

## Abridged Threatened Species Nomination Form

For nominations under the Common Assessment Method (CAM) where supporting information is available, but not in a format suitable for demonstrating compliance with the CAM, and assessment against the IUCN Red List threat status.

### Cover Page *(Office use only)*

<b>Species name</b> (scientific and common name):	<b><i>Austrostipa bronwenae</i></b>
<b>Nomination for</b> (addition, deletion, change):	<b>Addition</b>
<b>Nominated conservation category and criteria:</b>	<b>Endangered B1ab(ii,iii,v)+B2ab(ii,iii,v); C2(a)(i)</b>

Scientific committee assessment of eligibility against the criteria:		
This assessment is consistent with the standards set out in Schedule 1, item 2.7 (h) and 2.8 of the Common Assessment Method Memorandum of Understanding.		Yes <input type="checkbox"/> No <input type="checkbox"/>
<b>A.</b>	Population size reduction	•
<b>B.</b>	Geographic range	•
<b>C.</b>	Small population size and decline	•
<b>D.</b>	Very small or restricted population	•
<b>E.</b>	Quantitative analysis	•

Outcome:			
<i>Scientific committee Meeting date:</i>			
<i>Scientific committee comments:</i>			
<i>Recommendation:</i>			
<i>Ministerial approval:</i>		<i>Date of Gazettal/ Legislative effect:</i>	

# Nomination summary *(to be completed by nominator)*

<b>Current conservation status</b>				
<b>Scientific name:</b>	<i>Austrostipa bronwenae</i>			
<b>Common name:</b>				
<b>Family name:</b>	Poaceae	Fauna <input type="checkbox"/>	Flora <input checked="" type="checkbox"/>	
<b>Nomination for:</b>	Listing <input checked="" type="checkbox"/>	Change of status <input type="checkbox"/>	Delisting <input type="checkbox"/>	
1. Is the species currently on any conservation list, either in a State or Territory, Australia or Internationally? 2. Is it present in an Australian jurisdiction, but not listed?		Provide details of the occurrence and listing status for each jurisdiction in the following table		
<b>Jurisdiction</b>	<b>State / Territory in which the species occurs</b>	<b>Date listed or assessed (or N/A)</b>	<b>Listing category i.e. critically endangered or 'none'</b>	<b>Listing criteria i.e. B1ab(iii)+2ab(iii)</b>
International (IUCN Red List)				
National (EPBC Act)				
State / Territory	1. WA (WC Act 1950)	07/04/2014	Critically Endangered	B2ab(ii,iii,v)
	2. WA (WC Act 1950)	28/09/2016	Endangered	B1ab(ii,iii,v)+B2ab(ii,iii,v); C2(a)(i)
	3.			
<b>Consistent with Schedule 1, item 2.7 (h) and 2.8 of the Common Assessment Method Memorandum of Understanding, it is confirmed that:</b>				
<ul style="list-style-type: none"> <li>this assessment meets the standard of evidence required by the Common Assessment Method to document the eligibility of the species under the IUCN criteria;</li> </ul>			Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
<b>Comments:</b>				
<ul style="list-style-type: none"> <li>surveys of the species were adequate to inform the assessment;</li> </ul>			Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
<b>Comments:</b>	Targeted surveys have been undertaken between 2003 and 2015 at all three subpopulations. Plots have been established at all three sites for monitoring and population estimates. Other vegetation surveys and ecological community surveys have been conducted in much of the remnant vegetation of the Swan Coastal Plain in previous years.			
<ul style="list-style-type: none"> <li>the conclusion of the assessment remains current and that any further information that may have become available since the assessment was completed supports or is consistent with the conclusion of the assessment.</li> </ul>			Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
<b>Comments:</b>	Assessment has changed due to re-calculation of the AOO using the 2x2km grid method. No longer meets CR under criterion B2. Meets EN under criterion B1, B2 and C2(a)(i).			

