



Department of
Parks and Wildlife



Interim Recovery Plan No. **369**

Austrostipa jacobsoniana

Interim Recovery Plan
2016–2021



Department of Parks and Wildlife, Western Australia

November 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
GPS	Global Positioning System
IBRA	Interim Biogeographic Regionalisation for Australia
IRP	Interim Recovery Plan
IUCN	International Union for Conservation of Nature
LGA	Local Government Authority
MRS	Metropolitan Region Scheme
NRM	Natural Resource Management
PICA	Public Information and Corporate Affairs
SCB	Species and Communities Branch
SRTFCRT	Swan Region Threatened Flora and Communities Recovery Team
SWALSC	South West Aboriginal Land and Sea Council
SWRTFRT	South West Region Threatened Flora Recovery Team
TEC	Threatened Ecological Community
TFSC	Threatened Flora Seed Centre
TPFL	Threatened and Priority Flora database
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 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 flora, fauna and ecological communities, and begin the recovery process.

Parks and Wildlife is committed to ensuring that threatened flora 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) flora, always within one year of endorsement of that rank by the Minister.

This plan will operate from November 2016 to October 2021 but will remain in force until withdrawn or replaced. It is intended that if *Austrostipa jacobiana* 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 31 October 2016 and was approved by the Director of Science and Conservation on 23 November 2016. 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 November 2016.

Plan preparation: This plan was prepared by:

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

Cover photograph by Anne Harris.

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Summary

Scientific name:	<i>Austrostipa jacobiana</i>	Shires:	Gosnells, Bunbury
Family:	Poaceae	NRM regions:	Swan, South West
Common name:	None	IBRA region:	Swan Coastal Plain
Flowering period:	October–November	IBRA subregion:	Perth SWA02
DPaW regions:	Swan, South West	Recovery teams:	SRTFCRT, SWRTFRT
DPaW districts:	Swan Coastal, Wellington		

Distribution and habitat: *Austrostipa jacobiana* is known from populations near Gosnells and Bunbury on the Swan Coastal Plain. Near Gosnells the species grows in calcareous-clay to fine sandy-clay in a low-lying area on the fringe of a seasonally wet depression, while near Bunbury it grows in sandy-loam over lime-marl rock in a seasonal dampland.

Habitat critical to the survival of the species, and important populations: It is considered that all known habitat for wild populations is critical to the survival of *Austrostipa jacobiana*, and that all wild populations are important populations. Habitat critical to the survival of *A. jacobiana* includes the area of occupancy of populations and areas of similar habitat surrounding populations (providing potential habitat for population expansion). 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: *Austrostipa jacobiana* was listed as specially protected under the Western Australian *Wildlife Conservation Act 1950* on 2 December 2014. It is ranked as Critically Endangered (CR) in Western Australia under International Union for Conservation of Nature (IUCN) 2001 criteria B2ab(ii,iii) due to its area of occupancy estimated to be less than 10km²; populations being severely fragmented and their being a continuing decline in the area of occupancy and quality of habitat. The species is not listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Threats: Threats to *Austrostipa jacobiana* include road, firebreak and utilities maintenance, weeds, grazing and trampling, farming activities, rubbish dumping, clearing, fire 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. Landholders have been notified of the location and threatened status of *Austrostipa jacobiana*.
2. Three surveys have been undertaken at the site containing Population 1.
3. Two surveys have been undertaken at the site containing Population 2.
4. Monitoring has been undertaken opportunistically.

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 considered a success if one or more of the following occur.

- No important populations have been lost and the number of mature plants within those populations has remained within a 10% range or has increased by >10% over the term of the plan from 389 to 428 or more or
- New populations have been found, increasing the number of known populations from two to three or more over the term of the plan with no net loss of mature plants or
- The area of occupancy has increased by >10% over the term of the plan with no net loss of mature plants.

Criteria for recovery failure: The plan will be considered a failure if one or more of the following occur.

- Important populations have been lost or
- The number of mature plants has decreased by >10% from 389 to 350 or less or
- The area of occupancy has decreased by >10% over the term of the plan with a net loss of mature plants.

