

## 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>Galaxiella nigrostriata</i> (black-stripe minnow, black-striped dwarf galaxias)</b>
<b>Nomination for</b> (addition, deletion, change):	<b>Addition</b>
<b>Nominated conservation category and criteria:</b>	<b>Endangered A2bc</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:			
Scientific committee Meeting date:			
Scientific committee comments:			
Recommendation:			
Ministerial approval:		Date of Gazettal/ Legislative effect:	

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

<b>Current conservation status</b>				
<b>Scientific name:</b>	<i>Galaxiella nigrostriata</i>			
<b>Common name:</b>	black-stripe minnow, black-striped dwarf galaxias			
<b>Family name:</b>	Galaxiidae	Fauna <input checked="" type="checkbox"/>	Flora <input 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)	6/1/2017	Endangered	A2bc
	2.			
	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>	Historical (pre-2000) records include WA Museum collections and studies conducted by Christensen (1982), Pusey & Edwards (199) and Morgan <i>et. al.</i> (1998). A targeted study was undertaken by Galeotti in 2013. In 2014 and 2015, Ogston <i>et. al.</i> (2016) surveyed 53 sites for presence or absence of <i>G. nigrostriata</i> . The sites included a re-examination of all historical records and additional sites that have not previously been surveyed. The survey caught the species at 26 of the 53 sites sampled between Augusta and Albany. There is also reliable evidence of three occurrences on the Swan Coastal Plain.			
<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>	The species was assessed by Ogston <i>et. al.</i> (2016) and nominated for listing in Western Australia at the 2016 WA TSSC meeting. Freshwater fish surveys since 2015 have not found <i>G. nigrostriata</i> at any additional sites and therefore the conclusion of the assessment remains current.			

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?	A2bc	
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>(A2) Eligible for listing as Endangered meeting the sub-criteria A2bc: A population reduction <math>\geq 50\%</math> over 10 years is inferred based on calculated declines in EOO and AOO. Historical EOO is calculated as 47,578 km<sup>2</sup> and current EOO as 20,276 km<sup>2</sup>, which is an approximate reduction of 57%. Historical AOO is calculated as 55 km<sup>2</sup> (244 km<sup>2</sup> using 2kmx2km grid) and a current AOO as 23 km<sup>2</sup> (80 km<sup>2</sup> using 2kmx2km grid), which is an approximate reduction of 58%. The reduction occurred in the past and may not have ceased or be reversible.</li> <li>The EOO and AOO calculated reductions are considered to be (b) 'an index of abundance appropriate to the taxon'.</li> <li>(A4) Not eligible for listing against sub-criterion A4c: The issue of climate change was loosely inferred in the supporting paper and was not clearly stated how it would impact the species. There was insufficient information to demonstrate the scale of the inferred future decline in population size due to climate change for meeting eligibility under A4 as being <math>\geq 30\%</math> for vulnerable or <math>\geq 50\%</math> for endangered. However, it was accepted that climate change was an issue for the species.</li> </ul>
B.	Geographic range (EOO and AOO, number of locations and evidence of decline)	<ul style="list-style-type: none"> <li>(B2) Not eligible: The EOO is larger than 20,000 km<sup>2</sup> (calculated as 20,276 km<sup>2</sup> using MCP), therefore not eligible under B1. The AOO is calculated as less than 500 km<sup>2</sup> (calculated as 23 km<sup>2</sup> using 2kmx1km grid or 80km<sup>2</sup> using 2kmx2km grid), meeting sub-criterion B2 for Endangered.</li> <li>There is calculated (b) continuing decline in (i) EOO and (ii) AOO and observed decline (iii) area, extent and quality of habitat. However, (a) the number of locations is greater than 10, it is not considered to be severely fragmented, and there are no (c) extreme fluctuations. Therefore the species does not meet two of the three sub-criteria as required.</li> </ul>
C.	Small population size and decline (population size, distribution and evidence of decline)	<ul style="list-style-type: none"> <li>Not eligible: The number of mature individuals is unknown.</li> </ul>
D.	Very small or restricted population (population size)	<ul style="list-style-type: none"> <li>Not eligible: (D1) the number of mature individuals is unknown, and (D2) the AOO is <math>&gt; 20</math> km<sup>2</sup> and number of locations is <math>&gt; 5</math>.</li> </ul>
E.	Quantitative analysis	<ul style="list-style-type: none"> <li>Not eligible: insufficient data available</li> </ul>