Nominated national conservation status: category and criteria		
Presumed extinct (EX) <input type="checkbox"/> Critically endangered (CR) <input type="checkbox"/> Endangered (EN) <input checked="" type="checkbox"/> Vulnerable (VU) <input type="checkbox"/>		
None (least concern) <input type="checkbox"/> Data Deficient <input type="checkbox"/> Conservation Dependent <input type="checkbox"/>		
What are the IUCN Red List criteria that support the recommended conservation status category?	B1ab(ii,iii,v)+B2ab(ii,iii,v); C2(a)(i)	
Eligibility against the IUCN Red List criteria (A, B, C, D and E)		
Provide justification for the nominated conservation status; is the species eligible or ineligible for listing against the five criteria. For <b>delisting</b> , provide details for why the species no longer meets the requirements of the current conservation status.		
A.	Population size reduction (evidence of decline)	<ul style="list-style-type: none"> <li>Plant numbers have reduced at the Kemerton subpopulation by 80% – from 100 in 2003 to 20 plants in 2008, with a recent survey (2015) only locating one plant.</li> <li>Insufficient data to assess across all of the species' subpopulations.</li> </ul>
B.	Geographic range (EOO and AOO, number of locations and evidence of decline)	<ul style="list-style-type: none"> <li>(B1) The three known locations of the species are highly disjunct. Using Minimum Convex Polygon, the EOO is 651 km<sup>2</sup>.</li> <li>(B2) The Area of Occupancy is 12km<sup>2</sup> using the 2x2km grid method.</li> <li>(a) The species is severely fragmented and only occurs at four subpopulations from three locations approximately 175 km apart. The degree of fragmentation has increased beyond the natural level of separation of the flat low-lying calcareous winter wet habitat type on the extensively cleared Swan Coastal Plain.</li> <li>(b) Continuing decline observed and projected: <ul style="list-style-type: none"> <li>(ii) The Kemerton subpopulation had an area occupied of 0.1 km<sup>2</sup> but this declined within five years to 200 m<sup>2</sup>. If management does not succeed in protecting the remaining habitat at Kemerton, then it is projected that the location will become extinct, resulting in a projected decline in number of locations and AOO.</li> </ul> </li> <li>(iii) Ongoing threats to habitat condition and extent from sand mining, proposed development, weed competition and a drying climate.</li> <li>(v) Plant numbers have reduced at the Kemerton subpopulation by 80% from 100 in 2003 to 20 plants in 2008, with a recent survey (2015) only locating one plant.</li> <li><b>Meets criteria for Endangered B1ab(ii,iii,v)+B2ab(ii,iii,v)</b></li> </ul>
C.	Small population size and decline (population size, distribution and evidence of decline)	<ul style="list-style-type: none"> <li>There are 333 mature individuals in total.</li> <li>If management does not succeed in protecting the remaining habitat at Kemerton, then it is projected that the total plant numbers will reduce a further 5.6% and the total number of locations by one out of three (33%).</li> </ul>



<p>Grazing (kangaroos)</p> <ul style="list-style-type: none"> <li>Kangaroos (scientific name) are reducing seed production and hence the establishment of seedlings, thereby limiting natural recruitment.</li> </ul> <p>Current</p>	Kemerton subpopulation	Severe
<p>Feral pigs</p> <ul style="list-style-type: none"> <li>Feral pigs (scientific name) cause severe damage to plants and their habitat by digging through large areas of soil in search of food. They also increase the potential of weed and nutrient introduction, and the soil disturbance they create encourages establishment of weeds. Grazing may also reduce the reproductive output of the species. In more recent surveys, pigs did not appear to be active in the area.</li> </ul> <p>Past and current</p>	Kemerton subpopulation	Moderate (severe damage to <i>Austrostipa bronwenae</i> plants occurred in 2008)
<p>Fire and firebreak maintenance</p> <ul style="list-style-type: none"> <li>Increased frequency of fire will deplete the soil seed store. Fire also facilitates weed invasion.</li> <li>Creation and maintenance of firebreak can damage individual plants.</li> </ul> <p>Current and future</p>	Entire Kemerton subpopulation (single plant occurs along a firebreak)	Moderate
<p>Vegetation clearing</p> <ul style="list-style-type: none"> <li>Clearing for future subdivision of a private property will cause habitat loss.</li> </ul> <p>Future</p>	Kenwick subpopulation	Moderate
<p>Mineral sands mining</p> <ul style="list-style-type: none"> <li>Mining causes the loss and degradation of habitat</li> </ul> <p>Current and future</p>	Kemerton subpopulation	Catastrophic
<p>Drought</p> <ul style="list-style-type: none"> <li>Drought could be considered as equivalent to a major disturbance even when considering the capacity of plants to recover from other disturbances such as fire, and seedling recruitment and survival.</li> <li>The Bunbury subpopulation occurs on a claypan community which is at risk of reduced surface water due to low levels of rainfall.</li> </ul> <p>Current and future</p>	Bunbury subpopulation	Severe
<b>Management and Recovery</b>		
Is there a Recovery Plan (RP) or Conservation Management Plan operational for the species?		Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
<p>List all relevant recovery or management plans (including draft, in-preparation, out-of-date, national and State/Territory recovery plans, recovery plans for other species or ecological communities, or other management plans that may benefit or be relevant to the nominated species).</p> <ul style="list-style-type: none"> <li>Department of Parks and Wildlife (2015 DRAFT). <i>Interim Recovery Plan No. #: Austrostipa bronwenae Interim Recovery Plan 2015–2020</i>. Perth, Western Australia: Department of Parks and Wildlife.</li> </ul>		

