Department of Parks and Wildlife

Interim Recovery Plan No. **344**

Prickly honeysuckle
(*Lambertia echinata* subsp. *echinata*)

Interim Recovery Plan
2014–2019

Department of Parks and Wildlife, Western Australia

June 2014

List of Acronyms

The following acronyms are used in this plan:

BGPA	Botanic Gardens and Parks Authority
CALM	Department of Conservation and Land Management
CCWA	Conservation Commission of Western Australia
CITES	Convention on International Trade in Endangered Species
CR	Critically Endangered
DEC	Department of Environment and Conservation
DAA	Department of Aboriginal Affairs
DPaW	Department of Parks and Wildlife (Parks and Wildlife)
DRF	Declared Rare Flora
EDTFCRT	Esperance District Threatened Flora and Communities Recovery Team
EN	Endangered
EPBC	Environment Protection and Biodiversity Conservation
GALSC	Goldfields Aboriginal Land and Sea Council
IBRA	Interim Biogeographic Regionalisation for Australia
IRP	Interim Recovery Plan
IUCN	International Union for Conservation of Nature
NRM	Natural Resource Management
PEC	Priority Ecological Community
RP	Recovery Plan
SCB	Species and Communities Branch (Parks and Wildlife)
SCD	Science and Conservation Division
TEC	Threatened Ecological Community
TFSC	Threatened Flora Seed Centre
UNEP-WCMC	United Nations Environment Program World Conservation Monitoring Centre
VU	Vulnerable
WA	Western Australia

Foreword

Interim Recovery Plans (IRPs) are developed within the framework laid down in Department of Parks and Wildlife Policy Statements Nos. 44 and 50 (CALM 1992; CALM 1994). Note: The Department of Conservation and Land Management (CALM) formally became the Department of Environment and Conservation (DEC) in July 2006 and the Department of Parks and Wildlife in July 2013. Plans 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.

Parks and Wildlife 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, within one year of endorsement of that rank by the Minister.

This plan, which replaces plan No. 97 Prickly Honeysuckle, *Lambertia echinata* subsp. *echinata* (Monks *et al*. 2001), will operate from June 2014 to May 2019 but will remain in force until withdrawn or replaced. It is intended that, if the taxon is still ranked as CR in Western Australia, this plan will be reviewed after five years and the need for further recovery actions assessed.

This plan was given Regional approval on 6 June 2014 and was approved by the Director of Science and Conservation on 13 June 2014. The provision of funds identified in this plan is dependent on budgetary and other constraints affecting Parks and Wildlife, as well as the need to address other priorities.

Information in this plan was accurate at June 2014.

Plan preparation: This plan was prepared by:

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Cover photograph by Emma Adams.

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Summary

Scientific name:	***Lambertia echinata* subsp. *echinata***	**IBRA subregion:**	Recherche
		Common name:	Prickly Honeysuckle
Family:	Proteaceae	**Flowering period:**	September – January
DPaW region:	South Coast	**DPaW district:**	Esperance
Shire:	Esperance	**NRM region:**	South Coast
IBRA region:	Esperance Plains	**Recovery team:**	EDTFCRT

Distribution and habitat: *Lambertia echinata* subsp. *echinata* is known from four extant populations east of Esperance, growing on windswept rocky slopes in association with *Eucalyptus lehmannii*, *Hakea ruscifolia*, *Melaleuca striata*, *Allocasuarina trichodon*, *Acacia nigricans*, *Agonis baxteri* and *Banksia armata*.

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

Conservation status: *Lambertia echinata* subsp. *echinata* is specially protected under the Western Australian *Wildlife Conservation Act 1950* and is ranked as CR in Western Australia under International Union for Conservation of Nature (IUCN 2001) criteria A3e; B1ab(iii,v)+2ab(iii,v); C1 due to a population size reduction of greater than or equal to 80%, projected or suspected to be met within the next 10 years or three generations, whichever is the longer based on the effects of pathogens; the extent of occurrence being less than 100km^2; it being severely fragmented; there being a continuing decline in area, extent and/or quality of habitat, and number of mature individuals; the area of occupancy being less than 10km^2; population size estimated to number less than 250 mature individuals; and an estimated continuing decline of at least 25% within three years or one generation whichever is the longer. The subspecies is listed as Endangered (EN) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Threats: Threats to the subspecies include disease, inappropriate fire regimes, limited genetic diversity and recreational development.

Existing recovery actions: The following recovery actions have been or are currently being implemented and have been considered in the preparation of this plan:

1. More than 5000 seeds are stored in the Threatened Flora Seed Centre (TFSC).
2. The Botanic Gardens and Parks Authority (BGPA) currently have 67 plants in their nursery and gardens.
3. Eight translocations have been carried out.
4. Populations 1, 2 (since 2002) and 3 (since 2006) were sprayed with 30 l/ha of phosphite at 400 g/l concentration bi-yearly until 2010.
5. A fire management research project was undertaken in 2009 (Rathbone *et al.* 2009).
6. A gravel pit at Subpopulation 1a (no longer used for gravel extraction) has been ripped and allowed to regenerate. The old access road has also been ripped and barricaded to prevent entry.
7. An information sheet on *Lambertia echinata* subsp. *echinata* has been produced.
8. Dieback signage and boot cleaning equipment has been placed on the walk trail near Population 2.

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

Recovery criteria

Criteria for success:

1. The number of extant populations has increased from four to five or more over the term of the plan and/or
2. The number of mature individuals has increased by 20% or more over the term of the plan from 474 plants to 568 or more.