	(statistical probability of extinction)				
<b>Summary of assessment information</b>					
EOO	20,276 km <sup>2</sup> (Minimum Convex Polygon)	AOO	80 km <sup>2</sup> (2kmx2km grid) 23 km <sup>2</sup> (1km x1km grid)	Generation length	1 year
No. locations	11 based on occurrences in separate river tributaries and swamp/lakes outside those tributaries.	Severely fragmented	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown <input type="checkbox"/>		
No. subpopulations	3 on Swan Coastal Plain and >8 between Augusta and Albany	No. mature individuals	Unknown		
Percentage global population within Australia			100 %		
Percentage population decline over 10 years or 3 generations			Inferred population reduction of ≥ 50 % over 10 years based on a calculated decline in EOO and AOO		
<b>Threats</b> (detail how the species is being impacted)					
Threat (describe the threat and how it impacts on the species. Specify if the threat is past, current or potential)		Extent (give details of impact on whole species or specific subpopulations)		Impact (what is the level of threat to the conservation of the species)	
Climate change leading to increased air and water temperatures, decreased rainfall, increased evaporation and lowering groundwater table: <i>Past, present and future</i>  In the south-west of WA, climate change is expected to cause a reduction in rainfall of >40% by 2070 with increased rates of evapotranspiration. This will lead to unseasonal or extended dry periods		The entire south-western region has undergone drying and warming, and furthermore is projected to continue to be impacted into the future.		High: Drying to occur even under low emissions scenarios)	
Introduced invasive fish: <i>Past, present and future</i>  The introduction of exotic fish, including the mosquitofish <i>Gambusia holbrooki</i> , could impact on <i>G. nigrostriata</i> through food competition, aggressive or predatory behaviour (i.e. fin-nipping) leading to displacement, injury and/or death, and introduction of diseases.		Permanent pools throughout the species distribution.		Low (on a species scale): <i>G. holbrooki</i> is unable to survive dry periods in the ephemeral wetlands and therefore will only be a major threat in areas where <i>G. nigrostriata</i> survives in permanent pools.	
Habitat modification leading to degradation and loss of habitat: <i>Past, present and future</i>  Filling and draining of wetlands and waterways for various land-use practices, including agriculture, urbanisation, road construction and maintenance, forestry, dams and other related infrastructure, and mineral and quartzite sand mining.  Excessive anthropogenic groundwater extraction.		Historically in areas now primarily used for agricultural and urban purposes (i.e. Swan Coastal Plain)  Currently, isolated pools or sections of pools bordering long strips of roadway.		Historically, High: land use practices directly or indirectly caused the loss of up to 80% of wetlands on the Swan Coastal Plain  Low (on a species scale), High (on a local scale): Loss of individual sites causing potential isolation of other	

Altered fire regimes. Increased salinity due to agricultural practices/historical land clearing.		pools
<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><i>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).</i></p> <ul style="list-style-type: none"> <li>N/A</li> </ul>		
<p><i>List current management or research actions, if any, that are being undertaken that benefit the conservation of the species.</i></p> <ul style="list-style-type: none"> <li>There are numerous wetlands, many of which contain <i>G. nigrostriata</i>, in the south-west that fall within or are directly adjacent to Department-managed lands. The species therefore benefits from any habitat protection and management undertaken in these areas.</li> <li>Fire programs within Department-managed lands consider riparian vegetation prior to conducting burns.</li> <li>Riparian vegetation and stream reserves are protected from timber harvesting under the Forest Management Plan 2014-2023.</li> <li>Main Roads WA, local government and consultants conduct environmental assessments of proposed infrastructure (including maintenance and upgrades of roads).</li> <li>The Freshwater Fish Group at Murdoch University regularly monitors wetlands in the south-west, many of which contain <i>G. nigrostriata</i>.</li> <li>The Freshwater Fish Group at Murdoch University and the South East Regional Centre for Urban Landcare have produced informational products, including a field guide.</li> <li>The <i>WA Native Fish Strategy</i>, funded by the State NRM and undertaken by the WA Department of Fisheries and Department of Water, compiled survey data on native and feral fish into a database, reviewed management actions and developed a public website as an information source for the general public. The WA Department of Fisheries has also produced other educational products, including the <i>Aquatic Invaders Identification Guide: Freshwater</i>.</li> <li>A Freshwater Ecosystems Working Group has been established to act as a liaison point for the management of threatened freshwater species.</li> </ul>		
<p><i>List further recommended management or research actions, if any, that would benefit the conservation of the species.</i></p> <p>The following management or research actions have been recommended by Ogston <i>et. al.</i> (2016) in <i>Section 4.3 Management implication</i>:</p> <ul style="list-style-type: none"> <li>Research the duration of aestivation and other ecological requirements and biological features, including physiological tolerances, timing of reproduction, recruitment and larval development.</li> <li>Research on the suitability and design of artificial water points, with the aim of creating additional pools to prevent the extinction of the species in the wild.</li> <li>Research into the vulnerability of the species to climate change and other threats.</li> <li>Develop management actions based on research to prevent further population decline and range retraction, and develop strategies (i.e. addressing other existing stressors) to increase the species' resilience to climate change.</li> </ul> <p>The following management or research actions have been recommended by Galeotti <i>et. al.</i> (2010) in <i>Discussion</i>:</p>		

- Protect habitat and surrounding areas, including continuing existing and creating new nature reserves to encompass wetlands and provide substantial buffer zones.
- Rehabilitation and change land use in degraded habitats where *G. nigrostriata* is found.
- Reintroductions of *G. nigrostriata* at rehabilitated wetlands within the species' past distribution.
- Install physical barriers, such as bunds, to prevent exotic species from entering un-infested wetlands from permanent rivers or streams.
- Continue to raise public awareness about the impact of releasing exotic species into natural habitats.
- Further genetic analysis to improve identification (i.e. mitigate species confusion) and further examine population genetic structure. Genetic findings should be used to determine whether the northern and southern subpopulations should be managed separately.