- Department of Parks and Wildlife (2015). *Interim Recovery Plan No. 354: Clay pans of the Swan Coastal Plain (Community types 7, 8, 9 and 10a – Gibson et. al. 1994 and Clay pans with mid dense shrublands of Melaleuca lateritia over herbs) 2015-2020*. Available from: <http://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/198-approved-interim-recovery-plans>
- Department of Conservation and Land Management (2000). *Interim Recovery Plan No. 57: Shrubland and woodlands on Muchea limestone 2000-2003*. Available from: <http://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/198-approved-interim-recovery-plans>

List current management or research actions, if any, that are being undertaken that benefit the conservation of the species.

- Land managers have been notified of the location and threatened status of *Austrostipa bronwenae*.
- Monitoring and surveys have been carried out to determine population numbers and impact of threats.
- A temporary ring lock fence has been installed around the remaining plant at the Kemerton subpopulation to prevent grazing by kangaroos and allow room for recruitment.

List further recommended management or research actions, if any, that would benefit the conservation of the species.

#### Management

- Ongoing monitoring and observations of subpopulations and threats.
- Expand the fencing at the Kemerton subpopulation to reduce grazing by kangaroos and pigs and allow recruitment within a larger area of habitat. Investigate installing fencing at the Bunbury subpopulation to prevent damage by recreational users. Repair fencing at the Kenwick site managed by the Department of Planning to prevent damage by recreational users.
- Collect and store seeds to guard against the extinction of natural populations. Collections should aim to sample and preserve the maximum range of genetic diversity possible.
- Undertake weed control at all subpopulations.
- Undertake surveys in areas of potentially suitable habitat during spikelet production, which occurs between October and November or early summer.
- Seek additional ways of protecting habitat on private property, such as land purchase or the development of a Management Plan in consultation with land holders.
- Develop a translocation proposal and select a disease free translocation site.
- Develop and implement a fire management strategy, including associated weed control measures and the need for and method of the construction and maintenance of firebreak.
- Ongoing liaison with land managers, the mining company and Aboriginal communities to ensure that populations of *Austrostipa bronwenae* are not accidentally damaged or destroyed, and the habitat is maintained in a suitable condition for the conservation of the species.
- Map habitat critical to the survival of *Austrostipa bronwenae* to facilitate its protection and appropriate management.
- Promote awareness of the species with land managers/owners and general public.

#### Research

- Undertake a genetic study to confirm the relationship between the widely separated subpopulations.
- As habitat disturbance (physical or fire) is thought to promote germination of soil stored seed, it is recommended that disturbance trials be undertaken.
- Research biology and ecology of the species, with a focus on pollination effectiveness, seed viability, conditions required for natural germination, response to threats and disturbances, and reproductive biology.

<b>Nomination prepared by:</b>	
<b>Contact details:</b>	
<b>Date submitted:</b>	05/10/2016
<i>If the nomination has been refereed or reviewed by experts, please provide their names and contact details:</i>	

Summary of subpopulation information <i>(detailed information to be provided in the relevant sections of the form)</i>						
Location <i>(include coordinates)</i>	Land tenure	Survey information: Date of survey and No. mature individuals	Area of sub-populations	Site / habitat Condition	Threats <i>(note if past, present or future)</i>	Specific management actions
Brook Rd, Kenwick 115.9875, -32.0133	Department of Planning	2009: few plants 2013: 188 mature individuals (+45 juveniles) 2014: 232 mature individuals	5,148 m <sup>2</sup>	Very good	Weed invasion (present and future) Recreational activities (present and future) Poor recruitment (future) Fire (future) Drought (future)	Conduct weed control Install fencing to prevent disturbance and improve recruitment Develop a fire management plan
Brook Rd, Kenwick 115.9885, -32.0129	Private property	2009: 2 clusters (unable to distinguish individual plants, but few plants noted)	Unknown	Very good	Weed invasion (present and future) Vegetation clearing (past, present and future) Fire (future) Poor recruitment (present and future) Drought (future)	Conduct weed control Ensure land managers and owners are aware of the presence of the species Seek additional ways of protecting habitat (develop management plan with land managers) Develop a fire management plan Install fencing to prevent disturbance and improve recruitment
CR 32719, Bunbury 115.6628, -33.3630	Shire Reserve (Purpose: recreation)	2012: 100 mature individuals 2015: >100 mature individuals	6,000 m <sup>2</sup>	Excellent	Weed invasion (present and future) Recreational activities (present and future) Drought (future)	Conduct weed control Install fencing to prevent disturbance from recreational activities and improve recruitment



