



Department of
Parks and Wildlife



Interim Recovery Plan No. **371**

Leucopogon nitidus

Interim Recovery Plan
2016–2021



Department of Parks and Wildlife, Western Australia

December 2016

List of Acronyms

The following acronyms are used in this plan:

BGPA	Botanic Gardens and Parks Authority
CALM	Department of Conservation and Land Management
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
DRF	Declared Rare Flora
EN	Endangered
EPBC	Environment Protection and Biodiversity Conservation
GDTFCRT	Geraldton District Threatened Flora and Communities Recovery Team
GPS	Global Positioning System
IBRA	Interim Biogeographic Regionalisation for Australia
IRP	Interim Recovery Plan
IUCN	International Union for Conservation of Nature
NRM	Natural Resource Management
PICA	Public Information and Corporate Affairs
SCB	Species and Communities Branch
TFSC	Threatened Flora Seed Centre
TPFL	Threatened and Priority Flora Database
UNEP-WCMC	United Nations Environment Program World Conservation Monitoring Centre
WA	Western Australia

Foreword

Interim Recovery Plans (IRPs) are developed within the framework laid down in Department of Parks and Wildlife Corporate Policy Statement No. 35 (DPaW 2015a) and Department of Parks and Wildlife Corporate Guideline No. 35 (DPaW 2015b). 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, always within one year of endorsement of that rank by the Minister.

This plan will operate from December 2016 to November 2021 but will remain in force until withdrawn or replaced. It is intended that if *Leucopogon nitidus* is still listed as Threatened in Western Australia following 5 years of implementation this plan will be reviewed and the need for further recovery actions assessed.

This plan was given regional approval on 14 November 2016 and was approved by the Director of Science and Conservation on 15 December 2016. The provision of funds identified in this plan is dependent on budgetary and other constraints affecting the Department of Parks and Wildlife, as well as the need to address other priorities.

Information in this plan was accurate at December 2016.

Plan preparation: This plan was prepared by:

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Acknowledgments: The following people provided assistance and advice in the preparation of this plan:

Jenna Brooker	Volunteer, Geraldton Regional Herbarium Group
Tony Brooker	Volunteer, Geraldton Regional Herbarium Group
Alanna Chant	Flora Conservation Officer, Parks and Wildlife Geraldton District
Andrew Crawford	Principal Technical Officer, Threatened Flora Seed Centre, Parks and Wildlife Science and Conservation Division
Anthony Desmond	Regional Leader Nature Conservation, Parks and Wildlife Midwest Region
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Janet Newell	Flora Conservation Officer, Parks and Wildlife Geraldton District
Geoff Owen	Natural Heritage Program Officer, National Trust of Australia (WA)
Amanda Shade	Assistant Curator (Nursery), Botanic Gardens and Parks Authority

Thanks also to the staff of the Western Australian Herbarium for providing access to Herbarium databases and specimen information, and other Parks and Wildlife staff for assistance in developing this plan.

Cover photograph by Tony Brooker.

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Summary

Scientific name:	<i>Leucopogon nitidus</i>	NRM region:	Northern Agricultural
Family:	Ericaceae	IBRA region:	Geraldton Sandplains
Common name:	None	IBRA subregion:	Geraldton Hills GES01
Flowering period:	Observed in July	Recovery team:	Geraldton District Threatened Flora and Communities Recovery Team
DPaW region:	Midwest		
DPaW district:	Geraldton		
Shire:	Greater Geraldton		

Distribution and habitat: *Leucopogon nitidus* is restricted to a single location east of Geraldton where it grows in shallow gravelly sand over laterite on the top of a breakaway. Associated vegetation is heathland dominated by *Allocasuarina campestris*, *Banksia fraseri* var. *ashbyi* and *Hakea lissocarpa* (Hislop 2011). The area of occupancy and extent of occurrence is 0.02km².