**Nomination prepared by:**

**Contact details:**

**Date submitted:**

8/2/2017

*If the nomination has been refereed or reviewed by experts, please provide their names and contact details:*

Summary of subpopulation information (detailed information to be provided in the relevant sections of the form)						
Subpopulations (include coordinates)	Land tenure	Survey information: Date of survey and No. mature individuals	Area of subpopulations	Site / habitat Condition	Threats (note if past, present or future)	Specific management actions
Lake Chandala, Chandala Nature Reserve near Muchea, Swan Coastal Plain	Nature Reserve	2009	1.4 km <sup>2</sup> (based on aerial mapping of wetland)	Generally in good condition	Invasive fish: <i>Past, present and future</i>  Habitat modification: <i>Past, present and future</i>	Invasive fish management  Habitat protection and rehabilitation
Wetland EPP173 in Melaleuca Park, Gnangara-Moore River State Forest , Swan Coastal Plain	State Forest	2008	400 m <sup>2</sup> (based on aerial mapping of wetland)	Generally in good condition	Invasive fish: <i>Past, present and future</i>  Habitat modification: <i>Past, present and future</i>	Invasive fish management  Habitat protection and rehabilitation
Wetlands within Kemerton Reserve near Bunbury, Swan Coastal Plain	Department land	2009 and 2010	23 km <sup>2</sup> (based on aerial mapping of wetlands)	Generally in good condition	Invasive fish: <i>Past, present and future</i>  Habitat modification: <i>Past, present and future</i>	Invasive fish management  Habitat protection and rehabilitation
Between Augusta and Albany <i>Galaxiella nigrostriata</i> were present at 26 of the 53 sites sampled between 2014- 2015. The following locations are a summary of the survey sites with <i>G. nigrostriata</i> present – specific site names and IDs provided in Table A6 in Appendix A of Ogston <i>et al.</i> (2016).	Various	Winter and Summer 2014- 2015	Area of pool sampled: 12m <sup>2</sup> to 300m <sup>2</sup>	Generally in good condition except for the eastern sites which are largely degraded/polluted	Climate change: <i>Past, present and future</i>  Invasive fish: <i>Past, present and future</i>  Habitat modification: <i>Past, present and future</i>	Invasive fish management  Habitat protection and rehabilitation
Scott River Road (Site ID 1 and 2), Scott National Park	Road Reserve - National Park	June and December 2014	As above	As above	As above	As above
Fouracres Road (Site ID 25), Scott River East	Road Reserve - UCL	December 2014	-	-	-	-

Windy Harbour Road (Site ID 3, 4, 5, 6, 7, 8, 23), D'Entrecasteaux National Park	Road Reserve - National Park	June and December 2014	-	-	-	-
Doggerup Creek (Site ID 54), D'Entrecasteaux National Park	National Park	December 2014	-	-	-	-
Chesapeake Road (Site ID 9, 19, 20, 21, 28, 29, 30, 31, 32, 38, 39), D'Entrecasteaux National Park	Road Reserve - National Park	May, June, July, October and December 2014	-	-	-	-
Lower Gardner River Road (Site ID 40), D'Entrecasteaux National Park	National Park	December 2014	-	-	-	-
Moore Hut Drive (Site ID 49), D'Entrecasteaux National Park	National Park	August, October & December 2014	-	-	-	-
Deeside Coast Road and Preston Road (Site ID 18), Shannon National Park	Road Reserve - National Park	December 2014	-	-	-	-
Brooke Inlet Road (Site ID 47), D'Entrecasteaux National Park	Road Reserve - National Park	December 2014	-	-	-	-



## Threatened species nomination

For nominations to the WA Threatened Species Scientific Committee (and the Minister for Environment) to amend threatened species listings under the WA *Wildlife Conservation Act 1950* or their IUCN Red List threat status.