Proposed Kemerton Nature Reserve 115.7989, -33.1358	Conservation estate (unofficial nature reserve)	2003: 100 mature individuals 2008: 20 mature individuals 2015: 1 mature individual	200 m <sup>2</sup>	Poor	Weed invasion (present and future) Grazing (kangaroos and pigs) (past and present) Poor recruitment (present and future) Fire and firebreak maintenance (present and future) Sand mining (past, present and future) Drought (future)	Conduct weed control Install fencing to prevent grazing and improve recruitment Develop a fire management plan Seek additional ways of protecting habitat (purchase for conservation estate or develop management plan with land managers)
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Department of  
Environment and Conservation

Our environment, our future



**Form to nominate a Western Australian species for listing as threatened, change of category or delisting 2014 (updated 2016).**

**NOTICE:** Incomplete forms may result in delays in assessment, or rejection of the nomination. To fill out this form you must refer to the Guidelines and contact the relevant Officer in the DEC Species and Communities Branch. DEC staff can advise you on how to fill out the form and may be able to supply additional, unpublished information.

Answer all relevant sections, filling in the white boxes and indicating when there is no information available. **Note**, this application form applies to both flora and fauna species, and hence some questions or options may not be applicable to the nominated species – for these questions, type “N/A”.

To mark boxes with a **cross**, double click the box and select not checked or checked.

**SECTION 1. NOMINATION**

**1.1. Nomination for:**

Flora ☒ Fauna ☐ Threatened / DRF ☒ Change of category ☐ Delisting ☐

**1.2. Scientific Name**

This name will be used to identify the species on all official documentation. Use the approved name used by the Western Australian Museum or Herbarium, if possible.

*Austrostipa bronwenae* A.R. Williams

**1.3. Common Name**

If the species has a generally accepted common name, please show it here.

**1.4. Current Conservation Status. If none, type 'None'.**

	IUCN Red List Category e.g. Vulnerable	IUCN Red List Criteria e.g. B1ab(iv);D(1)
International IUCN Red List	None	
National EPBC Act 1999	None	
State of Western Australia	Critically Endangered [2014]	B2ab(ii,iii,v)
State of WA Priority	1 <input type="checkbox"/>	2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>

**1.5. Nominated Conservation Status.**

	IUCN Red List Category e.g. Vulnerable	IUCN Red List Criteria e.g. B1ab(iv);D(1)
State of Western Australia	Critically Endangered	2ab(ii,iv,v); D
State of WA Priority	1 <input type="checkbox"/>	2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/>

Is the species listed as 'Threatened' in any other Australian State or Territory? If Yes, list these States and/or Territories and the status for each.

No ☒ Yes ☐

**1.6. Reasons for the Nomination.**

**Briefly summarise the reasons for the nomination in dot points. Please include details relevant to the IUCN Categories and Criteria where appropriate.**

Only known from three sites (Kenwick, Kemerton and Bunbury) comprising four small subpopulations.

1. Reduction in population size (observed, inferred and projected [explanations below]).

Observed

- Plant numbers have reduced at the Kemerton site by 80% from 100 growing in three discrete areas over 10ha, to 20 plants in one area.

Inferred

- At the Kenwick site, substantial areas of suitable habitat within the surrounding area have been cleared for urban development.
- There are major hydrological changes occurring at Kemerton through sand mining.
- At the Bunbury site, extensive clearing has occurred for urban development.
- A possible requirement for hot fires to recruit plants is unlikely to be undertaken and may cause significant weed invasion.

Projected

- Plant numbers will almost certainly reduce in the future, considering the still active proposals to extend the Kemerton sand mine and plans for the Kenwick site to be part of a regional industrial area.
2. Area of occupancy is <10 km<sup>2</sup>.
  3. Continuing decline (observed, inferred and projected in the area of occupancy; area, extent & quality of habitat and number of locations).
    - Sand mining, proposed development, weed competition and a drying climate will impact further on the habitat in all of the locations.
  4. Number of locations are <5 and severely fragmented.
  5. Number of mature individuals are <2,500 [333, 2016].