Criteria for failure:

1. The number of extant populations has decreased from four to three or less over the term of the plan and/or
2. The number of mature individuals has decreased by 20% or more over the term of the plan from 474 plants to 380 or less.

Recovery actions

1. Coordinate recovery actions
2. Monitor populations
3. Apply phosphite
4. Monitor the impact of phosphite
5. Continue to maintain disease hygiene
6. Determine susceptibility to other diseases
7. Realign walk trail at Population 2
8. Develop and implement a fire management strategy
9. Obtain biological and ecological information
10. Undertake surveys
11. Collect and store seed
12. Undertake and monitor translocations if required
13. Liaise with land managers and Aboriginal communities
14. Promote awareness
15. Map habitat critical to the survival of *Lambertia echinata* subsp. *echinata*
16. Review this plan and assess the need for further recovery actions

1. Background

Analysis of outputs and effectiveness of Interim Recovery Plan (IRP) No. 97 (2001-2004) by Monks, Stack, Evans & Brown.

The criteria for success in the previous plan (the number of individuals within populations and/or the number of populations have increased) have been met. In 2001 when plan was written the taxon was known from two populations and two subpopulations, comprising 65 mature plants. Two new populations and 22 new subpopulations have since been located. Translocation has also established four new populations. The number of mature individuals has increased from 216 in 2001 to 474 in 2014.

Although a number of recovery actions in the previous plan have been fully or partially implemented, there are some actions yet to be implemented. Also, the taxon's restricted extent of occurrence, a continuing decline in its quality of habitat and its current Critically Endangered (CR) ranking, warrant further recovery. *Action 13* in the previous plan - Write a full Recovery Plan is redundant as IRPs are now reviewed and updated if required. The status of recovery actions is listed in table 1.

Table 1: Status of recovery actions included in previous plan

Recovery action	Status	Result
Establish a Threatened Flora Recovery Team	Established and ongoing	The EDTFCRT was established in 2002 and has met biannually over the term of the plan.
Phosphite application	Started and ongoing	Populations 1, 2 (since 2002) and 3 (since 2006) were sprayed with 30 l/ha of phosphite at 400 g/l concentration biyearly until 2010.
Install dieback signs	Complete	Dieback signage and boot cleaning stations have been installed at entrance points to the walk trail near where Population 2 occurs.
Develop and implement a fire management strategy	Mostly complete	Parks and Wildlife has no specific Fire Management Plan for this subspecies. However, fire ecology research plots have been installed at two populations to collect data on the post fire response of the taxon.
Collect seed and cutting material	Started and ongoing	Over 5000 seeds are currently stored at the TFSC at –20°C, with duplicate collections sent to the Millennium Seed Bank at RBG Kew, UK for safe keeping.
Propagate plants for translocation	Complete	Plants have been propagated by BGPA for use in translocations.
Conduct further translocations	Complete	Eight translocations have been carried out for this subspecies.
Rehabilitate the gravel pit	Complete	The pit has been ripped and allowed to regenerate. The old access road has been barricaded to prevent entry.
Monitor populations	Started and ongoing	Parks and Wildlife's District flora conservation officer has regularly monitored populations with population data collected.
Conduct further surveys	Started and ongoing	The taxon has been opportunistically surveyed. Two new populations and 22 new subpopulations have been discovered.
Obtain biological and ecological information	Started and ongoing	Research has been undertaken on the susceptibility of *Lambertia* species to *Phytophthora cinnamomi* infestation (Shearer *et al*. 2010), and the effectiveness of using low-volume phosphite spray in reducing plant mortality (Shearer and Crane 2012). A fire management research project was undertaken in 2009 (Rathbone *et al*. 2009).
Address appropriate recommendations in the Management Plan for the park	Started and ongoing	The Esperance and Recherche parks and reserves Management Plan which includes Cape Le Grand National Park is currently in draft. This Plan includes a recommendation to alter the walk trail between Lucky Bay and Rossiter Bay to detour around a population.
Write full Recovery Plan	N/A	The IRP will be reviewed and a new plan written as a replacement.

Ongoing and new recovery actions included in this plan are to coordinate recovery actions, monitor the impact of phosphite, maintain disease hygiene, determine susceptibility to other diseases, realign a walk trail at Population 2, undertake and monitor translocations if required, liaise with land managers and Aboriginal communities, promote awareness, map habitat critical to the survival of *Lambertia echinata* subsp. *echinata* and review this plan and assess the need for further recovery actions.

History

Lambertia echinata subsp. *echinata* was collected by Robert Brown in 1801 and was formally described by him in 1810. There are three subspecies of *L. echinata* (subsp. *echinata*, subsp. *citrina* and subsp. *occidentalis*). Two of these - subsp. *echinata* and subsp. *occidentalis* are Declared Rare Flora (DRF), both ranked as CR.

Between 1998 and 2004, four translocations were carried out in an attempt to increase the number of extant plants and ensure the long-term survival of the subspecies. Unfortunately, no plants survived to maturity. *Phytophthora* dieback was attributed to the majority of the deaths. In 2006 two seed orchards were established to source seed and cutting material for future *ex-situ* translocations. In 2010 a further two translocations were implemented, using material from the seed orchards. Two of the sites have a 45 to 55% survival. The other two are doing well with 80%+ surviving. Plants have fruited and a new seedling was found at one site.

Phosphite has been applied to Populations 1 and 2 since 2002, and Population 3 since 2006 to manage the impact of *Phytophthora cinnamomi*. The habitat of *Lambertia echinata* subsp. *echinata* is highly susceptible to infestation by *Phytophthora* dieback due to soil type and topography and there is minimal suitable healthy habitat within its current or historical range available for *ex-situ* conservation.