### Cover Page (Office use only)

Species name (scientific and common name):	<b><i>Galaxiella nigrostriata</i> (black-stripe minnow, black-striped dwarf galaxias)</b>
Nomination for (addition, deletion, change):	<b>Addition</b>
Nominated conservation category and criteria:	Endangered A2c and A4c

TSSC assessment of eligibility against the criteria:		
<b>A.</b>	Population size reduction	<ul style="list-style-type: none"> <li>Eligible for listing as A2bc: Inferred population reduction of <math>\geq 50\%</math> measured over 10 years based on a calculated decline in EOO and AOO meeting eligibility for listing as Endangered. Historical EOO of 47,578 km<sup>2</sup> and current EOO of 20,276 km<sup>2</sup> (an approximate reduction of 57%). Historical AOO of 55 km<sup>2</sup> and a current AOO of 23 km<sup>2</sup> (approx. reduction of 58%). The calculated reduction occurred in the past and may not have ceased or be reversible. The reduction calculations based on 'an index of abundance appropriate to the taxon' is also appropriate for this species.</li> <li>Not eligible for listing as A4c: The issue of climate change was loosely inferred in the supporting paper and was not clearly stated how it would impact the species. There was insufficient information to demonstrate the scale of the inferred future decline in population size due to climate change for meeting eligibility under A4 as being <math>\geq 30\%</math> for vulnerable or <math>\geq 50\%</math> for endangered. Although it was accepted that climate change was an issue for the species.</li> </ul>
<b>B.</b>	Geographic range	<ul style="list-style-type: none"> <li>Not eligible: The EOO is calculated as larger than 20,000 km<sup>2</sup>, therefore not eligible under B1. The AOO is calculated as smaller than 2,000 km<sup>2</sup>, meeting the area for B2. There is calculated continuing decline in EOO and AOO and observed decline area, extent and quality of habitat. However, the number of locations is greater than 10, it is not considered to be severely fragmented, and there no extreme fluctuations. Therefore the species does not meet two of the three sub-criteria as required.</li> </ul>
<b>C.</b>	Small population size and decline	<ul style="list-style-type: none"> <li>Not eligible: The number of mature individuals is unknown.</li> </ul>
<b>D.</b>	Very small or restricted population	<ul style="list-style-type: none"> <li>Not eligible: The number of mature individuals is unknown, the AOO is <math>&gt; 20</math> km<sup>2</sup> and number of locations is <math>&gt; 5</math>.</li> </ul>
<b>E.</b>	Quantitative analysis	<ul style="list-style-type: none"> <li>Not eligible</li> </ul>

<b>Outcome:</b>			
<i>TSSC Meeting date:</i>	22 June 2016		
<i>TSSC comments:</i>	<p>The committee was satisfied with the adequacy of survey. The issue of climate change was loosely inferred in the supporting paper and was not clearly stated how it would impact the species. There was insufficient information to demonstrate the scale of the inferred future decline in population size due to climate change for meeting eligibility under A4 as being <math>\geq 30\%</math> for vulnerable or <math>\geq 50\%</math> for endangered. However it was accepted that climate change was an issue for the species. The committee advised that if the nominator was able to provide additional information for how the species may be impacted by climate change and the inferred or suspected scale of population reduction and reduction in the EOO and AOO, then the committee may consider the addition of other criteria as a nomination for criteria change at a future meeting.</p>		
<i>Recommendation:</i>	<b>Endangered A2bc</b>		
<i>Ministerial approval:</i>	29 December 2016	<i>Government Gazette:</i>	6 January 2017

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

Current conservation status				
Scientific name:	<i>Galaxiella nigrostriata</i>			
Common name:	Black-stripe minnow / Black-striped Dwarf Galaxias			
Family name:	Galaxiidae	Fauna <input checked="" type="checkbox"/>	Flora <input type="checkbox"/>	
Nomination for:	Listing <input checked="" type="checkbox"/>	Change of status <input type="checkbox"/>	Delisting <input type="checkbox"/>	
Is the species currently on any conservation list, either in WA, Australia or Internationally?		Yes <input checked="" type="checkbox"/> If Yes; complete the following table	No <input type="checkbox"/> If No; go to the next question	
Jurisdiction	List or Act name	Date listed or assessed	Listing category i.e. critically endangered	Listing criteria i.e. B1ab(iii)+2ab(iii)
International	IUCN Red List			
National	EPBC Act			
State of WA	WC Act			
	DPaW Priority list	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input checked="" type="checkbox"/>
Other States or Territories	Australian Society for Fish Biology – Threatened Species List	2015	Endangered	A2(c) and A4(c)
Nominated conservation status: category and criteria (including recommended categories for deleted species)				
Presumed extinct (EX) <input type="checkbox"/> Critically endangered (CR) <input type="checkbox"/> Endangered (EN) <input checked="" type="checkbox"/> Vulnerable (VU) <input type="checkbox"/>				
None <input type="checkbox"/> Priority 1 <input type="checkbox"/> Priority 2 <input type="checkbox"/> Priority 3 <input type="checkbox"/> Priority 4 <input type="checkbox"/> Other Specially Protected (Conservation Dependent) <input type="checkbox"/>				
What criteria support the conservation status category above? <i>Refer to Appendix A table 'Summary of the five criteria (A-E)' and the check version that can be completed to indicate all criteria options</i>			A2(c) and A4(c)	
Eligibility against the criteria				
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	<ul style="list-style-type: none"> <li>Population reduction inferred based on reduction in Extent of Occurrence (EOO) and Area of Occupancy (AOO). <i>Galaxiella nigrostriata</i> was historically distributed across an area of 47,578 km<sup>2</sup> and currently has an EOO of 20,276 km<sup>2</sup> (an approximate reduction of 57%). AOO for <i>G. nigrostriata</i> declined from a historic 55 km<sup>2</sup> to a current 23 km<sup>2</sup> (an approximate reduction of 58%).</li> </ul>		