<b>SECTION 2. SPECIES</b>
<b>2.1. Taxonomy.</b> <b>Describe the taxonomic history, using references, and describe the key distinguishing features that can be used to separate this taxon from closely related taxa. Include details of the type specimen, changes in taxonomy, scientific names and common names used for the species.</b>
<p>First recorded from Muchea limestone at Kemerton in 2003. Separated as <i>Austrostipa</i> sp. Harvey (BJ Keighery GWAL/1) in PERTH. Subsequently described as <i>Austrostipa bronwenae</i> by AR Williams in a revision of the subgenus in which it occurs (Williams, A.R. (2011) <i>Austrostipa</i> (Poaceae) subgenus <i>Lobatae</i> in Western Australia. Telopea 13: 177-192.)</p> <p>A key to the group is presented on page 180 and a very detailed comparison of the 4 known species is given on page 185 of the revision.</p> <p>The Swan Coastal Plain species (<i>A. bronwenae</i> and <i>A. jacobsiana</i>) differ from wheatbelt species (<i>A. geoffreyi</i> and <i>A. juncifolia</i>) of the subgenus in having basal leaf sheaths 2-4 mm wide, vs 7-11 mm, ligule lobes 0-1 mm long (vs 2.5-12 mm long) with distinct sheath lobes.</p> <p><i>Austrostipa bronwenae</i> differs from <i>A. jacobsiana</i> having a narrow to almost absent ligule between long sheath lobes, possessing an involucre of hairs almost encircling the culm, upper glume 3 nerved and lemma hairs dark golden brown at maturity and anthers pedicellate, 4-5 mm long.</p>
<b>Is this species conventionally accepted? If no, explain why. For example, is there any controversy about the taxonomy? For undescribed species, detail the location of voucher specimens (these should be numbered and held in a recognised institution and be available for reference purposes).</b>
No <input type="checkbox"/> Yes <input checked="" type="checkbox"/>
<b>Describe any known hybridisation with other species in the wild, indicating where this occurs and how frequently.</b>
None known
<b>2.2. Description</b> <b>Describe the physical appearance, habit, behaviour/dispersion and life history. Include anatomy or habit (e.g. size and/or weight, sex and age variation, social structure) and dispersion (e.g. solitary, clumped or flocks etc), and life history (e.g. short lived, long lived, geophytic, etc).</b>
Perennial rhizomatous grass to 1.5 metres tall (with flower spikes). Leaves to 45 cm long, terete, rolled or involute, abaxial surface not ribbed. Inflorescence 10-20 cm long. Flowering from October through November.
<b>2.3. Distribution</b> <b>Describe the distribution of the species in Australia and, if possible, provide a map.</b>
Swan Coastal Plain, south-Western Australia. <i>Austrostipa bronwenae</i> is currently known from two sub-populations at Kenwick (~16 km SE of Perth) one population at Kemerton (131 km S of Perth) and one population at Bunbury (191 km S of Perth) (refer Map 1 attached).

<b>2.4. Habitat</b> Describe the non-biological habitat (e.g. aspect, topography, substrate, climate) and biological habitat (e.g. forest type, associated species, sympatric species). If the species occurs in various habitats (e.g. for different activities such as breeding, feeding, roosting, dispersing, basking etc) then describe each habitat.
<b>Non-biological habitat</b>
<i>Austrostipa bronwenae</i> grows within the Swan Coastal Plain in flat low-lying calcareous winter wet grey-brown sandy loam or dark brown loam over clay. Two of the sites are examples of Muchea Limestone [Keighery, G.J. and Keighery, B.J. (1995)].
<b>Biological habitat</b>
At Kenwick the species grows under Tall Open Shrubland of <i>Callitris pyramidalis</i> and <i>Viminaria juncea</i> over Open Shrubland of <i>Melaleuca brevifolia</i> over Open Low Heath of <i>Hypocalymma angustifolia</i> , <i>Grevillea thelemanniana</i> subsp. <i>thelemanniana</i> (P4), <i>Acacia lasiocarpa</i> , <i>Banksia telmatiaea</i> , <i>Boronia crenulata</i> with <i>Gahnia trifida</i> . Plants were also recorded on the boundary of Sedgeland/Herbland of <i>Chaetanthus aristatus</i> , <i>Centrolepis aristata</i> .  At Kemerton, plants grow under <i>Eucalyptus decipiens</i> over <i>Gahnia trifida</i> .  At Bunbury, plants grow under <i>Melaleuca raphiophylla</i> , <i>Eucalyptus rudis</i> Low Open Forest over <i>Hakea varia</i> Tall Open Shrubland over <i>Gahnia trifida</i> and <i>Baumea juncea</i> sedges.
<b>Does the (fauna) species use refuge habitat e.g. in times of fire, drought or flood? Describe this habitat.</b>
N/A
<b>Is the species part of, or does it rely on, a listed threatened ecological community? Is it associated with any other listed threatened species?</b>
Yes. Both the Kenwick and Kemerton sites are associated with the 'Muchea Limestone' TEC. The Kenwick site is a wetter type that has a <i>Melaleuca</i> shrub overstorey.  The wetland at Bunbury is highly likely to be an example of the TEC Swan Coastal Plain 09 – 'Dense shrublands on clay flats'.
<b>2.5. Reproduction</b> Provide an overview of the breeding system. For <u>fauna</u> : Provide an overview of the breeding system and breeding success, including: when does it breed; what conditions are needed for breeding; are there any breeding behaviours that may make it vulnerable to a threatening process? For <u>flora</u> : When does the species flower and set fruit? Is the seed produced viable? What conditions are needed for this? What is the pollinating mechanism? If the species is capable of vegetative reproduction, a description of how this occurs, the conditions needed and when. Does the species require a disturbance regime (e.g. fire, ground disturbance) in order to reproduce?
Flowering from October through November. Mature seeds present November through December. Pollinated by wind.
<b>2.6. Population dynamics</b> Provide details on ages of sexual maturity, extent of breeding success, life expectancy and natural mortality. Describe population structure (presence of juveniles/seedlings, mature and senescing individuals).
Both mature and juvenile plants were recorded for the Kenwick population. Plants are caespitose and usually form large clumps. Some very small individual non-flowering plants were seen at the Kenwick site.

