainability and Environment Vic); Megan Burns (Gippsland Water); Doug Bickerton, Randall Johnson, Wendy Stubbs, Jean Turner and Helen Vonow (Department for Environment and Heritage South Australia); Jackie Miles (NGH Environmental NSW); Alison Rowell (Botanical consultant, Canberra) and Greg Baines (ACT Government). Rainer Rehwinkel (Department of Environment and Climate Change NSW) provided almost all of the information on *D. procumbens* populations in NSW.

## References

---

- Adherb 2008. Adelaide Herbarium Database (data extracted September 2008). Department for Environment and Heritage, South Australia.
- Clarke, P.J., Davison, E.A., and Fulloon, L. 2000. Germination and dormancy of grassy woodland and forest species: effects of smoke, heat, darkness and cold. *Australian Journal of Botany* 48: 687–700.
- DEH 2000. *Revision of the Interim Biogeographic Regionalisation of Australia (IBRA) and the Development of Version 5.1. - Summary Report*. Department of Environment and Heritage, Canberra.
- DEH 2006. *Mokota Conservation Park Draft Grassland Management Plan 2006*. Internal Report. Department for Environment and Heritage, South Australia.
- Duretto, M.F. 1999. *Sapindaceae* in: Walsh, N.G. & Entwisle, T.J. (eds.) *Flora of Victoria vol. 4: Cornaceae to Asteraceae*. Inkata Press, Melbourne.
- Hyde, M., Davies, R., Steed, Y. and Reynolds, T. 2000. *Mokota Conservation Park, Burra Hills, South Australia: A baseline biodiversity study*. Nature Conservation Society of South Australia Inc.
- West, J. 1984. A revision of *Dodonaea* Miller (Sapindaceae) in Australia. *Brunonia* 7(1): 1–194.
- West, J.G. 1986. *Sapindaceae* in: Jessop, J.P. & Toelken, H.R. (eds.) *Flora of South Australia Part II Leguminosae-Rubiaceae*. South Australian Government Printing Division, Adelaide.
- Wilson, P.G. and Scott, J.A. 2002. *Dodonaea* in: Harden, G.J. (ed.) *Flora of New South Wales revised edition vol. 2*. University of New South Wales Press, Sydney.

## Priority, Feasibility and Estimated Costs of Recovery Actions

Action	Description	Priority	Feasibility	Responsibility	Cost estimate					
					Year 1	Year 2	Year 3	Year 4	Year 5	Total
<b>1</b>	<b>Distribution, abundance</b>									
1.1	Taxonomy	3	75%	RBG	\$5,000	\$0	\$0	\$0	\$0	\$5,000
1.2	Surveys	1	100%	DECC, DEH, DSE	\$10,000	\$10,000	\$10,000	\$8,000	\$8,000	\$46,000
<b>2</b>	<b>Habitat requirements</b>									
2.1	Known habitat	1	100%	DECC, DEH, DSE	\$20,000	\$20,000	\$20,000	\$0	\$0	\$60,000
2.2	Potential habitat	2	75%	DECC, DEH, DSE	\$0	\$0	\$20,000	\$20,000	\$20,000	\$60,000
<b>3</b>	<b>Habitat protection</b>									
3.1	Public land	1	100%	DSE, DECC, DEH	\$8,000	\$8,000	\$0	\$0	\$0	\$16,000
3.2	Private land	1	75%	DSE, DECC, DEH	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$25,000
<b>4</b>	<b>Threat management</b>									
4.1	Pest plants	1	75%	DECC, DEH, DSE	\$15,000	\$15,000	\$10,000	\$10,000	\$10,000	\$60,000
4.2	Grazing, pest animals	1	75%	DSE, DECC, DEH	\$20,000	\$15,000	\$10,000	\$10,000	\$10,000	\$65,000
4.3	Human damage	1	75%	DECC, DEH, DSE, GW	\$15,000	\$15,000	\$10,000	\$10,000	\$10,000	\$60,000
4.4	Other threats	2	50%	DECC, DEH, DSE, GW	\$0	\$10,000	\$10,000	\$8,000	\$0	\$28,000
<b>5</b>	<b>Biological functions</b>									
5.1	Reproductive status	2	75%	DSE, DECC, DEH	\$0	\$10,000	\$10,000	\$10,000	\$5,000	\$35,000
5.2	Seed germination	2	75%	DECC, DEH, DSE	\$0	\$0	\$0	\$10,000	\$5,000	\$15,000
5.3	Fire ecology	3	50%	DSE, DEH	\$0	\$0	\$15,000	\$10,000	\$10,000	\$35,000
<b>6</b>	<b>Population viability</b>									
6.1	Censusing	1	100%	DECC, DEH, DSE	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$75,000
<b>7</b>	<b>Seed bank</b>									
7.2	Seed bank	3	100%	RBG	\$0	\$0	\$5,000	\$2,000	\$2,000	\$9,000
<b>8</b>	<b>Community support</b>									
8.1	Community extension	3	50%	DECC, DEH, DSE	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$10,000
<b>TOTALS</b>					<b>\$115,000</b>	<b>\$125,000</b>	<b>\$142,000</b>	<b>\$120,000</b>	<b>\$102,000</b>	<b>\$612,000</b>