B.	Geographic range	•
C.	Small population size and decline	•
D.	Very small or restricted population	•
E.	Quantitative analysis	•
<b>Reasons for change of status</b>		
Genuine change <input checked="" type="checkbox"/> New knowledge <input type="checkbox"/> Taxonomic change <input type="checkbox"/> Previous mistake <input type="checkbox"/> Other <input type="checkbox"/>		
<b>Summary of assessment information</b> <i>(detailed information to be provided in the relevant sections of the form)</i>		
EOO	47,578 km <sup>2</sup> reduced to 20,276 km <sup>2</sup> (approx. reduction 57%)	AOO 55 km <sup>2</sup> reduced to 23 km <sup>2</sup> (approx. reduction 58%) Generation length
No. locations	Caught at 24 of the 53 sites physically sampled	Severely fragmented Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
No. subpopulations	-	No. mature individuals -
Percentage global population within WA		100%
Percentage global population within Australia		100%
Percentage population decline over 10 years or 3 generations		-

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	AOO	Site / habitat Condition	Threats <i>(note if past, present or future)</i>	Specific management actions
Caught at 30 of the 53 sites physically sampled. See Table A6 in Appendix A, Ogston et al. (2016).						

## Nomination detail

Please refer to the Departments guidelines on nominating species for amendment of the Western Australian threatened species lists at [http://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/Listings/Threatened\\_Species\\_Nomination\\_Guidelines\\_2014.pdf](http://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/Listings/Threatened_Species_Nomination_Guidelines_2014.pdf)

For technical information on terminology used in this form, and the intent of information requirements, as they relate to an assessment of this nomination against the IUCN Red List criteria, refer to the 2001 *IUCN Red List Categories and Criteria. Version 3.1*

[http://www.iucnredlist.org/documents/redlist\\_cats\\_crit\\_en.pdf](http://www.iucnredlist.org/documents/redlist_cats_crit_en.pdf)

and *Guidelines for Using the IUCN Red List Categories and Criteria Version 11* (February 2014)


<http://cmsdocs.s3.amazonaws.com/RedListGuidelines.pdf>

## Section 1: Taxonomy

<b>1.1 Current taxonomy</b>			
Species name and Author:		<i>Galaxiella nigrostriata</i> Shipway	
Subspecies name(s) and Author:			
Is the species/subspecies conventionally accepted?			Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Is there any controversy about the taxonomy?			Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
If not conventionally accepted and/or if there is any controversy; provide details:			
Has the species/subspecies been formally named?			Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Has the species/subspecies been recently described?			Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
If the species has not been formally named or described; is it in the process of being described? Is there an anticipated date for the publication of the description? Has a type specimen been deposited? And if so provide the registration number and where deposited.			
If there are any closely related taxa provide details and include key distinguishing features:		<i>Galaxiella nigrostriata</i> is closely related with <i>Galaxiella munda</i> which also occurs in the south-west of Western Australia. Distinguishing features: The dorsal fin of <i>G. nigrostriata</i> originates anterior to the 5th anal ray, whereas in <i>G. munda</i> the dorsal fin originates posterior to the 5th anal ray. Mature <i>G. nigrostriata</i> are easily distinguished by the presence of two black lateral bands separated by an orange band. Meristic variation is also present - See Berra & Allen (1989).	
<b>1.2 Taxonomic history</b>			
Are there recent synonyms for the species?			Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
If Yes; provide details of synonyms:			
Have there been recent changes in the taxonomy or nomenclature?			Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>

If Yes; provide details of changes:			
<b>1.3 Hybridisation</b>			
Is there any known hybridism with other species in the wild?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	Unknown <input type="checkbox"/>
If Yes; Where does this occur and how frequently?			

## Section 2: Species information

<b>2.1 Morphology / physical description</b>	
Insert photograph(s) of species or provide as an attachment:	
	
Figure 1. Photo of the Black-stripe minnow ( <i>Galaxiella nigrostriata</i> ) Photo credit: Dr Gerry Allen	
Species description:	The Black-stripe Minnow, <i>Galaxiella nigrostriata</i> , is a small (maximum 48 mm TL), scaleless freshwater fish. It is characterised by two black longitudinal bands separated with a yellow/orange to red stripe.
<b>2.2 Biology (provide details)</b>	
Rapid growth and development (attaining 78-88% of total body length prior to dry season). The species has been documented to consume micro-crustaceans, dipterans, and rotifers. Research has suggested they may be sensitive to high temperatures and may be reliant on thermal stratification of wetlands (population north of Perth).	
<b>2.3 Ecology (provide details)</b>	
Short life cycle (12 months), and annually aestivate during the dry periods each year. External fertilisation occurs during breeding season from June to September, peaking around August/September. Females are multiple spawners.	