Habitat critical to the survival of the species, and important populations: It is considered that all known habitat of *Leucopogon nitidus* is critical to its survival, and that the wild population is an important population. Habitat critical to the survival of *L. nitidus* includes the area of occupancy of the population and areas of similar habitat surrounding the population (these providing potential habitat for population expansion and for pollinators). It may also include additional occurrences of similar habitat that may contain undiscovered populations of the species or be suitable for future translocations, and the local catchment for the surface and/or groundwater that maintains the habitat of the species.

Conservation status: *Leucopogon nitidus* was listed as specially protected under the Western Australian *Wildlife Conservation Act 1950* on 2 December 2014. It is ranked as Endangered (EN) in Western Australia under International Union for Conservation of Nature (IUCN) 2001 criterion D due to its population size estimated to number fewer than 250 mature plants. The species is not currently listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Threats: The main threats to the species are restricted distribution, small population size, fire, weeds, grazing and poor recruitment.

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. Parks and Wildlife with the assistance of the Geraldton District Threatened Flora and Communities Recovery Team is overseeing the implementation of recovery actions for *Leucopogon nitidus*.
2. The land owner/manager has been notified of the location and threatened status of *Leucopogon nitidus*.
3. *Leucopogon nitidus* has been opportunistically surveyed for with no additional populations located.
4. The private property location containing the known population of *Leucopogon nitidus* was placed under a National Trust covenant on 25 August 2000.
5. Monitoring has been carried out opportunistically with plant numbers and current threats recorded.

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

Recovery criteria

Criteria for recovery success: The plan will be deemed a success if one or more of the following take place over the term of the plan.

- The number of mature plants within the known population has remained within a 20% range or has increased by >20% over the term of the plan from 84 to 101 or more or
- New populations have been found, increasing the number of known populations from one to two or more with no net loss of mature plants or
- The area of occupancy has increased by >10% with no net loss of mature plants.

Criteria for recovery failure: The plan will be deemed a failure if one or more of the following take place over the term of the plan.

- The known population has been lost or
- The number of mature plants in the population has decreased by >20% from 84 to 67 or less or
- The area of occupancy has decreased by >10% or more with a net loss of mature plants.

Recovery actions

1. Coordinate recovery actions
2. Monitor populations
3. Liaise with land managers and Aboriginal communities
4. Collect and store seed
5. Undertake weed control
6. Protect plants from herbivory
7. Develop and implement a translocation proposal
8. Undertake surveys

9. Undertake regeneration trials
10. Develop and implement a fire management strategy
11. Obtain biological and ecological information
12. Map habitat critical to the survival of *Leucopogon nitidus*
13. Promote awareness
14. Review this plan and assess the need for further recovery actions

1. Background

History

The first collection of *Leucopogon nitidus* was made from private property east of Geraldton by Jenna Brooker in July 2001. At the time, no species name was assigned to the taxon and the phrase name *L. sp. Kojarena* (J. Brooker 232) was raised in 2008. The species was formally described in 2011 (Hislop 2011).

Leucopogon nitidus is known from a single population comprising 84 plants (count undertaken 2013) on land that was likely to have been subjected to grazing by sheep and/or cattle prior to being fenced. The area was placed under a restrictive National Trust covenant on 25 August 2000. The covenant restricts activities on the private land referred to as the 'Wildlife Sanctuary' in order to protect its natural and cultural landscape values.

Description

Leucopogon nitidus is an erect, open shrub to 50cm high by 50cm wide. The leaves are usually spirally arranged, occasionally opposite, very narrow, more or less linear, 3.2 to 8.3mm long, 0.5 to 0.8mm wide, and have two deep grooves, one each side of the broad midrib, on the abaxial surface. The flowers are white and densely hairy internally. The fruit is more or less cylindrical, 2.1 to 2.3mm long, and 0.9 to 1.0mm wide, slightly to distinctly longer than the calyx, with a well-defined, subapical rim, hairy in the lower half (Hislop 2011).