<b>Questions 2.7 and 2.8 apply to <u>fauna</u> nominations only</b>
<b>2.7. Feeding</b> <b>Summarise food items or sources and timing/availability.</b>
N/A
<b>Briefly describe feeding behaviours, including those that may make the species vulnerable to threatening processes.</b>
N/A
<b>2.8. Movements</b> <b>Describe any relevant daily or seasonal pattern of movement for the species, including relevant arrival/departure dates if migratory. Provide details of home range/territories.</b>
N/A
<b>SECTION 3. INTERNATIONAL CONTEXT</b>
<b>For species that are distributed both in <u>Australia</u> and in <u>other countries</u>.</b>
<b>3.1. Distribution</b> <b>Describe the <u>global</u> distribution.</b>
Swan Coastal Plain, south-Western Australia
<b>Provide an overview of the global population size, trends, threats and security of the species outside of Australia.</b>
N/A
<b>Explain the relationship between the Australian population and the global population. What percentage of the global population occurs in Australia? Is the Australian population distinct, geographically separate or does part, or all, of the population move in/out of Australia's jurisdiction? Do global threats affect the Australian population?</b>
The entire species is in south-Western Australia
<b>SECTION 4. CONSERVATION STATUS AND MANAGEMENT</b>
<b>4.1. Population</b> <b>What is the total population size in terms of number of mature individuals? Has there been any known reduction in the size of the population, or is this likely in the future? – provide details. Are there other useful measures of population size and what are they? Or if these are unavailable, provide an estimate of abundance (e.g. scarce, locally abundant etc).</b>
<p>At Kenwick both sub-populations are on adjoining freehold lots (one is privately owned and the other is state government managed). Records in the taxonomic paper describing the species indicate that in 2009 there were only a few plants on one lot with two similar small clusters on the adjacent lot within regenerating vegetation 3 years post-fire.</p> <p>In 2014, a detailed survey of the original record on Lot 26 Brook Rd at Kenwick (state gov't managed) found 232 plants over 0.5 ha. Permission was not obtained to review the two small clusters on the adjoining privately owned Lot 28.</p> <p>At Kemerton in 2003 there were three sub-populations over an area of 10 ha, extending west and north of the current population. In 2008, this had declined to 20 individuals growing in an area of 200 m<sup>2</sup>.</p> <p>At Bunbury in 2012 over 100 plants were estimated to be growing in an area of 0.6 ha. The population was observed to appear unchanged in 2013.</p> <p>Overall the current total population is most likely to be between 352 and 400 known plants (clumps).</p>

**Provide locations of: captive/propagated occurrences or *ex situ* collections; recent re-introductions to the wild; and sites for proposed re-introductions. Have these sites been identified in recovery plans?**

none

**How many locations do you consider the species occurs in and why? Where a species is affected by more than one threatening event, location should be defined by considering the most serious plausible threat.**

*Austrostipa bronwenae* occurs in three widely separated locations ~175 km apart, and is seriously threatened at the Kemerton location from declining habitat and plant numbers.