## Section 3: Geographic range

### 3.1 Distribution

Insert map(s) of the species distribution, or provide as an attachment:

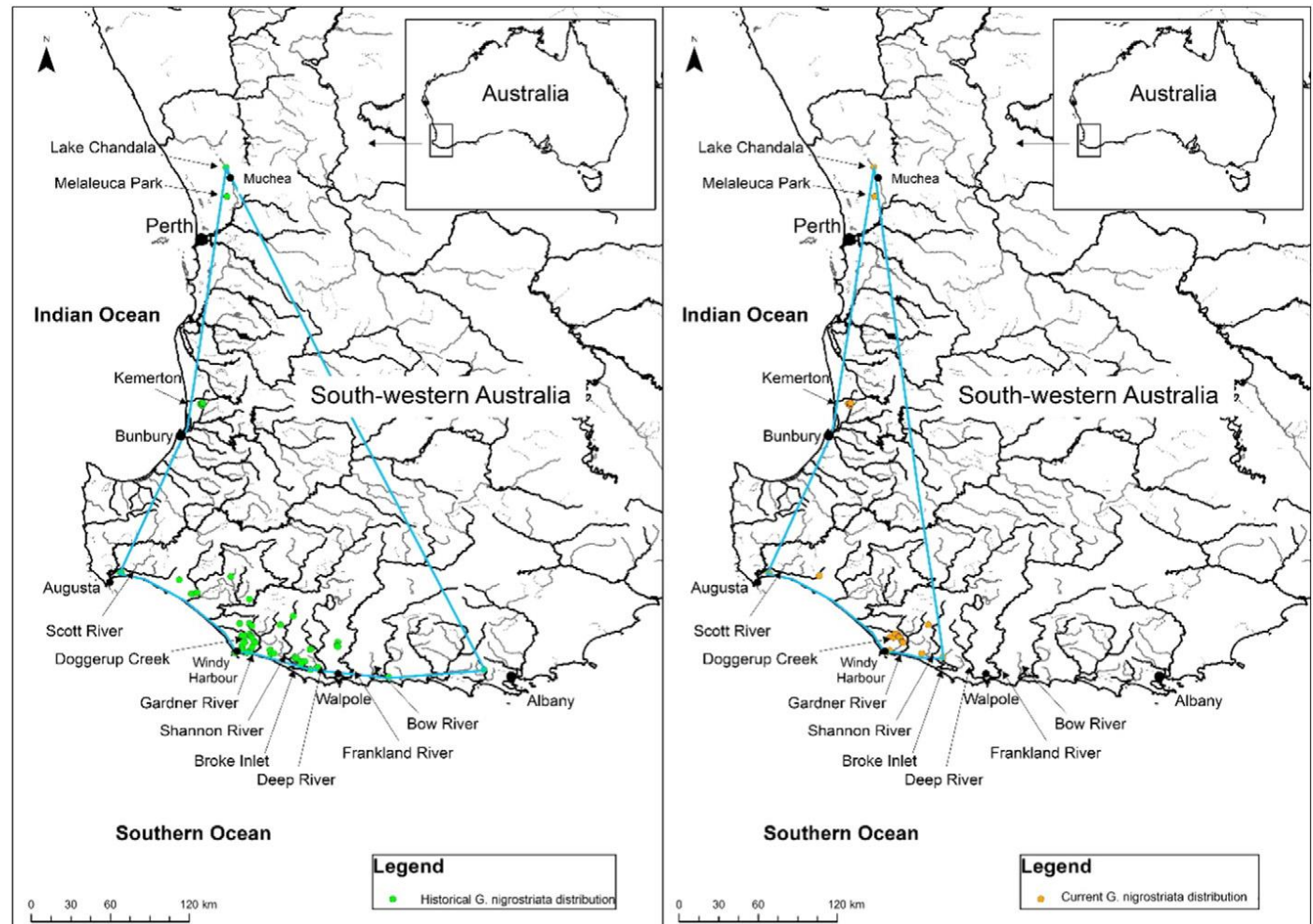


Figure 2. Change in extent of occurrence for *Galaxiella nigrostriata*

What is the current distribution of the species within Western Australia?	The species is restricted to the ephemeral peat wetlands of south-western Australia
What percentage of the species distribution is within WA?	100%
What is the current distribution of the species within the other Australian States and Territories?	Nil
Does the species occur outside of Australia?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
If Yes, what percentage of the species distribution is within Australia, or what is the significance of the occurrence in Australia?	
What is the current international trend for the species?	