Between 2001 and 2011, departmental staff and volunteers searched for new populations, concentrating on areas of similar habitat within Cape Le Grand National Park. In 2001 a new population was discovered north-east of Frenchman's Peak and in November 2011 a further new population was located during a survey for a proposed New Island Bay track (Markey 2012). The taxon is currently known from four populations comprising 474 mature individuals. Given the extreme threat from *Phytophthora* dieback, the long-term prognosis for the taxon is poor.

Description

Lambertia echinata subsp. *echinata* is a many-branched shrub to 1m tall with hairy stems and leaves that are usually divided into five sharply pointed lobes. The leaves, which taper toward the stem and are up to 4cm long, have prominent veins on their underside and are commonly arranged in whorls of three. The flowers are trumpet-shaped, dark pinkish-red and up to 5cm long. Arranged in sevens, they are produced from September to January. The shiny grey coloured fruits are beaked and up to 2cm long (Brown 1810; Erickson *et al*. 1979).

Lambertia echinata subsp. *echinata* has pinkish-red coloured flowers, while *L. echinata* subsp. *occidentalis* and *L. echinata* subsp. *citrina* have yellow flowers.

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; Hnatiuk, R.J. (1995) *Flora of Australia*. 16: 425–7; Keighery, G.J. (1997) A new subspecies of *Lambertia echinata* (Proteaceae). *Nuytsia*. 11(2): 283–4; Western Australian Herbarium (1998–) *FloraBase- the Western Australian Flora*. Department of Parks and Wildlife. http://florabase.dpaw.wa.gov.au/.

Distribution and habitat

Lambertia echinata subsp. *echinata* is known from four populations east of Esperance, growing on sandy-loams over granite on windswept rocky slopes with *Eucalyptus lehmannii*, *Hakea ruscifolia*, *Melaleuca striata*, *Allocasuarina trichodon*, *Acacia nigricans*, *Agonis baxteri* and *Banksia armata*.

Table 2. Summary of population land vesting, purpose and manager

Population number & location	Parks and Wildlife district	Shire	Vesting	Purpose	Manager
1a. Cape Le Grand	Esperance	Esperance	CCWA	National park	Parks and Wildlife
1b. Cape Le Grand	Esperance	Esperance	CCWA	National park	Parks and Wildlife
1c. Cape Le Grand	Esperance	Esperance	CCWA	National park	Parks and Wildlife
1d. Cape Le Grand	Esperance	Esperance	CCWA	National park	Parks and Wildlife
1e. Cape Le Grand	Esperance	Esperance	CCWA	National park	Parks and Wildlife
1f(T). Cape Le Grand	Esperance	Esperance	CCWA	National park	Parks and Wildlife
2a. Cape Le Grand	Esperance	Esperance	CCWA	National park	Parks and Wildlife
2b. Cape Le Grand	Esperance	Esperance	CCWA	National park	Parks and Wildlife
2c. Cape Le Grand	Esperance	Esperance	CCWA	National park	Parks and Wildlife
2d. Cape Le Grand	Esperance	Esperance	CCWA	National park	Parks and Wildlife
2e. Cape Le Grand	Esperance	Esperance	CCWA	National park	Parks and Wildlife
2f. Cape Le Grand	Esperance	Esperance	CCWA	National park	Parks and Wildlife
2g. Cape Le Grand	Esperance	Esperance	CCWA	National park	Parks and Wildlife
2h. Cape Le Grand	Esperance	Esperance	CCWA	National park	Parks and Wildlife
2i. Cape Le Grand	Esperance	Esperance	CCWA	National park	Parks and Wildlife
3a. Cape Le Grand	Esperance	Esperance	CCWA	National park	Parks and Wildlife
3b. Cape Le Grand	Esperance	Esperance	CCWA	National park	Parks and Wildlife
3c. Cape Le Grand	Esperance	Esperance	CCWA	National park	Parks and Wildlife
3d. Cape Le Grand	Esperance	Esperance	CCWA	National park	Parks and Wildlife
3e. Cape Le Grand	Esperance	Esperance	CCWA	National park	Parks and Wildlife
3f. Cape Le Grand	Esperance	Esperance	CCWA	National park	Parks and Wildlife
3g. Cape Le Grand	Esperance	Esperance	CCWA	National park	Parks and Wildlife
3h. Cape Le Grand	Esperance	Esperance	CCWA	National park	Parks and Wildlife
4. Cape Le Grand	Esperance	Esperance	CCWA	National park	Parks and Wildlife
5(T). Dalyup	Esperance	Esperance	CCWA	Nature reserve	Parks and Wildlife
6(T). E of Mt Barker	Albany	Plantagenet	Private property		Landowners
7(T). Coolinup	Esperance	Esperance	CCWA	Nature reserve	Parks and Wildlife
8(T). Alexander Bay	Esperance	Esperance	CCWA	Nature reserve	Parks and Wildlife

Note: Populations 5, 6, 7 and 8 and Subpopulation 1f are translocated populations.

Biology and ecology

Phytophthora dieback is present at the majority of the *Lambertia echinata* subsp. *echinata* populations. A study to determine the variation in susceptibility to *Phytophthora* infestation within the genus *Lambertia* using soil and stem inoculation found that *L. echinata* subsp. *echinata* had a high mortality and moderate lesion scores and is likely to be at high risk of extinction from infection (Shearer *et al.* 2010). Low-volume phosphite spray significantly reduced plant mortality following root inoculation but not after stem challenge inoculation (Shearer and Crane 2012).