The closest relatives of *Leucopogon nitidus* appear to be a group of undescribed species endemic to the Geraldton Sandplains (these were referred to as the 'Northern Group' in Hislop 2014). Outside of the Geraldton Sandplains, the species is most similar in foliage characters to *L. cinereus* (Avon-Wheatbelt), differing in having shiny leaves which lack a glaucous texture or long spreading hairs, a different sepal and fruit shape and different distribution and orientation of hairs on the fruit (Hislop 2011).

Leucopogon nitidus is named from the Latin *nitidus* (shining and bright), in reference to the glossy leaf surfaces (Hislop 2011).

Illustrations and/or further information

Hislop, M. (2011) New, locally endemic taxa in *Leucopogon* (Ericaceae: Styphelioideae: Styphelieae) from the Perth and Midwest regions of Western Australia. *Nuytsia* 21(2): 75–89; Western Australian Herbarium (1998–) FloraBase- the Western Australian Flora. Department of Parks and Wildlife. <https://florabase.dpaw.wa.gov.au/>.

Distribution and habitat

Leucopogon nitidus is known from a single location east of Geraldton where it grows in shallow gravelly sand over laterite on the top of a breakaway. Associated vegetation is heathland dominated by *Allocasuarina campestris*, *Banksia fraseri* var. *ashbyi* and *Hakea lissocarpha* (Hislop 2011). The area of occupancy and extent of occurrence is 0.02 km².

Table 1. Summary of population land vesting, purpose and manager

TPFL population number & location	Parks and Wildlife district	Shire	Vesting	Purpose	Manager
1. E of Geraldton	Geraldton	Greater Geraldton	Private property	Freehold	Landowners

Biology and ecology

When collected in July *Leucopogon nitidus* had buds, flowers and mature fruits but is likely to have a much longer flowering period determined by soil moisture levels (Hislop 2011). It is believed that, as with many other members of the genus, its seed is likely to germinate following-fire and has the capacity to remain viable in the soil for many years between disturbance events. Seed is likely to be dispersed by ants. Many insects may act as potential pollinators (Chant 2014).

Conservation status

Leucopogon nitidus was listed as specially protected under the Western Australian *Wildlife Conservation Act 1950* on 2 December 2014. It is ranked as Endangered (EN) in Western Australia under International Union for Conservation of Nature (IUCN) 2001 criterion D due to its population size estimated to number fewer than 250 mature plants. The species is not listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Threats

- **Small population size.** Low genetic diversity could limit the long term viability of the species.
- **Altered fire regimes.** It is thought that infrequent fire is required to stimulate germination of soil-stored seed. Frequent fire however may result in a reduced seed bank if it occurs before plants reach maturity. Fire should therefore occur at appropriate intervals between germination events.
- **Habitat degradation.** Introduced weeds will result in habitat degradation as they suppress early plant growth through competition for soil moisture, nutrients and light, exacerbate grazing pressure and increase the fire hazard due to the high fuel loads they produce annually.
- **Grazing.** Grazing by rabbits and kangaroos may impact the population through soil disturbance, increased nutrient levels and grazing of seedlings.
- **Poor recruitment.** The population showing little or no natural recruitment.

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

Table 2. Summary of population information and threats

TPFL population number & location	Land status	Year/no. mature plants	Condition		Threats
			Plants	Habitat	
1. E of Geraldton	Private property	2001 common 2008 5 2013 84	Healthy	Very good	Small population size, fire, weeds, grazing (rabbits, kangaroos), poor recruitment

Note: The known population (**bold text**) is considered to be an important population.

Guide for decision-makers

Section 1 provides details of current and possible future threats. Actions for development and/or land clearing in the immediate vicinity of *Leucopogon nitidus* may require assessment.

Actions that result in any of the following may potentially significantly impact the species:

- Damage or destruction of occupied or potential habitat.
- Alteration of the local surface hydrology or drainage.
- Reduction in population size.
- A major increase in disturbance in the vicinity of a population.