Recovery actions

1. Coordinate recovery actions	12. Obtain biological and ecological information
2. Monitor populations	13. Undertake surveys
3. Protect Subpopulation 1b from grazing and potential damage from firebreak maintenance	14. Achieve long-term protection of habitat
4. Install DRF markers	15. Remove soil mound from Subpopulation 1a
5. Undertake weed control	16. Liaise with land managers and Aboriginal communities
6. Collect and store seed	17. Map habitat critical to the survival of <i>Austrostipa jacobiana</i>
7. Undertake a genetic study	18. Promote awareness
8. Rehabilitate habitat	19. Review this plan and prepare a revised plan if necessary
9. Undertake regeneration trials	
10. Develop and implement a translocation proposal	
11. Develop and implement a fire management strategy	

1. Background

History

Austrostipa jacobiana was first collected from a road verge near Gosnells in 1995. In 2003 about 50 plants (large clumps) were found on each of the northern and southern road verges. A detailed survey in 2014 recorded 22 plants on the northern road verge and 91 plants on the southern verge, with three plants in the adjoining private property. Although this indicates an increase in plant numbers, it is more likely due to the separation of the clumps through grading and heavy grazing over the intervening years. The habitat has reduced in size and plant numbers on the north verge have declined from 50 to 22 indicating the population is under serious threat.

In 2005 Greg and Bronwyn Keighery located a new population just south of Bunbury in a small reserve surrounded by urban development. Approximately 50 plants were found at that time. Subsequent detailed population mapping has recorded 273 plants.

Austrostipa jacobiana was originally provided the name *Austrostipa juncifolia* subsp. Southern River (BJ Keighery 2160). However, in a revision of the genus *Austrostipa* subgenus *Lobatae*, Williams (2011) named it as a species.

Austrostipa jacobiana is currently known from two populations, comprising around 389 plants. It was listed as threatened flora on 2 December 2014.

Description

Austrostipa jacobiana is a perennial rhizomatous grass to 1.2 metres tall including flower spikes. The leaves are up to 45cm long, folded and swollen giving a terete appearance. The abaxial surface is strongly ribbed. The inflorescence is 10–20cm long. Flowering occurs in October–November. Fruit matures in November–December (Williams 2011).

Austrostipa jacobiana is related to *A. juncifolia* and *A. geoffreyi*, both of which are much larger. It is also similar to *A. petraea* which occurs in the Flinders Ranges region of South Australia but differs in lemma hair colour and anther size. In size and habit *A. jacobiana* is most similar to *A. bronwenae* but differs in its shorter sheath lobes, folded and shorter leaves, glabrous involucre, shorter and narrower panicle, 5-nerved upper glume, white lemma hairs, narrower awn column, longer paleal lodicule and shorter, non-pencillate anthers (Williams 2011).

Austrostipa jacobiana is named in honour of the late Surrey Jacobs, in recognition of his work on the phylogenetics and taxonomy of *Austrostipa* and contribution to Australian botany (Williams 2011).

Illustrations and/or further information

Western Australian Herbarium (1998–) *FloraBase*- the Western Australian Flora. Department of Parks and Wildlife. <http://florabase.dpaw.wa.gov.au/>; Williams, A.R. (2011) *Austrostipa* (Poaceae) subgenus *Lobatae* in Western Australia. *Telopea* 13(1–2): 177–192.

Distribution and habitat

Austrostipa jacobiana is known from two populations on the Swan Coastal Plain, one near Gosnells and the other near Bunbury.

Near Gosnells the species is found in a low-lying area on the fringe of a seasonally wet depression, growing in calcareous-clay to fine sandy-clay over a Muchea Limestone formation (Williams 2011). This site is a degraded example of a Muchea Limestone Threatened Ecological Community (TEC) (Keighery and Keighery 1995) and therefore, does not fall into the mapped boundary. Associated vegetation is sparse *Corymbia calophylla* over *Xanthorrhoea preissii*, *Viminaria juncea* and *Jacksonia sternbergiana* over occasional *Phyllanthus calycinus*, *Tricoryne elatior*, *Lepidosperma longitudinale* and *Mesomelaena tetragona* and weeds (Poaceae and Iridaceae spp.).