Lambertia echinata subsp. *echinata* is killed by fire and germinates from seed stored on the plant in woody capsules. For obligate seeders, in particular serotinous seeder species, the time required to re-establish seed banks after germination is critical. If a second fire occurs before a population has produced sufficient seed it may decline or become locally extinct (Barrett *et al.* 2009). The intensity of fire may also play an important role in the recovery of populations. Populations 1 and 3 were burnt during a prescribed burn in 1992 while Population 2 occurs in an area where there are no recorded fires and is assumed to be long unburnt (Rathbone *et al.* 2009). The majority of Population 1 was burnt again in the summer of 2010 and to date there has been no germination. The wildfire may have been too hot and the taxon may have become locally extinct or germinants may have died due to *Phytophthora* dieback or drought.

Plants have been observed flowering three years post-fire, in the wild. Population 4 was burnt during a 2008 wildfire which was a moderate to high intensity fire that burnt up to 80% of the vegetation. In October 2011 plants were seen flowering, and fruits were recorded in January 2012.

Conservation status

Lambertia echinata subsp. *echinata* is specially protected under the Western Australian *Wildlife Conservation Act 1950* and is ranked as CR in Western Australia under International Union for Conservation of Nature (IUCN 2001) criteria A3e; B1ab(iii,v)+2ab(iii,v); C1 due to a population size reduction of greater than or equal to 80%, projected or suspected to be met within the next 10 years or three generations, whichever is the longer based on the effects of pathogens; the extent of occurrence being less than 100km^2; it being severely fragmented; there being a continuing decline in area, extent and/or quality of habitat, and number of mature individuals; the area of occupancy being less than 10km^2; population size estimated to number less than 250 mature individuals; and an estimated continuing decline of at least 25% within three years or one generation whichever is the longer. The subspecies is listed as Endangered (EN) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Threats

- **Disease** *Phytophthora cinnamomi*, a pathogen that causes root rot resulting in susceptible plants dying of drought stress, is a threat to all populations. It has been identified in many areas of Cape Le Grand National Park (Obbens and Coates 1997) and visual observations indicate that it is affecting vegetation surrounding Subpopulation 1a. *P. cinnamomi* has also been isolated from dead plants in Population 2 and from translocated seedlings in Subpopulation 1a. Several plants in Population 2, including juvenile plants had necrotic limbs and foliage, possibly due to drought or aerial canker, which will need to be assessed. Population 2 is particularly at risk as a result of a walk

trail that bisects the population. Although this area is broadly infested with *Phytophthora* dieback, some areas have lower levels of inoculum or small pockets that have escaped infestation. Walking off the trail therefore has the potential to increase the spread of the pathogen.

- **Altered fire regimes:** Frequent fire before plants reach maturity would likely deplete the seed store. Conversely, occasional fire may be required to germinate stored seed. Fire may facilitate weed invasion and when it occurs should be followed up with appropriate weed control.
- **Limited genetic diversity** is a threat to the long-term conservation of *Lambertia echinata* subsp. *echinata*. There are just 474 naturally occurring adult plants in the four known populations. Genetic diversity is needed to provide populations the ability to adapt to changes in the environment. It is possible that the taxon is unable to do this with the limited genetic material available in the four known populations.
- **Recreational development** is a threat to Population 4 which is located in the footprint of a proposed New Island Bay track. The development has the potential to impact on the taxon through clearing of vegetation and the spread of *Phytophthora* dieback.

The intent of this plan is to provide actions that will mitigate immediate threats to *Lambertia echinata* subsp. *echinata*. Although climate change and drought may have a long-term effect on the subspecies, actions taken directly to prevent their impact are beyond the scope of this plan.

Table 3. Summary of population information and threats

Population number & location	Land status	Year /	No. of plants	Condition of habitat	Threats
1a. Cape Le Grand	National park	2000 2007 2010	3 (4) 4 (3) 8	Moderate	Disease, inappropriate fire regimes
1b. Cape Le Grand	National park	2002 2005 2010	15 6 (4) 0	Moderate	Disease, inappropriate fire regimes
1c. Cape Le Grand	National park	2003 2005 2010	13 4 0	Moderate	Disease, inappropriate fire regimes
1d. Cape Le Grand	National park	2000 2005 2010	11 0 0	Moderate	Disease, inappropriate fire regimes
1e. Cape Le Grand	National park	2000 2005 2010	2 0 0	Moderate	Disease, inappropriate fire regimes
1f(T) Cape Le Grand	National park	2004 2005	(26) 0	Moderate	
2a. Cape Le Grand	National park	2000 2005 2009 2012	9 (1) 5 (21) 10 (11) 20	Moderate	Disease, inappropriate fire regimes
2b. Cape Le Grand	National park	2000 2009 2012	8 (1) 9 (10) 15	Moderate	Disease, inappropriate fire regimes
2c. Cape Le Grand	National park	2000 2005 2012	1 (4) 4	Moderate	Disease, inappropriate fire regimes
2d. Cape Le Grand	National park	2000 2005 2012	0 3 (1) 4	Moderate	Disease, inappropriate fire regimes