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

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 *L. nitidus* includes the area of occupancy of the population and areas of similar habitat surrounding the population (these providing potential habitat for population expansion and for pollinators). It may also include additional occurrences of similar habitat that may contain undiscovered populations of the species or be suitable for future translocations, and the local catchment for the surface and/or groundwater that maintains the habitat of the species.

Benefits to other species or ecological communities

Recovery actions implemented to improve the quality or security of the habitat of *Leucopogon nitidus* will also benefit the threatened species listed in the table below.

Table 3. Conservation-listed flora species occurring within 500m of *Leucopogon nitidus*

Species name	Conservation status (WA)	Conservation status (EPBC Act 1999)
<i>Leucopogon marginatus</i>	Threatened (EN)	EN

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

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 species 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 no sites of Aboriginal significance adjacent to the population of *Leucopogon nitidus*. However, input and involvement has been sought through the DAA to determine if there are any issues or interests with respect to management for this species. Opportunity for future Aboriginal involvement in the implementation of the plan is included as an action in the plan. Aboriginal 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 species occurs.

Social and economic impacts

The land in which *Leucopogon nitidus* occurs is under a restrictive National Trust covenant. However, practices carried out on private land adjacent to the population may require modification and result in some economic impact. Recovery actions refer to continued negotiations between stakeholders with regard to these areas.

Affected interests

Affected interests include private landholder and the National Trust.

Evaluation of the plan's performance

Parks and Wildlife, with assistance from the Geraldton District Threatened Flora and Communities Recovery Team (GDTFCRT), 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

Plan objective

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

Recovery criteria

Criteria for recovery success: The plan will be deemed a success if one or more of the following take place over the term of the plan.

- The number of mature plants within the known population has remained within a 20% range or has increased by >20% over the term of the plan from 84 to 101 or more or
- New populations have been found, increasing the number of known populations from one to two or more with no net loss of mature plants or
- The area of occupancy has increased by >10% with no net loss of mature plants.

Criteria for recovery failure: The plan will be deemed a failure if one or more of the following take place over the term of the plan.

- The known population has been lost or
- The number of mature plants in the population has decreased by >20% from 84 to 67 or less or
- The area of occupancy has decreased by >10% or more with a net loss of mature plants.

3. Recovery actions

Existing recovery actions

Parks and Wildlife, with the assistance of the GDTFCRT, is overseeing the implementation of recovery actions for *Leucopogon nitidus*.

The land owner/manager has been notified of the location and threatened status of *Leucopogon nitidus*. Notifications detail the current Declared Rare Flora (DRF) status of the species and the associated legal obligations in regards to its protection.

Leucopogon nitidus has been opportunistically surveyed for elsewhere in the district, but no additional populations have been located. Surveys include:

- Survey by Department of Parks and Wildlife volunteer Jenna Brooker in July 2001.
- Survey of 2001 collection location by Geraldton Regional Herbarium in 2008.
- Survey by botanist Ann Gunness (commissioned by Department of Parks and Wildlife) in August 2008.
- Opportunistic survey by Mike Hislop.
- Survey and mapping of the known population in July 2013 by Alanna Chant and the Geraldton Regional Herbarium Group.

- Inspection of a nature reserve to the south of the known population by Alanna Chant during spring 2013.

The private property location containing the population of *Leucopogon nitidus* was placed under a National Trust covenant on 25 August 2000. In order to protect its natural and cultural landscape values the covenant restricts activities on the private land referred to as the 'Wildlife Sanctuary'.

Monitoring has been carried out opportunistically with plant numbers and current threats recorded. Global Positioning System (GPS) locations of plants within the population have been recorded in Geographic Information System databases at Geraldton District, and at Species and Communities Branch (SCB).

Future recovery actions

The following recovery actions are listed in approximate order of decreasing 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. Where these 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.