Near Bunbury the species is found in a seasonal dampland, growing in sandy-loam over lime-marl rock (Williams 2011). The site is predominantly within the 'Shrublands on calcareous silts of the Swan Coastal Plain' (Swan Coastal Plain type 18) TEC. Associated vegetation comprises *Melaleuca raphiophylla*, *M. viminea* low open forest, over *Kunzea recurva*, *Hakea varia*, *Acacia saligna* shrubland with emergent *Spyridium globulosum* over *Gahnia trifida*, *Chaetanthus aristatus* and *Lepidosperma longitudinale* sedges. The area is described as a transitional zone between seasonally shallowly inundated *Melaleuca* and *Gahnia* wetland and dampland of a *Eucalyptus rudis*, *Xanthorrhoea brunonis* and *Cyathochaeta avenacea* community.

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

TPFL population number & location	DPaW district	Shire	Vesting	Purpose	Manager
1a. Southern River	Swan Coastal	Gosnells	LGA	Road reserve	City of Gosnells
1b. Southern River	Swan Coastal	Gosnells	Private property		Landowners
2. Bunbury	Wellington	Bunbury	LGA	Recreation reserve	City of Bunbury

Biology and ecology

Austrostipa jacobiana flowers between October and November. Mature seeds are present between November and December with some spikelets not falling until early January. Pollination occurs by wind. It is thought that germination may be stimulated by fire but this has yet to be confirmed.

Conservation status

Austrostipa jacobiana was listed as specially protected under the Western Australian *Wildlife Conservation Act 1950* on 2 December 2014. It is ranked as Critically Endangered (CR) in Western Australia under International Union for Conservation of Nature (IUCN) 2001 criteria B2ab(ii,iii) due to its area of occupancy estimated to be less than 10km²; populations being severely fragmented and their being a continuing decline in the area of occupancy and quality of habitat. The species is not listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Threats

- **Road, firebreak and utilities maintenance.** Threats include grading, chemical spraying, construction of drainage channels and the slashing of roadside vegetation. Several of these actions also encourage weed invasion. Plants at Population 2 occur adjacent to a partially closed and revegetated firebreak. Re-grading of this firebreak will result in plant loss. Utilities maintenance by Telstra and Water Corporation also has the potential to impact on plants at Population 1.
- **Habitat degradation and weed invasion.** Weeds at Population 1 include *Eragrostis curvula*, *Briza maxima*, *Avena fatua* and *Brachypodium distachyon*. Couch grass and other annual weed grasses are invading the habitat of Population 2.
- **Grazing and trampling.** Both road verges containing Population 1 have been mown and grazed. It is not known if grazing is by stock or kangaroos, or if stock have access to plants on the adjacent private property.
- **Farming activities.** Threats to Subpopulation 1b include chemical and fertiliser drift, weeds, grazing and trampling.
- **Rubbish.** Garden refuse and a mound of building site soil/rubble has been dumped along the road verge at Subpopulation 1a. The City of Gosnells is picking up dumped rubbish once a month and a permit is being applied for to remove the mound.
- **Clearing.** Future subdivision of private property locations are a threat to Population 1. The area is currently zoned Urban Deferred under the Metropolitan Region Scheme (MRS). The land owner has recently lodged an Amendment for the current zoning to be lifted and zoned as Urban under the MRS.
- **Altered fire regimes.** The response of *Austrostipa jacobsoniana* to fire is unknown. Frequent burning would however deplete the soil seed store. Fire also may also facilitate weed invasion.
- **Lack of recruitment.** Few fruiting spikes were noted at Subpopulation 1a during the 2014 survey and this may be due to grazing/mowing of plants.

The intent of this plan is to provide actions that will mitigate immediate threats to *Austrostipa jacobsoniana*. 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	
1a. Gosnells	Shire road reserve	2003 100 2014 113	Healthy	Degraded	Grazing and trampling, weeds, road and utilities maintenance, rubbish dumping, lack of recruitment, fire, clearing
1b. Gosnells	Private property	2014 3	Healthy	Degraded	Weeds, firebreak and fence maintenance, grazing and trampling, fire, farming activities, clearing
2. Bunbury	Shire recreation reserve	2005 50 2014 273	Healthy	Excellent	Firebreak maintenance, weeds, fire

Note: all populations (**bold text**) are considered to be important populations.