2e. Cape Le Grand	National park	2000 2 2008 0 2012 0	Moderate	Disease, inappropriate fire regimes
2f. Cape Le Grand	National park	2000 1 2012 0	Moderate	Disease, inappropriate fire regimes
2g. Cape Le Grand	National park	2000 4 2008 0 2012 0	Moderate	Disease, inappropriate fire regimes
2h. Cape Le Grand	National park	2005 1 2009 1 2012 1	Moderate	Disease, inappropriate fire regimes
2i. Cape Le Grand	National park	2005 30 (49) 2008 98 (17) 2012 133	Moderate	Disease, inappropriate fire regimes
3a. Cape Le Grand	National park	2004 4 2007 2 (1) 2010 3 (9)	Moderate	Disease, inappropriate fire regimes
3b. Cape Le Grand	National park	2001 2 2007 3 2010 3 (10)	Moderate	Disease, inappropriate fire regimes
3c. Cape Le Grand	National park	2001 1 2005 2 (2) 2007 6 (1) 2010 5 (7)	Moderate	Disease, inappropriate fire regimes
3d. Cape Le Grand	National park	2001 5 2005 3 2010 2 (1)	Moderate	Disease, inappropriate fire regimes
3e. Cape Le Grand	National park	2001 6 (1) 2004 3 2010 3 (3)	Moderate	Disease, inappropriate fire regimes
3f. Cape Le Grand	National park	2004 3 (2) 2007 6 (5) 2010 2 (32)	Moderate	Disease, inappropriate fire regimes
3g. Cape Le Grand	National park	2004 4 (2) 2007 2 (1) 2010 1	Moderate	Disease, inappropriate fire regimes
3h. Cape Le Grand	National park	2004 2 2007 2 2010 0	Moderate	Disease, inappropriate fire regimes
4. Cape Le Grand	National park	2011 (230) 2012 12 (255) 2/2013 270 (300 seedlings)	Healthy	Disease, inappropriate fire regimes, recreational development
5T. Dalyup	Nature reserve	2006 102 2009 65 5/2012 44 (5 seedlings)	Healthy	
6T. E of Mt Barker	Private property	2006 90 2010 84 2012 81	Healthy	
7T. Coolinup	Nature reserve	6/2010 (101) 12/2010 97 2/2013 80	Healthy	
8T. Alexander Bay	Nature reserve	2010 (87) 2011 82 8/2012 51	Healthy Moderate	

Note: T = translocated population; Populations in **bold text** are considered to be important populations; () = number of seedlings/juveniles.

Guide for decision-makers

Section 1 provides details of current and possible future threats. Actions for development and/or land management in the immediate vicinity of *Lambertia echinata* subsp. *echinata* should be subject to an assessment of potential environmental impacts.

Actions that could result in any of the following may potentially result in a significant impact on the species:

- Damage or destruction of occupied or potential habitat
- Alteration of the local surface hydrology or drainage
- Reduction in population size
- Spread or amplification of *Phytophthora* dieback
- Impact of fire on occupied or potential habitat
- A major increase in disturbance in the vicinity of a population.

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

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

Benefits to other species or ecological communities

Recovery actions implemented to improve the quality or security of the habitat of *Lambertia echinata* subsp. *echinata* will also improve the status of associated native vegetation. Nine Priority flora taxa occur within 500m of the taxon (see table 4).

Table 4. Conservation-listed flora species occurring within 500m of *Lambertia echinata* subsp. *echinata*

Species name	Conservation status (WA)	Conservation status (EPBC Act 1999)
Commersonia apella	Priority 1	-
Dampiera decurrens	Priority 2	-
Goodenia quadrilocularis	Priority 2	-
Lasiopetalum maxwellii	Priority 2	-
Leucopogon multiflorus	Priority 2	-
Patersonia inaequalis	Priority 2	-
Eucalyptus semiglobosa	Priority 3	-
Leucopogon rotundifolius	Priority 3	-
Eucalyptus aquilina	Priority 4	-

For a description of conservation codes for Western Australian flora see http://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/Listings/Conservation_code_definitions_18092013.pdf

Lambertia echinata subsp. *echinata* does not occur within or adjacent to any Threatened Ecological Community (TEC) or Priority Ecological Community (PEC).

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. The taxon is not listed under Appendix II in the United Nations Environment Program World Conservation Monitoring Centre (UNEP-WCMC) Convention on International Trade in Endangered Species (CITES) and this plan does not affect Australia's obligations under any other international agreements.

Aboriginal consultation

A search of the Department of Aboriginal Affairs (DAA) Aboriginal Heritage Sites Register revealed one site (#2570 Lucky Bay Road 1) of Aboriginal significance adjacent to a population of *Lambertia echinata* subsp. *echinata*. Input and involvement has been sought through the Goldfields Aboriginal Land and Sea Council (GALSC) and DAA to determine if there are any issues or interests with respect to management for this taxon. Indigenous opportunity for future involvement in the implementation of the recovery plan is included as an action in the plan. Indigenous involvement in management of land covered by an agreement under the *Conservation and Land Management Act 1984* is also provided for under the joint management arrangements in that Act, and will apply if an agreement is established over any reserved lands on which this subspecies occurs.

Social and economic impacts

The implementation of this plan may potentially result in some social and economic impact for the Department of Tourism as Population 4 is located in the footprint of a proposed New Island Bay track. All populations occur in a national park for which Parks and Wildlife has primary management responsibility and economic impact may be through the implementation of recovery actions (controlling weeds and disease) and restrictions imposed on the management of the land.

Affected interests

The implementation of this plan has some implications for the Department of Tourism and Parks and Wildlife. The maintenance of the translocated seed orchard site (Subpopulation 6T) is through agreement with the land owner and the owner is considered an affected interest.

Evaluation of the plan's performance

Parks and Wildlife, with assistance from the Esperance District Threatened Flora and Communities Recovery Team (EDTFCRT), will evaluate the performance of this plan. 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

Objective

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

Recovery criteria

Criteria for recovery success:

1. The number of extant populations has increased from four to five or more over the term of the plan and/or
2. The number of mature individuals has increased by 20% or more over the term of the plan from 474 plants to 568 or more.