1. Coordinate recovery actions

Parks and Wildlife, with assistance from the GDTCRT, will oversee the implementation of recovery actions for *Leucopogon nitidus* and include information on progress in annual reports.

Action:	Coordinate recovery actions
Responsibility:	Parks and Wildlife (Geraldton District), with assistance from the GDTCRT
Cost:	\$8,000 per year

2. Monitor population

Monitoring of the population and its habitat should be undertaken to identify trends or potential management requirements. Population monitoring should record the health and expansion or decline in the population, and other observations such as pollinator activity or seed production. Site monitoring should include observations of grazing, habitat degradation including weed invasion, and hydrological status (drought). Specific monitoring of hydrology and activities relating to research into the biology and ecology of *Leucopogon nitidus* are included in other recovery actions detailed below.

Action:	Monitor population
Responsibility:	Parks and Wildlife (Geraldton District), with assistance from the GDTCRT
Cost:	\$8,000 per year

3. Liaise with land managers and Aboriginal communities

As the species is known from a single population on private property staff from Parks and Wildlife Geraldton District will liaise with the land owner/manager to ensure the population is not accidentally

damaged or destroyed (i.e. during the grading of firebreaks and fencing) and the habitat is maintained in a suitable condition for the conservation of the species.

If new populations are located adjacent to or within sites of Aboriginal significance, consultation with the Aboriginal community will take place to determine if there are any issues or interests in areas that are habitat for the species.

Action:	Liaise with land managers and Aboriginal communities
Responsibility:	Parks and Wildlife (Geraldton District)
Cost:	\$4,000 per year

4. Collect and store seed

To guard against the extinction of natural populations of *Leucopogon nitidus* it is recommended that seed be collected and stored at the Parks and Wildlife TFSC. Collections should aim to sample and preserve the maximum range of genetic diversity possible by collecting from the widest range of reproductive plants.

Action:	Collect and store seed
Responsibility:	Parks and Wildlife (Geraldton District, TFSC)
Cost:	\$10,000 per year

5. Undertake weed control

Weeds are a threat to the known population and the following actions are recommended:

1. Determine which weeds are present and map them.
2. Control invasive weeds by hand removal and/or spot spraying as they emerge.
3. Monitor the success of the treatment on weed death, and the tolerance of *Leucopogon nitidus* and associated native plant species to the treatment methods.
4. Report on the method and success of the treatment.

Action:	Undertake weed control
Responsibility:	Parks and Wildlife (Geraldton District)
Cost:	\$10,000 per year, as required

6. Protect plants from herbivory

If monitoring ascertains the threat of herbivory to *Leucopogon nitidus* is high, baiting for rabbits using 1080 oats should be undertaken. Where areas of high infestation occur, ripping or fumigating warrens may also be implemented. Additional protective measures such as fencing or caging of plants may also be required.

Action:	Protect plants from herbivory
Responsibility:	Parks and Wildlife (Geraldton District), landowners
Cost:	\$10,000 in year 1; \$8,000 per years 2-5

7. Develop and implement a translocation proposal

Translocations may be required for the long term conservation of *Leucopogon nitidus* if the natural population declines.

Information on the translocation of threatened plants and animals in the wild is provided in Parks and Wildlife Corporate Policy Statement No. 35 (DPaW 2015a), Parks and Wildlife Corporate Guideline No. 36 (DPaW 2015c) and the Australian Network for Plant Conservation translocation guidelines (Vallee *et al.* 2004). The 2004 guidelines state that a translocation may be needed when a species is represented by few populations and the creation of additional self-sustaining, secure populations may decrease its susceptibility to catastrophic events and environmental stochasticity. For small populations which may be declining in size or subject to high levels of inbreeding, successful population enhancement may increase population stability and hence long-term viability (Vallee *et al.* 2004).