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 *Austrostipa jacobiana* 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

Austrostipa jacobiana is ranked as Critically Endangered (CR) in Western Australia and it is considered that all known habitat for wild populations is critical to the survival of the species, and that all wild populations are important populations. Habitat critical to the survival of *A. jacobiana* includes the area of occupancy of populations and areas of similar habitat surrounding populations (these providing potential habitat for population expansion). 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 *Austrostipa jacobiana* will also will also benefit the Priority flora listed in the table below:

Table 3. Conservation-listed flora species occurring within 500m of *Austrostipa jacobiana*

Species name	Conservation status (WA)	Conservation status (EPBC Act 1999)
<i>Meeboldina decipiens</i> subsp. <i>decipiens</i>	Priority 3	-
<i>Caladenia speciosa</i>	Priority 4	-
<i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>	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

Population 1 of *Austrostipa jacobiana* occurs on a degraded example of the "Shrublands and woodlands on Muchea Limestone" TEC that is currently unmapped. This TEC is ranked as Endangered (EN) by the Western Australian and Commonwealth Governments.

The majority of Population 2 occurs within the "Shrublands on calcareous silts of the Swan Coastal Plain (SCP18)" TEC which is ranked as Vulnerable (VU) in Western Australia. For a description of TEC categories see Department of Environment and Conservation (2010).

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 found that Population 1 of *Austrostipa jacobiana* occurs on the boundary of a registered Aboriginal site (#3511-Southern River). Input and involvement has been sought through the South West Aboriginal Land and Sea Council (SWALSC) and 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 Western Australian *Conservation and Land Management Act 1984* is also provided for under the joint resting and joint management arrangements in that Act, and will apply if an agreement is established over any lands reserved under the Act on which this species occurs.

Social and economic impacts

Management of private land containing *Austrostipa jacobiana* may need to be modified to include weed control and restricted stock access. Road and firebreak maintenance and other activities in the vicinity of populations may also need to be modified. Recovery actions refer to continued liaison between affected stakeholders.

Affected interests

The implementation of this plan has some implications for the private landholder, the City of Gosnells and City of Bunbury, particularly as populations occur on lands not specifically managed for conservation.

Evaluation of the plan's performance

Parks and Wildlife, with assistance from the Swan Region Threatened Flora and Communities Recovery Team (SRTFCRT) and South West Region Threatened Flora Recovery Team (SWRTFRT), 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 extant populations to ensure the long-term conservation of the species in the wild.

Recovery criteria

Criteria for recovery success: The plan will be considered a success if one or more of the following occur.

- No important populations have been lost and the number of mature plants within those populations has remained within a 10% range or has increased by >10% over the term of the plan from 389 to 428 or more or
- New populations have been found, increasing the number of known populations from two to three or more over the term of the plan with no net loss of mature plants or
- The area of occupancy has increased by >10% over the term of the plan with no net loss of mature plants.

Criteria for recovery failure: The plan will be considered a failure if one or more of the following occur.

- Important populations have been lost or
- The number of mature plants has decreased by >10% from 389 to 350 or less or
- The area of occupancy has decreased by >10% over the term of the plan with a net loss of mature plants.

See table 2 for important populations.

3. Recovery actions

Existing recovery actions

Parks and Wildlife, with the assistance of the SRTFCRT and SWRTFRT, is overseeing the implementation of recovery actions for *Austrostipa jacobiana*.

Land managers have been notified of the location and threatened status of *Austrostipa jacobiana*. Notifications detail the current DRF status of the species, the associated legal obligations in regards to its protection and contact details for management assistance.

Three surveys have been undertaken in the area of Population 1 since 1995. The first survey coincided with community mapping of a nearby Bush Forever site. Plants were noted at the time and an estimation of numbers taken. A more thorough survey was undertaken in 2003 and an accurate estimation of numbers (clumps) was made. The third survey was undertaken in mid-summer 2014 and included the recording of plant numbers using a differential Global Positioning System (GPS) during a transect-based search.

Two surveys have been undertaken in the area of Population 2, the first coinciding with a survey for a TEC. Plants were noted and an estimation of numbers taken. The second survey undertaken in late

summer 2014 included mapping of the population boundary and an accurate estimation of plant numbers (clumps).

Monitoring has been carried out opportunistically with plant numbers and threats recorded. GPS positioning of all populations has been included in Geographic Information System databases at Swan Coastal District, Wellington District and Species and Communities Branch (SCB).

Future recovery actions

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. 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.