Criteria for recovery failure:

1. The number of extant populations has decreased from four to three or less over the term of the plan and/or
2. The number of mature individuals has decreased by 20% or more over the term of the plan from 474 plants to 380 or less.

3. Recovery actions

Existing recovery actions

The Threatened Flora Seed Centre (TFSC) currently has more than 500 *Lambertia echinata* subsp. *echinata* seeds stored (see Table 5). Some seed has been tested for its viability and germination ranged from 50 to 100%.

Table 5. TFSC collection details for *Lambertia echinata* subsp. *echinata*

Accession number	Date collected	Population number	Collection type	Seeds/follicles in storage	Germination rate (%)
00041	29/01/1993	1	I/3	178	93
00124	14/01/1994	1	I/3	328	93
00249	20/10/1995	1	I/3	117	100
00431	31/01/1997	1	I/3	88	85
00619	27/01/1999	1	I/4	126	80
00785	28/02/2001	2	I/4	325	100
00803	28/02/2001	3	B/5	18	-
01377	13/01/2004	1	I/4	371	97
01378	13/01/2004	1	I/8	322	100
01379	13/01/2004	2	I/8	398	-
02048	31/05/2006	1	I/5	518	-
02049	01/06/2006	2	I/36	1275	-
03079	03/07/2009	Seed orchard	I/17	64	100
03109	05/11/2009	Seed orchard	I/5	46	50
03189	14/12/2009	Seed orchard	I/43	230	97
03190	01/12/2009	Seed orchard	I/15	47	99
03288	27/01/1999	1	I/3	0	88
03919	29/05/2012	unknown	I/3	29	-
03921	14/03/2013	Seed orchard	B/3	9	-
03923	21/03/2013	Seed orchard	I/36	467	-
04003	2/04/2013	Cultivated	I/1	0	-
04196	29/10/2013	Seed orchard	I/15	64	-
04275	28/11/2013	4	B/20	199	-
04304	18/02/2014	2	I/7	104	-
04305	7/02/2014	Seed orchard	I/1	0	-

Note: 'I' = a collection of individuals and the number of plants collected; 'B' = a bulked collection and the number of plants sampled.

The Botanic Gardens and Parks Authority (BGPA) currently have 67 living plants in their nursery and gardens and 100.9g of seed collected from their nursery stock.

Eight translocations have been carried out (see table 6). Two translocations (comprising 194 seedlings) were undertaken in 1998 and 1999 at Subpopulation 1a. Another two translocations (comprising 51 seedlings) were undertaken at two other sites in 2004. Unfortunately no plants remain alive in any of these translocation sites, most likely as a result of *Phytophthora* dieback. In 2006, seed orchards were established on private property and in a nature reserve with a total of 192 seedlings planted. In 2010 a further four translocations comprising 188 seedlings were implemented using material obtained from

the seed orchards. Two of the sites have a 45–55% survival. The other two are doing well with 80% or more surviving. Plants have fruited and a new seedling was found at one site.

Table 6. Translocations undertaken for *Lambertia echinata* subsp. *echinata*

Year planted	Location	Type of translocation	Number of seedlings planted	Number alive
1998	Cape Le Grand (Population 1a)	Restocking	160	0
1999	Cape Le Grand (Population 1a)	Restocking	34	0
2004	Cape Le Grand (Population 1f)	Conservation introduction	26	0 (2005)
2004	Woody Island	Conservation introduction	25	0 (2005)
2006	Dalyup Nature Reserve	Conservation introduction (seed orchard)	102	65 (2009) 45 (2012)
2006	Private property, Albany	Conservation introduction (seed orchard)	90	84 (2010) 81 (2012)
2010	Coolinup Nature Reserve	Conservation introduction	101	97 (DPaW 2010) 87 (2012)
2010	Alexander Nature Reserve	Conservation introduction	87	68 (2011) 57 (2012)

Populations 1, 2 (since 2002) and 3 (since 2006) were sprayed with 15 l/ha of phosphite at 400 g/l concentration every biyearly until 2010.

A fire management research project was undertaken in 2009 (Rathbone *et al*. 2009). This project aimed to:

- review and update population size and extent of the subspecies
- review fire history of populations
- characterise the structure and composition of associated vegetation communities through establishment of permanent quadrats
- determine the demographic structure within populations, and
- investigate the species' reproductive capacity.

A gravel pit at Subpopulation 1a (which is no longer used for gravel extraction) has been ripped and allowed to regenerate. The old access road has also been ripped and barricaded to prevent entry.

An information sheet for *Lambertia echinata* subsp. *echinata* was jointly produced by the Australian government and Parks and Wildlife, using funds from the Natural Heritage Trust. The sheet contains photographs, a description of the plant, its habitat type, threats and management actions. This poster was distributed to the public through Parks and Wildlife's Esperance District.

Dieback signage and boot cleaning infrastructure has been placed on the walk trail near Population 2.

Future recovery actions

Parks and Wildlife is, with the assistance of the EDTFCRT, overseeing the implementation of this plan and will include information on progress in annual reports to Parks and Wildlife's Corporate Executive and funding bodies. Where recovery actions are implemented on lands other than those managed by Parks and Wildlife, permission has been or will be sought from the appropriate land managers prior to actions being undertaken. 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 recovery action if funding is available and other opportunities arise.

1. Coordinate recovery actions

Parks and Wildlife, with assistance from the EDTFCRT, will coordinate recovery actions for *Lambertia echinata* subsp. *echinata* and will include information on progress in annual reports to Parks and Wildlife's Corporate Executive and funding bodies.