Depending on the characteristics of the species, Vallee *et al.* (2004) suggest a minimum viable population size estimated between 50 and 2,500 individuals will be required. Suitable translocation sites may include where the taxon occurs, where it was known to have occurred historically and other areas that have similar habitat (soil, associated vegetation type and structure, aspect etc.), within the known range of the taxon (Vallee *et al.* 2004).

All translocation proposals require endorsement by the department's Director of Science and Conservation. Monitoring of translocations is essential and will be included in the timetable developed for the Translocation Proposal.

Action:	Develop and implement a translocation proposal
Responsibility:	Parks and Wildlife (Science and Conservation Division, Geraldton District), BGPA
Cost:	\$42,000 in years 1 and 2; and \$26,500 in subsequent years as required

8. Undertake surveys

Surveys should be undertaken in areas of potentially suitable habitat during the species flowering period with all surveyed areas recorded and the presence or absence of *Leucopogon nitidus* documented to improve survey efficiency and prevent duplication of effort. Where feasible, volunteers will be encouraged to participate.

Areas should be resurveyed following disturbance such as fire. All surveyed areas should be recorded and the presence or absence of the species documented to increase survey efficiency and prevent duplication of effort.

Action:	Undertake surveys
Responsibility:	Parks and Wildlife (Geraldton District), with assistance from the GDTCRT and volunteers
Cost:	\$10,000 per year

9. Undertake regeneration trials

As habitat disturbance (physical or fire) is thought to enhance germination of *Leucopogon nitidus* seed it is recommended that regeneration trials be undertaken using a mixture of fire and physical disturbance.

Action:	Undertake regeneration trials
Responsibility:	Parks and Wildlife (Science and Conservation Division, Geraldton District)
Cost:	\$10,000 in years 1 and 3, \$4,000 in years 2, 4 and 5

10. Develop and implement a fire management strategy

A fire management strategy will be developed in consultation with the land owner/manager, recommending fire frequency, intensity and seasonality, precautions to prevent wildfire and strategies for reacting to wildfire, and the need, method of construction and maintenance of firebreaks. The risk of fire occurring in the habitat of the population should be minimised, except where it is being used to assist recovery. All data relating to fire response of the species will be entered into the Threatened Priority Flora (TPFL) fire response data base.

Action:	Develop and implement a fire management strategy
Responsibility:	Parks and Wildlife (Geraldton District), landowners
Cost:	\$10,000 in year 1, and \$6,000 in years 2–5

11. Obtain biological and ecological information

It is recommended that research on biology and ecology of *Leucopogon nitidus* include:

1. Identification of pollinators and their habitat requirements.
2. Soil seed bank dynamics and seed viability.
3. Conditions necessary for natural germination.
4. Response to disturbance, competition, drought, inundation and grazing.
5. Longevity of plants, time taken to reach maturity, and minimum viable population size.
6. The impact of changes in hydrology.

Action:	Obtain biological and ecological information
Responsibility:	Parks and Wildlife (Science and Conservation Division, Geraldton District)
Cost:	\$50,000 in years 1–3

12. Map habitat critical to the survival of *Leucopogon nitidus*

Although spatial data relating to habitat critical to the survival of *Leucopogon nitidus* is alluded to in Section 1, it is not yet mapped. If additional populations are located, habitat critical to their survival will also be determined and mapped.

Action:	Map habitat critical to the survival of <i>Leucopogon nitidus</i>
Responsibility:	Parks and Wildlife (SCB, Geraldton District)
Cost:	\$6,000 in year 2

13. Promote awareness

The importance of biodiversity conservation and the protection of *Leucopogon nitidus* will be promoted through direct contact with the affected land owner/manager, and more broadly through the print and electronic media and by setting up poster displays. Formal links with local naturalist groups and interested individuals will also be encouraged.