### 3.2 Migration (fauna only)



Is the species migratory?		Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Is the migration within WA or within Australia or international?		
<b>3.3 Extent of Occurrence (EOO) within Australia</b>		
What is the current EOO?	20,276 km <sup>2</sup>	
How has this been calculated?	Current and historical presence data were mapped in ArcGIS Pro 1.0.2. Extent of occurrence (EOO) was determined by constructing minimum convex polygons around the perimeter of the sites as per IUCN (2014). Separate EOO polygons were constructed for historical sites and for current sites, with the difference in area between the two providing an estimate of the temporal change in EOO	
What is the historical EOO?	47,578 km <sup>2</sup>	
What is the current EOO trend?	Decreasing <input checked="" type="checkbox"/> Increasing <input type="checkbox"/> Stable <input type="checkbox"/>	
<i>Provide details on the current trend – quantify if possible</i>		
If there has been a change in EOO when did this change occur?	Species distribution not extensively surveyed prior to 2000.	
Was the change observed, estimated, inferred or projected?	Change was observed through physically sampling wetlands for the species. It was also observed that several historical wetlands have been destroyed through road widening. Importantly the eastern most sites were also found to be absent of both <i>G. nigrostriata</i> and <i>L. salamandroides</i> by Morgan et al. (1998) and Galeotti et al. (2010).	
If the EOO is decreasing / declining, is it continuing?		Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Is the continuing decline observed, estimated, inferred or projected?	Continuing decline is estimated based on projected climate change models for the region	
Is there extreme fluctuation in EOO?		Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
<i>If Yes, provide details:</i>		
<b>3.4 Area of Occupancy (AOO) within Australia</b>		
What is the current AOO?	23 km <sup>2</sup>	
How has this been calculated?	Area of occupancy (AOO) was also determined as per IUCN (2014). A 1 km <sup>2</sup> grid was inserted as an overlay in ArcGIS with the number of squares overlaying sites summed and multiplied by the area of each square to determine the AOO. Again, the AOOs (one historical and one current) were determined for each species, with the difference between the two providing a measure of temporal change.	
What is the historical AOO?	55 km <sup>2</sup>	
What is the current AOO trend?	Decreasing <input checked="" type="checkbox"/> Increasing <input type="checkbox"/> Stable <input type="checkbox"/>	
<i>Provide details on the current trend – quantify if possible</i>		

If there has been a change in AOO when did this change occur?	Species AOO not extensively surveyed prior to 2000.		
Was the change observed, estimated, inferred or projected? Give details.	Change was observed through physically sampling wetlands for the species. It was also observed that several historical wetlands have been destroyed through road widening.		
If the AOO is decreasing / declining, is it continuing?		Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Is the continuing decline observed, estimated, inferred or projected? Give details.	Continuing decline is estimated based on projected climate change models for the region		
Is there extreme fluctuation in AOO?		Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
If Yes, provide details:			
Does the species have a restricted AOO?		Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
If Yes, provide details:			
<b>3.5 Number of Locations</b>			
<p><b>'Locations'</b> are defined as a geographically or ecologically distinct area in which a single threatening event can rapidly affect all individuals of the taxon present. The size of the location depends on the area covered by the threatening event and may include part of one or many subpopulations. Where a taxon is affected by more than one threatening event, location should be defined by considering the most serious plausible threat. (IUCN 2001).</p>			
At how many locations does the species occur?			
Has there been a change in the number of locations?	Decrease <input type="checkbox"/>	Increase <input type="checkbox"/>	No change <input type="checkbox"/>
If there has been a change, when did this change occur?			
Was the change observed, estimated, inferred or projected? Give details.			
If the number of locations is decreasing / declining, is it continuing?		Yes <input type="checkbox"/>	No <input type="checkbox"/>
Is the continuing decline observed, estimated, inferred or projected? Give details.			
Is there extreme fluctuation in the number of locations?		Yes <input type="checkbox"/>	No <input type="checkbox"/>
If Yes, provide details:			
Does this species occur on any off-shore islands?		Yes <input type="checkbox"/>	No <input type="checkbox"/>
If Yes, provide details:			
<b>3.6 Fragmentation</b>			
Is the distribution fragmented?		Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

<p>The phrase '<b>severely fragmented</b>' refers to the situation in which increased extinction risks to the taxon results from the fact that most of its individuals are found in small and relatively isolated subpopulations (in certain circumstances this may be inferred from habitat information). These small subpopulations may go extinct, with a reduced probability of recolonization.</p>		
Is the distribution severely fragmented?		Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
If Yes, provide details:		
<b>3.7 Land tenure</b>		
Is the species known to occur on lands managed primarily for nature conservation? i.e. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation		Yes <input type="checkbox"/> No <input type="checkbox"/>
If Yes; provide details:		
Is the species known to occur on lands that are under threat? i.e. mining tenement, zoned for development		Yes <input type="checkbox"/> No <input type="checkbox"/>
If Yes; provide details:		
Provide details of other land tenures where the species occurs as this relates to the species conservation status		