Action:	Coordinate recovery actions
Responsibility:	Parks and Wildlife (Esperance District), with assistance from the EDTFCRT
Cost:	$6,000 per year

2. Monitor populations

All populations will be monitored and include accurate population counts, grazing, weed invasion, habitat degradation, disease presence (sampling to be undertaken as per action 4), population stability (expansion or decline), pollinator activity, seed production, recruitment and longevity.

Action:	Monitor populations
Responsibility:	Parks and Wildlife (Esperance District), with assistance from the EDTFCRT
Cost:	$5,000 per year

3. Apply phosphite

Lambertia echinata subsp. *echinata* is extremely susceptible to *Phytophthora* dieback. Parks and Wildlife will apply phosphite as required. Application of phosphite to the habitat of the taxon will also protect other threatened plant species.

Action:	Apply phosphite
Responsibility:	Parks and Wildlife (Esperance District)
Cost:	$10,000 per year

4. Monitor the impact of phosphite

Regular monitoring will be undertaken to evaluate the effectiveness of, and any impacts from, phosphite application.

Action:	Monitor the impact of phosphite
Responsibility:	Parks and Wildlife (Esperance District)
Cost:	$5,000 per year

5. Maintain disease hygiene

Phytophthora cinnamomi is present at most populations and is a major threat to the taxon and its habitat. Disease hygiene measures are required for all populations. Dieback hygiene (outlined in Department of Parks and Wildlife, 2014) will be followed during installation and maintenance of firebreaks and when walking into populations in wet soil conditions. Purpose built signs advising of the dieback risk and high conservation values of the sites will be installed if required, and boot cleaning stations installed at walk trail entrances located near population sites.

Action:	Maintain disease hygiene
Responsibility:	Parks and Wildlife (Esperance District)
Cost:	$2,000 per year

6. Determine susceptibility to other diseases

Testing to determine the susceptibility of the species to aerial canker (*Botryosphaeria* spp.) or other diseases such as *Armillaria luteobubalina* is required.

Action:	Determine susceptibility to other diseases
Responsibility:	Parks and Wildlife (Esperance District, Forest and Ecosystem Management Division)
Cost:	$2,000 per year

7. Realign walk trail at Population 2

To prevent the spread of *Phytophthora* dieback at Population 2 the walk trail between Lucky Bay and Rossiter Bay requires re-alignment around the population as per a recommendation made in the Esperance and Recherche parks and reserves draft Management Plan (2011). The re-alignment would include:

- An Aboriginal heritage assessment
- A bobcat to clear the trail
- Possible hardening (may or may not be required), and scouring mitigation
- Interpretive signs
- A boot cleaning station and associated signs

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Action:	Realign walk trail at Population 2
Responsibility:	Parks and Wildlife (Esperance District)
Cost:	$10,000 in the second year

8. Develop and implement a fire management strategy

Where possible, fire will be prevented from occurring in the habitat of populations except where it is being used experimentally as a recovery tool. A fire management strategy will be developed in consultation that recommends fire frequency, intensity, season, and control measures.

Action:	Develop and implement a fire management strategy
Responsibility:	Parks and Wildlife (Esperance District)
Cost:	$10,000 in year 1 and $2,000 in subsequent years

9. Obtain biological and ecological information

Knowledge of the biology and ecology of *Lambertia echinata* subsp. *echinata* will provide a scientific basis for its management in the wild and will include information on:

1. Soil seed bank dynamics and the role of disturbance, competition, drought, inundation and grazing in recruitment and seedling survival and survival of mature plants
2. Reproductive success and pollination biology
3. Minimum viable population size
4. The impact of *Phytophthora* dieback and the effectiveness of control techniques on *Lambertia echinata* subsp. *echinata* and its habitat

Action:	Obtain biological and ecological information
Responsibility:	Parks and Wildlife (Science and Conservation Division (SCD), Esperance District)
Cost:	$10,000 per year

10. Undertake surveys

It is recommended that areas of potential habitat be surveyed with all areas recorded and the presence or absence of the taxon documented to increase survey efficiency and reduce unnecessary duplicate surveys. Where possible, volunteers from the local community, landcare groups, wildflower societies and naturalists' clubs will be encouraged to become involved.

Action:	Undertake surveys
Responsibility:	Parks and Wildlife (Esperance District), with assistance from the EDTFCRT and volunteers
Cost:	$5,000 per year

11. Collect and store seed

Preservation of genetic material is essential to guard against extinction if wild populations are lost. It is recommended that additional seed be collected (including seed from translocation sites) and stored in the TFSC and BGPA.

Action:	Collect and store seed
Responsibility:	Parks and Wildlife (Esperance District, TFSC), BGPA
Cost:	$5,000 per year

12. Undertake and monitor translocations

If required, further translocation proposals will be developed and suitable disease free translocation sites selected. Information on the translocation of threatened plants and animals in the wild is provided in Parks and Wildlife's policy statement No. 29 *Translocation of Threatened Flora and Fauna* (CALM 1995), and the Australian Network for Plant Conservation translocation guidelines (Vallee *et al.* 2004). All translocation proposals require endorsement by Parks and Wildlife's Director of Science and Conservation. Monitoring of translocations is essential and will be included in the timetable developed for the Translocation Proposal.