Action:	Promote awareness
Responsibility:	Parks and Wildlife (Geraldton District, SCB, Public Information and Corporate Affairs (PICA)), with assistance from the GDTFCRT
Cost:	\$7,000 in years 1 and 2; \$5,000 in years 3–5

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

If *Leucopogon nitidus* is still listed as Threatened at the end of the five-year term of this plan, the need for further recovery actions and/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, Geraldton District)
Cost:	\$6,000 at the end of year 5

Table 3. Summary of recovery actions

Recovery action	Priority	Responsibility	Completion date
Coordinate recovery actions	High	Parks and Wildlife (Geraldton District), with assistance from the GDTFCRT	Ongoing
Monitor population	High	Parks and Wildlife (Geraldton District), with assistance from the GDTFCRT	Ongoing
Liaise with land managers and Aboriginal communities	High	Parks and Wildlife (Geraldton District)	Ongoing
Collect and store seed	High	Parks and Wildlife (Geraldton District, TFSC)	2020
Undertake weed control	High	Parks and Wildlife (Geraldton District)	Ongoing
Protect plants from herbivory	High	Parks and Wildlife (Geraldton District), landowners	Ongoing
Develop and implement a translocation proposal	High	Parks and Wildlife (Science and Conservation Division, Geraldton District), BGPA	2020
Undertake surveys	Medium	Parks and Wildlife (Geraldton District), with assistance from the GDTFCRT and volunteers	Ongoing
Undertake regeneration trials	Medium	Parks and Wildlife (Science and Conservation Division, Geraldton District)	2020
Develop and implement a fire management strategy	Medium	Parks and Wildlife (Geraldton District)	Developed by 2016, implementation ongoing
Obtain biological and ecological information	Medium	Parks and Wildlife (Science and Conservation Division, Geraldton District)	2018
Map habitat critical to the survival of <i>Leucopogon nitidus</i>	Medium	Parks and Wildlife (SCB, Geraldton District)	2017
Promote awareness	Medium	Parks and Wildlife (Geraldton District, SCB, PICA), with assistance from the GDTFCRT	2020
Review this plan and assess the need for further recovery actions	Medium	Parks and Wildlife (SCB, Geraldton District)	2020

4. Term of plan

This plan will operate from December 2016 to November 2021 but will remain in force until withdrawn or replaced. If *Leucopogon nitidus* is still listed as Threatened at the end of the five year term of this plan, a review of this plan will be completed, the need for further recovery actions determined and a revised plan prepared if necessary.

5. References

- Chant, A. (2014) Form to nominate a Western Australian species for listing as threatened, change of category or delisting 2014. Department of Environment and Conservation, WA.
- Department of Parks and Wildlife (2015a) Corporate Policy Statement No. 35 *Conserving Threatened Species and Ecological Communities*. Perth, Western Australia.
- Department of Parks and Wildlife (2015b) Corporate Guideline No. 35 *Listing and Recovery of Threatened Species and Ecological Communities*. Perth, Western Australia.
- Department of Parks and Wildlife (2015c) Corporate Guideline No. 36 *Recovery of Threatened Species through Translocation and Captive Breeding or Propagation*. Perth, Western Australia.
- Government of Australia (1999) Environment Protection and Biodiversity Conservation Act.
- Hislop, M. (2011) New, locally endemic taxa in *Leucopogon* (Ericaceae: Styphelioideae: Styphelieae) from the Perth and Midwest regions of Western Australia. *Nuytsia* 21(2): 75–89.
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- Vallee, L., Hogbin, T., Monks, L., Makinson, B., Matthes, M. and Rossetto, M. (2004) Guidelines for the Translocation of Threatened Australian Plants. Second Edition. The Australian Network for Plant Conservation. Canberra, Australia.
- Western Australian Herbarium (1998–) FloraBase– the Western Australian Flora. Department of Parks and Wildlife. <http://florabase.dpaw.wa.gov.au/>.

6. Taxonomic description

Leucopogon nitidus

Hislop, M. (2011) New, locally endemic taxa in *Leucopogon* (Ericaceae: Styphelioideae: Styphelieae) from the Perth and Midwest regions of Western Australia. *Nuytsia* 21(2): 75–89.