**For flora, and where applicable, for fauna, detail the location, land tenure, estimated number of individuals, area of occupancy, and condition of site for each known date, location or occurrence.**

Date of survey	Location	Land status (DPaW 2014)	Number of individuals at location	Area of occupancy at location	Condition of site (Gov't of WA 2000)
(Pop 1) 2003	Kemerton	UCL	100	10 hectares	Excellent
(Pop 1) 2008	Kemerton	Proposed Kemerton Nature Reserve	20	200m <sup>2</sup>	Very Good (evidence of severe pig damage)
(Pop 2) 2009	Lot 26 Brook Rd, Kenwick	Freehold Dep't of Planning	Few plants		Very Good to Excellent
(Pop 2) 2014	Lot 26 Brook Rd, Kenwick	Freehold Dep't of Planning	232	5,148 m <sup>2</sup>	Very good to Excellent
(Pop 3) 2009	Lot 28 Brook Rd, Kenwick	Freehold. Private landowner	Two clusters of few plants		Very Good
(Pop 4) 2012	Loughton (Carey) Park, Bunbury	CR 32719 Public recreation	100	6,000 m <sup>2</sup>	Excellent to Pristine

**Has the number of individuals been counted, or is this an estimate? Provide details of the method of determining the number of individuals.**

The number of plants (clumps) were accurately counted and recorded with a Differential GPS at Lot 26 Brook Rd. Kenwick. Estimates of plant numbers were given for the other sites.

**Has there been any known reduction in the number of locations, or is this likely in the future? – provide details.**

Yes. At the Kemerton site there were three sub-populations over an area of 10 ha. Within 5 years this had declined to one over an area of 200 m<sup>2</sup>.

<b>What is the extent of occurrence (in km<sup>2</sup>) for the species; explain how it was calculated and datasets used. If an accurate estimate is unavailable, provide a range of values or a minimum or maximum area estimate. Include estimates of past, current and possible future extent of occurrence.</b>
The linear distance between the two known locations from Kenwick to Kemerton is 175 km. As these populations are highly disjunct with a mostly cleared vegetation in-between it is not accurate to quantify the km <sup>2</sup> extent of occurrence.
<b>If available, include data that indicates the percentage decline over 10 years or 3 generations (whichever is longer) that has occurred or is predicted to occur.</b>
Locally, at the Kemerton site, plant numbers have declined by 80% over the past 5 years. If management does not succeed in protecting the remaining habitat, total plant numbers will reduce a further 5.6% and the total number of sites by 33%.
<b>Is the distribution of the species severely fragmented? Why?</b>
Yes. There are only three known sites occurring ~175 km apart, two are on the eastern side of the Swan Coastal Plain which is over 95% cleared. The habitat the species occurs in, be it either the Muchea Limestone or Pinjarra Plain wetlands dominated by <i>Gahnia trifida</i> sedges are extensively cleared within the DPaW South-West Region. There are no other occurrences of this habitat remaining in this region.
<b>Identify important occurrences necessary for the long-term survival and recovery of the species? This may include: key breeding populations, those near the edge of the range of the species or those needed to maintain genetic diversity.</b>
All occurrences of this species are important.
<b>4.2. Survey effort</b>
<b>Describe the methods to conduct surveys. For example, (e.g. season, time of day, weather conditions); length, intensity and pattern of search effort (including where species not encountered); any limitations and expert requirements.</b>
Two surveys have been undertaken at the Kenwick site during early summer, which is the appropriate season for spikelet production. The first visit in 2009 involved plot establishment when plants were noted and an estimation of numbers taken. The second survey in 2014 consisted of recording accurate plant numbers during a transect-based search of the property.  Two surveys were undertaken of the Kemerton site. The first visit in mid-Spring 2003 involved plot establishment and a description of the pattern of the plants in the area. The second survey in early summer 2008 estimated plant numbers remaining within a reduced habitat.  The Hay Park, Bunbury site has been visited a number of times to monitor established plots where the <i>A. bronwenae</i> occurs and the population assessed for changes each time. The first targeted survey in early summer 2012 estimated the plant numbers at 100 and the second survey in 2013 recorded no change. The entire reserve was searched.
<b>Provide details on the distinctiveness and detectability of the species, or the distinctiveness of its habitat, that would assist survey success.</b>
The large size of the plant and its long persistent and visible glumes on old inflorescences make it noticeable in accompanying vegetation so it is unlikely to have been overlooked in a now very well surveyed area.