1. Coordinate recovery actions

Parks and Wildlife, with the assistance of the SRTFCRT and SWRTFRT, will oversee the implementation of recovery actions for *Austrostipa jacobiana* and will include information on progress in annual reports.

Action:	Coordinate recovery actions
Responsibility:	Parks and Wildlife (Swan Coastal and Wellington Districts), with assistance from the SRTFCRT and SWRTFRT
Cost:	\$8,000 per year

2. Monitor populations

Monitoring of populations of *Austrostipa jacobiana* 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 (inundation and drought). Specific monitoring of hydrology and activities relating to research into the biology and ecology of *Austrostipa jacobiana* are included in other recovery actions detailed below.

Action:	Monitor populations
Responsibility:	Parks and Wildlife (Swan Coastal and Wellington Districts), with assistance from the SRTFCRT and SWRTFRT
Cost:	\$8,000 per year

3. Protect Subpopulation 1b from grazing and firebreak maintenance

Agreement will be sought from the private landowner to protect *Austrostipa jacobiana* Subpopulation 1b from stock grazing and damage from firebreak maintenance.

Action:	Protect Population 1b from grazing and firebreak maintenance
Responsibility:	Parks and Wildlife (Swan Coastal District), landowners
Cost:	\$10,000 in year 1

4. Install DRF markers

DRF markers are required at *Austrostipa jacobiana* Subpopulation 1a to make road maintenance workers aware of the occurrence and reduce the risk of accidental impact to the site.

Action:	Install DRF markers
Responsibility:	Parks and Wildlife (Swan Coastal District), City of Gosnells
Cost:	\$4,000 in year 1

5. Undertake weed control

Weeds are a threat to both populations of *Austrostipa jacobiana* and the following actions are recommended:

1. Determine which weeds are present.
2. Control invasive weeds by hand removal and/or spot spraying as they first emerge.
3. Monitor the success of the treatment on weed death, and the tolerance of *Austrostipa jacobiana* and associated native plant species to the treatment methods.
4. Report on the method and success of the treatment.
5. Revegetate with site-specific species (in autumn) to suppress weeds.

Action:	Undertake weed control
Responsibility:	Parks and Wildlife (Swan Coastal and Wellington Districts)
Cost:	\$10,000 per year, as required

6. Collect and store seed

To guard against the extinction of natural populations of *Austrostipa jacobiana* 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 (Swan Coastal and Wellington Districts, TFSC)
Cost:	\$5,000 per year

7. Undertake a genetic study

Due to the distance between the two known populations of *Austrostipa jacobiana*, a genetic analysis should be undertaken to confirm their relationship.

Action:	Undertake a genetic study
Responsibility:	Parks and Wildlife (Science and Conservation Division)
Cost:	\$20,000 in years 1 and 2

8. Rehabilitate habitat

With the approval of the private property owners, a buffer of local native plant species will be established around *Austrostipa jacobiana* Subpopulation 1b to assist in habitat rehabilitation.

Action:	Rehabilitate habitat
Responsibility:	Parks and Wildlife (Swan Coastal District), landowners
Cost:	\$10,000 in years 1–3

9. Undertake regeneration trials

As habitat disturbance (physical or fire) is thought to promote germination of soil stored *Austrostipa jacobiana* seed, it is recommended that disturbance trials be undertaken.

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

10. Develop and implement a translocation proposal

Translocations may be required for the long term conservation of *Austrostipa jacobiana* if natural populations decline.

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. Translocation is not an alternative to *in situ* conservation and is not a suitable ameliorative, compensatory, or mitigating measure for development and should be considered as a last resort when all other options are deemed inappropriate or have failed (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 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:	Develop and implement a translocation proposal
Responsibility:	Parks and Wildlife (Science and Conservation Division, Swan Coastal and Wellington Districts), BGPA
Cost:	\$42,000 in years 1 and 2; and \$26,500 in subsequent years as required

11. Develop and implement a fire management strategy

A fire management strategy which includes recommendations on 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 will be developed in consultation with land managers and implemented if necessary. Fire, where possible, will be prevented from occurring in the habitat of *Austrostipa jacobiana* populations, except where it is being used experimentally as a recovery tool.