Action:	Undertake and monitor translocations
Responsibility:	Parks and Wildlife (SCD, Esperance District)
Cost:	$10,000 in years 1 and 2; and $5,000 in subsequent years as required

13. Liaise with land managers and Aboriginal communities

Staff from Parks and Wildlife's Esperance District will liaise with land managers to ensure that populations of *Lambertia echinata* subsp. *echinata* are not accidentally damaged or destroyed. Aboriginal consultation will take place to determine if there are any issues or interests in areas that are habitat for the subspecies.

Action:	Liaise with land managers and Aboriginal communities
Responsibility:	Parks and Wildlife (Esperance District)
Cost:	$2,000 per year

14. Promote awareness

The importance of biodiversity conservation and the protection of *Lambertia echinata* subsp. *echinata* will be promoted to the public by using local print and electronic media and by setting up poster displays. The information sheet will be updated and will be distributed to local landowners and shires. Formal links with local naturalist groups and interested individuals will also be encouraged.

Action:	Continue to promote awareness
Responsibility:	Parks and Wildlife (Esperance District, Species and Communities Branch (SCB), Public Information and Corporate Affairs (PICA)), with assistance from the EDTFCRT
Cost:	$4,000 in year 1 and $2,000 in years 2–5

15. Map habitat critical to the survival of *Lambertia echinata* subsp. *echinata*

Although critical habitat to the survival of the taxon is alluded to in Section 1 it has not been mapped. If additional populations are located, habitat critical to their survival will be determined and mapped also.

Action:	Map habitat critical to the survival of *Lambertia echinata* subsp. *echinata*
Responsibility:	Parks and Wildlife (SCB, Esperance District)
Cost:	$6,000 in year 2

16. Review this plan and assess the need for further recovery actions

If *Lambertia echinata* subsp. *echinata* is still ranked as CR at the end of the five-year term of this plan, the need for further recovery actions, or a review of this plan will be assessed and a revised plan prepared if necessary.

Action:	Review this plan and assess the need for further recovery actions
Responsibility:	Parks and Wildlife (SCB, Esperance District)
Cost:	$3,000 in year 5

Table 7. Summary of recovery actions

Recovery action	Priority	Responsibility	Completion date
Coordinate recovery actions	High	Parks and Wildlife (Esperance District), with assistance from the EDTFCRT	Ongoing
Monitor populations	High	Parks and Wildlife (Esperance District), with assistance from the EDTFCRT	Ongoing
Apply phosphite	High	Parks and Wildlife (Esperance District)	Ongoing
Monitor the impact of phosphite	High	Parks and Wildlife (Esperance District)	Ongoing
Maintain disease hygiene	High	Parks and Wildlife (Esperance District)	Ongoing
Determine susceptibility to other diseases	High	Parks and Wildlife (Esperance District, Forest and Ecosystem Management Division)	2019
Realign walk trail at Population 2	High	Parks and Wildlife (Esperance District)	2016
Develop and implement a fire management strategy	High	Parks and Wildlife (Esperance District)	Developed by 2015 with implementation ongoing
Obtain biological and ecological information	High	Parks and Wildlife (SCD, Esperance District)	2019
Undertake surveys	High	Parks and Wildlife (Esperance District), with assistance from the EDTFCRT and volunteers	2019
Collect and store seed	High	Parks and Wildlife (Esperance District, TFSC), BGPA	2019
Undertake and monitor translocations	High	Parks and Wildlife (Science and Conservation Division, Esperance District)	2019
Liaise with land managers and aboriginal communities	Medium	Parks and Wildlife (Esperance District)	Ongoing
Promote awareness	Medium	Parks and Wildlife (Esperance District, SCB, PICA), with assistance from the EDTFCRT	2019
Map habitat critical to the survival of *Lambertia echinata* subsp. *echinata*	Medium	Parks and Wildlife (SCB, Esperance District)	2016
Review this plan and assess the need for further recovery actions	Medium	Parks and Wildlife (SCB, Esperance District)	2019

4. Term of plan

This plan will operate from June 2014 to May 2019 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 will be determined, and a review of this plan will be assessed and a revised plan prepared if necessary.

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6. Taxonomic description

***Lambertia echinata* - Brown (1810)**

Shrub to 2.5m; lignotubers not known. Branches erect or spreading; young branches densely villous. Leaves with petiole to 2mm long or absent; lamina narrowly cuneate 10–40mm long, with dilated apex, 3–5 marginal spines, mucronate, glabrous, rarely almost unlobed; distal lobes undulate. Conflorescence 7-flowered; bracts numerous, firm; inner bracts c. two-thirds length of perianth. Flowers zygomorphic, crowded, loosely enclosed by bracts. Perianth 25–40mm long, yellow or reddish pink, dilated, ± glabrous; adaxial suture deepest. Hypogynous glands 2–4, free or variously fused. Style slender; lower half sparsely pilose-villous. Fruit ovoid, 5–8mm diameter, with spines on entire surface. Seeds 2, circular, with narrow, annular wing.

Endemic to Western Australia between Albany and Esperance; grows in gravelly or sandy-clay soils in kwongan vegetation. Flowers mainly September–January.

***Lambertia echinata* subsp. *echinata* - Hnatiuk (1995)**

Shrub to 1m tall; branches spreading. Leaves 30–40mm long; veins on undersurface prominently raised. Perianth orange-red to pink.

Known only from the type locality in south west of Western Australia; grow in exposed coastal area.

1A. Perianth yellow
2A. Vegetative and floral leaves have 3-5 rigid points, floral bracts 12–16 mm .....subsp. *citrina*
2B. Entire vegetative leaves, floral leaves 3-pointed or entire,
floral bracts 15–19 mm ....subsp. *occidentalis*
1B. Perianth orange-red to pink ..... subsp. *echinata*