**Has the species been reasonably well surveyed? Provide an overview of surveys to date (include surveys of known occurrences and surveys for additional occurrences) and the likelihood of its current known distribution and/or population size being its actual distribution and/or population size. Include comments on potential habitat and surveys that were conducted, but where the species was not present/found.**

Yes. Considering the number of surveys undertaken within remnant vegetation of the eastern side of the Swan Coastal Plain over many years for the Swan Coastal Plain Floristic Survey, System six update, Bush Forever and Swan Bioplan). As well as numerous surveys for potential TEC sites by Departmental staff.

#### **4.3. Threats**

**Identify past, current and future threats indicating whether they are actual or potential. For each threat describe:**

- a). how and where they impact this species
- b). what the effect of the threat(s) has been so far (indicate whether it is known or suspected
- c). present supporting information/research
- d). does it only affect certain populations?
- e). what is its expected effect in the future (is there supporting research/information; is the threat only suspected; does it only affect certain populations?).

**If possible, provide information threats for each current occurrence/location:**

<b>Location</b>	<b>Past threats</b>	<b>Current threats</b>	<b>Potential threats</b>	<b>Management requirements (see section 4.4)</b>
(Pop 1) Kemerton	Sand mining	Sand mining, pigs	Hydrological change through mining and a drying climate, nutrient enrichment, fire management.	Prepare a Recovery Plan for this species to address current and potential threats specific to each location.
(Pop 2) Kenwick	Clearing for housing, grazing, road development	Inappropriate fire intervals, recreational vehicles	Hydrological change through a drying climate, weed invasion, clearing, inappropriate fire intervals, recreational vehicles	Prepare a Recovery Plan for this species to address current and potential threats specific to each location.
(Pop 3) Bunbury	Clearing for housing	Weed invasion, fire prevention management	Hydrological change through a drying climate	Prepare a Recovery Plan for this species to address current and potential threats specific to each location.

<b>Identify and explain why additional biological characteristics particular to the species are threatening to its survival (e.g. low genetic diversity). Identify and explain any models addressing the survival of the species.</b>	
Habitat specificity has resulted in a rapidly declining regional area of occupation and extent of occurrence. There is now low population numbers, leading to enhanced chance events.	
<b>4.4. Management</b> <b>Identify key management documentation for the species e.g. recovery plans, conservation plans, threat abatement plans etc.</b>	
None	
<b>Does this species benefit from the management of another species or community? Explain.</b>	
Yes. Management of Muchea Limestone and SCP09 TECs, and general management of wetlands on the eastern side of the Swan Coastal Plain.	
<b>How well is the species represented in conservation reserves or covenanted land? Which of these are actively managed for this species? Provide details.</b>	
None are currently represented in conservation reserves. The population at Kemerton is in a proposed Nature Reserve.  The population at Bunbury is in a Crown Reserve, but the purpose is Public Recreation.	
<b>Are there any management or research recommendations that will assist in the conservation of the species? Provide details.</b>	
Need genetic studies on differences between these highly disjunct populations and on the variation within each population to determine management priorities.	
<b>4.5. Other</b> <b>Is there any additional information that is relevant to consideration of the conservation status of this species?</b>	
Fire response.	
<b>SECTION 5. NOMINATOR</b>	
<b>Nominator(s) name(s)</b>	
<b>Organisation(s)</b>	
<b>Address(s)</b>	
<b>Telephone number(s)</b>	
<b>Email(s)</b>	
<b>Date</b>	10/20/2014
<b>If the nomination has been refereed or reviewed by experts, provide their names and contact details.</b>	

## SECTION 6. REFERENCES

**What references or sources did you use to prepare your nomination? Include written material, electronic sources and verbal information. Include full references, address of web pages and the names and contact details of authorities with whom you had verbal communications.**

Government of Western Australia (2000) Bushforever, Vol. 2 Directory of Bush Forever Sites. Government of Western Australia.

Keighery, G.J. and Keighery, B.J. (1995). Muchea Limestones - Floristics. Unpublished report to ANCA National Reserves Network and CALM. 10 pp. Tauss, C. and A.S. Weston (2010) The Flora, Vegetation and Wetlands of the Maddington-Kenwick Strategic Employment Area. Report to City of Gosnells.

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

### **Electronic Information**

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Western Australian Herbarium (1998–). *FloraBase—the Western Australian Flora*. Department of Environment and Conservation. <http://florabase.dpaw.wa.gov.au> [last accessed on 11 February 2014].

Department of Environment and Conservation (2014) Threatened Flora Database (DEFL). Species and Communities Branch, DPaW, Western Australia.