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

12. Obtain biological and ecological information

It is recommended that research on the biology and ecology of *Austrostipa jacobiana* include:

1. Assessment of pollination effectiveness.
2. 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, Swan Coastal and Wellington Districts)
Cost:	\$50,000 in years 1–3

13. Undertake surveys

Surveys for *Austrostipa jacobiana* should be undertaken in areas of potentially suitable habitat. All surveyed areas will 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 (Swan Coastal and Wellington Districts), with assistance from the SRTFCRT, SWRTFRT and volunteers
Cost:	\$10,000 per year

14. Achieve long-term protection of habitat

Parks and Wildlife will seek additional ways of protecting private property habitat containing *Austrostipa jacobiana* Subpopulation 1b and the recreation reserve containing *A. jacobiana* Population 2. For Population 2, this may include upgrading the vesting of the reserve from 'C Class' to 'A Class' for the protection of flora and fauna. Other methods of achieving habitat protection may include land purchase or the development of a Management Plan in consultation with land managers.

Action:	Achieve long-term protection of habitat
Responsibility:	Parks and Wildlife (Wellington District, SCB), City of Bunbury
Cost:	\$4,000 per year

15. Remove soil mound from Subpopulation 1a

Building site soil/rubble has been dumped along the road reserve at *Austrostipa jacobiana* Subpopulation 1a and will need to be removed.

Action:	Remove soil mound from Subpopulation 1a
Responsibility:	Parks and Wildlife (Swan Coastal District), City of Gosnells
Cost:	\$5,000 year 1

16. Liaise with land managers and Aboriginal communities

Parks and Wildlife Swan Coastal and Wellington District staff will liaise with land managers to ensure that populations of *Austrostipa jacobiana* are not accidentally damaged or destroyed, and the habitat is maintained in a suitable condition for the conservation of the species. 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 (Swan Coastal and Wellington Districts)
Cost:	\$4,000 per year

17. Map habitat critical to the survival of *Austrostipa jacobiana*

Although habitat critical to the survival of *Austrostipa jacobiana* is alluded to in Section 1, it has not been 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>Austrostipa jacobiana</i>
Responsibility:	Parks and Wildlife (SCB, Swan Coastal and Wellington Districts)
Cost:	\$6,000 in year 2

18. Promote awareness

The importance of biodiversity conservation and the protection of *Austrostipa jacobiana* will be promoted through direct contact with affected land managers, 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 (Swan Coastal and Wellington Districts, SCB, Public Information and Corporate Affairs (PICA)), with assistance from the SRTFCRT and SWRTFRT
Cost:	\$7,000 in years 1 and 2; \$5,000 in years 3–5

19. Review this plan and prepare a revised plan if necessary

If *Austrostipa jacobiana* is still listed as Threatened Flora 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 prepare a revised plan if necessary
Responsibility:	Parks and Wildlife (SCB, Swan Coastal and Wellington Districts)
Cost:	\$6,000 at the end of year 5

Table 4. Summary of recovery actions

Recovery action	Priority	Responsibility	Completion date
Coordinate recovery actions	High	Parks and Wildlife (Swan Coastal and Wellington Districts), with assistance from the SRTFCRT and SWRTFRT	Ongoing
Monitor populations	High	Parks and Wildlife (Swan Coastal and Wellington Districts), with assistance from the SRTFCRT and SWRTFRT	Ongoing
Protect Subpopulation 1b from grazing and firebreak maintenance	High	Parks and Wildlife (Swan Coastal District), land managers	2016
Install DRF markers	High	Parks and Wildlife (Swan Coastal District), City of Gosnells	2016
Undertake weed control	High	Parks and Wildlife (Swan Coastal and Wellington Districts)	Ongoing
Collect and store seed	High	Parks and Wildlife (Swan Coastal and Wellington Districts, TFSC)	2020
Undertake a genetic study	High	Parks and Wildlife (Science and Conservation Division)	2017