Erect, open *shrubs* to 50 cm high and 50 cm wide; fire tolerance of the rootstock unknown although likely to be fire-sensitive. Young *branchlets* with a moderately dense to dense indumentum of patent, \pm straight or somewhat decurved hairs, 0.05–0.10 mm long. *Leaves* usually spirally arranged, occasionally opposite on a minority of branchlets, steeply antrorse, linear or very narrowly elliptic, 3.2–8.3 mm long, 0.5–0.8 mm wide; apex obtuse; base attenuate; petiole indistinct, yellowish, 0.1–0.3 mm long, shortly hairy on adaxial surface and margins, glabrous abaxially; lamina 0.35–0.50 mm thick, flat towards the base, becoming \pm trigonous in the upper half, straight or gently incurved along the longitudinal axis; surfaces \pm concolorous, shiny; adaxial surface usually sparsely hairy, especially towards the base, the venation not evident; abaxial surface with two deep grooves, one each side of the broad midrib, apparently glabrous, although short hairs are sometimes evident deep within the grooves; margins coarsely ciliate with stiff, antrorse hairs 0.05–0.20 mm long. *Inflorescences* erect, terminal and upper-axillary; axis 2–5 mm long, with 3–8 flowers, terminating in a bud-like rudiment or an attenuate point; axis indumentum of moderately dense, patent hairs 0.08–0.12 mm long; flowers erect and sessile. *Fertile bracts* narrowly ovate, obtuse, 1.9–2.6 mm long and 0.5–0.7 mm wide. *Bracteoles* ovate or broadly ovate, 1.2–1.5 mm long, 0.9–1.1 mm wide, obtuse or subacute, keeled; abaxial surface glabrous, becoming scarious towards the margins; adaxial surface shortly hairy in central portion; margins ciliolate. *Sepals* ovate, 2.0–2.4 mm long, 1.1–1.2 mm wide, acute or subacute; abaxial surface glabrous, greenish, often with some reddish-purple tinges towards the apex, the midrib somewhat raised, paler, other venation obscure, becoming scarious towards the margins; adaxial surface appressed-hairy in the upper half; the margins ciliolate with hairs 0.1–0.2 mm long. *Corolla tube* white, broadly campanulate, distinctly shorter than sepals, 0.9–1.3 mm long, 1.1–1.4 mm wide, glabrous externally and internally. *Corolla lobes* white, much longer than the tube (ratio = 2.3–3.1:1), widely spreading from the base and recurved, 2.5–2.9 mm long, 0.8–1.0 mm wide at the base, glabrous externally, densely hairy internally; indumentum white, distinctly shorter towards the base, 0.8–0.9 mm long near apex; glabrous tip c. 0.2 mm long. *Anthers* partially exerted from the tube (by 3/4–7/8 of their length), 1.3–1.6 mm long, prominently recurved at apex; sterile tips moderately conspicuous, 0.3–0.4 mm long. *Filaments* terete, 0.6–0.7 mm long, attached c. 2/3 above anther base, adnate to tube just below the sinus. *Ovary* broadly obovoid, rather angular, 0.5–0.6 mm long, 0.5–0.6 mm wide, sparsely appressed-hairy in the lower half, 3-locular. *Style* 0.4–0.5 mm long, tapering evenly from ovary apex, included within the corolla tube; *stigma* not or scarcely expanded; *nectary* annular, 0.3–0.4 mm long, very shallowly lobed, glabrous. *Fruit* \pm cylindrical, 2.1–2.3 mm long, 0.9–1.0 mm wide, slightly to distinctly longer than the calyx, with a well-defined, undulate, subapical rim, the surface between the rim and the style base either \pm level or more frequently ascending gently, hairy in the lower half with a rather sparse, steeply antrorse or antrorse-appressed indumentum, smooth beneath the hairs; style persistent.