Rehabilitate habitat	High	Parks and Wildlife (Swan Coastal District), land managers	2018
Undertake regeneration trials	High	Parks and Wildlife (Science and Conservation Division, Swan Coastal District)	2020
Develop and implement a translocation proposal	High	Parks and Wildlife (Science and Conservation Division, Swan Coastal and Wellington Districts), BGPA	2020
Develop and implement a fire management strategy	High	Parks and Wildlife (Swan Coastal and Wellington Districts)	Developed by 2016, implementation ongoing
Obtain biological and ecological information	High	Parks and Wildlife (Science and Conservation Division, Swan Coastal and Wellington Districts)	2018
Undertake surveys	High	Parks and Wildlife (Swan Coastal and Wellington Districts), with assistance from the SRTFCRT, SWRTFRT and volunteers	Ongoing
Achieve long-term protection of habitat	High	Parks and Wildlife (Wellington District, SCB), City of Bunbury	2020
Remove soil mound from Subpopulation 1a	High	Parks and Wildlife (Swan Coastal District), City of Gosnells	2016
Liaise with land managers and Aboriginal communities	High	Parks and Wildlife (Swan Coastal and Wellington Districts)	Ongoing
Map habitat critical to the survival of <i>Austrostipa jacobiana</i>	Medium	Parks and Wildlife (SCB, Swan Coastal and Wellington Districts)	2017
Promote awareness	Medium	Parks and Wildlife (Swan Coastal and Wellington Districts, SCB, PICA), with assistance from the SRTFCRT and SWRTFRT	2020
Review this plan and prepare a revised plan if necessary	Medium	Parks and Wildlife (SCB, Swan Coastal and Wellington Districts)	2020

4. Term of plan

This plan will operate from November 2016 to October 2021 but will remain in force until withdrawn or replaced. If *Austrostipa jacobiana* is still listed as Threatened Flora 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

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- Williams, A.R. (2011) *Austrostipa* (Poaceae) subgenus *Lobatae* in Western Australia. *Telopea* 13(1–2): 177–192.

6. Taxonomic description

***Austrostipa jacobiana* A.R.Williams, sp. nov.**

Williams, A.R. (2011) *Austrostipa* (Poaceae) subgenus *Lobatae* in Western Australia. *Telopea* 13(1–2): 177–192.

Perennial *grass*, 80–120cm tall. *Leaf* sheaths 3–4mm wide at the base, 1–1.5mm wide at the top, visibly ribbed, puberulous between the ribs in the lower parts with hairs 0.03–0.06mm long. Upper leaf sheath margin with hairs 0.01–0.02mm long. Ligule obtuse, usually entire, membranous, 0.4–1mm long. Auricular region glabrous, sheath lobes protruding above the ligule and continuous with it. Leaf blade 35–45cm long, 0.5–0.8mm wide; blade folded and swollen making a terete form, abaxial surface unribbed, glabrous and smooth, adaxial surface strongly ribbed, with an even covering of erect surface hairs 0.03–0.6mm long. *Panicle* 10–20cm long, exserted, contracted, 1–2cm wide, partially subtended by a short glabrous involucre; lowest panicle internode 20–30mm, scabrous, the hairs 0.06–0.1mm long; shortest undivided branch 3–4mm long, longest undivided branch 24–36mm long; branches somewhat flattened, scabrous, 40–80mm long overall including glumes; pedicels somewhat flattened 3–13mm long, scabrous, the hairs 0.1–0.15mm long; spikelets 14–24 per node, 10–12mm long. Glumes persistent, subequal, acuminate, glabrous, straw-coloured; lower glume 3-nerved, 10–12mm long; upper glume 5-nerved, 9–12mm long. *Floret* 6–8mm long, without a neck, sericeous with white hairs 0.4–0.5mm long that increase in length towards the apex. Lemma lobes 2, 0.4–0.8mm long; coma 1.1–1.5mm long; callus 1.6–2.1mm long, sericeous with white hairs 0.6–0.7mm long, tip weakly bent. Awn 38–49mm long, 0.25–0.3mm wide near the base, column 12–21mm long, 8–12mm to the first bend, scabrous, with hairs 0.1–0.3mm long; bristle triangular, no broader than column, paler than the column, scabrous with hairs 0.1–0.15mm long. Palea equal to and almost completely enclosed by lemma, with glabrous margins, pubescent between the dorsal nerves. Lodicules 3, membranous; abaxial lodicules acutely ovate, 1.1–1.5mm long, 0.3mm wide; paleal lodicule truncate, 1.3–2.0mm long, 0.1mm wide. Anthers 3, 3.2–3.3mm long, not pencillate. Style glabrous. Caryopsis 4.5–5mm long, 0.8–0.9mm wide; hilum 3–4mm long, embryo 1.0–1.1mm long.