## Section 4: Habitat

<b>4.1 Habitat</b> (provide details in response to the question below)		
<p>Describe the habitat suitable for the species (biological and non-biological). Include descriptions of specific purpose habitat (e.g. foraging, breeding, roosting, seasonal migration, different life stages).</p>	<p>Habitat - acidic ephemeral wetlands of the south-west of Western Australia. Generally prefer sandy soils (has been shown to be more suited for burrowing). Has been documented to survive in both natural wetlands, as well as excavated roadside pools (these pools may be important in conserving the species).</p> <p>Biological - Sympatric with the aestivating <i>Lepidogalaxias salamandroides</i></p>	
If the species occurs in a variety of habitats, is there a preferred habitat?	Distribution modelling identified a significant preference for pools with increased connectivity, with lower water temperatures, lower pH, and greater ORP (see Ogston et al., 2016). Also noted was the use of artificial roadside pools as opposed to pristine natural wetlands. This is potentially due to the excavated pools being deeper (closer to the groundwater table during dry periods).	
Does the species use refugia? (include what is it and when is it used)	The groundwater present below the soil surface provides refugia for the species over the summer period during aestivation.	
Is the habitat restricted in extent or number of locations?		Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
If Yes, provide details:	Acidic peat swamps in the south-western corner of WA generally on conservation/managed land (between Augusta and Albany with outlying populations)	

	at Kemerton, Melaleuca Park and near Muchea)		
Is this species reliant on a threatened or priority species or ecological community?		Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
If Yes, provide details:			
Are there any other species (sympatric species) that may affect the conservation status of the nominated species?		Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
If Yes, provide details:		<i>Lepidogalaxias salamandroides</i> - threats and declines observed in <i>Lepidogalaxias salamandroides</i> will also likely impact on <i>Galaxiella nigrostriata</i>	
What is the area, extent, abundance of habitat?			
What is the quality of habitat?		Habitat generally in good condition, with the exception of the eastern sites near Elleker which were largely degraded/polluted.	
Is there a decline in habitat area, extent or quality?		Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
If there is a decline, is the decline continuing?		Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Provide details:		During the study we observed the loss of several wetlands due to road widening and land clearing. Other areas (particularly near Elleker) were degraded and polluted.	
What is the critical habitat or habitat important for the survival of the species?		The critical habitat for the species is an ephemeral wetland of sufficient depth, to sustain them for long enough periods to build up fat stores sufficient enough to survive the summer dry period. This requires shallow depth to groundwater and generally sandy soils in order for the species to burrow and access suitable soil moisture over the dry period.	

## Section 5: Population

**'Population'** is used in a specific sense in the Red List Criteria that is different to its common biological usage. Population is here defined as the total number of mature individuals of the taxon. In the case of taxa obligately dependent on other taxa for all or part of their life cycles, biologically appropriate values for the host taxon should be used. (IUCN 2001)

**'Subpopulations'** are defined as geographically or otherwise distinct groups in the population between which there is little demographic or genetic exchange (typically one successful migrant individual or gamete per year or less).

5.1 Subpopulations				
Location (include coordinates)	Land tenure	Survey information: Date of survey and No. mature individuals	AOO	Site / habitat Condition

<b>5.2 Population size (Australian context)</b> <i>(include how numbers were determined/calculated)</i>				
What is the total population size?				
What is the number of subpopulations?				
What percentage of the population is within WA?				
What percentage of the population is within Australia?				
<b>5.3 Population dynamics (Australian context)</b> <i>(include how numbers were determined/calculated)</i>				
What is the number of mature individuals?				
What is the number of immature individuals?				
What is the number of senescing/past reproductive individuals?				
What is the maximum number of mature individuals per subpopulation?				
What is the percentage of mature individuals in the largest subpopulation?				
What percentage of mature individuals is within WA?				
What percentage of global mature individuals is within Australia?				
What is the age of sexual maturity?				
What is the life expectancy?				
What is the generation length?				
What is the reproductive capacity? (i.e. litter size or number of seeds)				
What is the reproductive success?				
<b>5.4 Population trend</b>				
What is the current population trend (mature individuals)?	Decreasing <input type="checkbox"/> Increasing <input type="checkbox"/> Stable <input type="checkbox"/>			
What is the percentage of the population change and over what time period?				
How has this been calculated?				

If the trend is decreasing; are the causes of the reduction understood?		Yes <input type="checkbox"/> No <input type="checkbox"/>
Have the causes of the reduction ceased?		Yes <input type="checkbox"/> No <input type="checkbox"/>
Are the causes of the reduction reversible?		Yes <input type="checkbox"/> No <input type="checkbox"/>
Is the reduction continuing (continuing decline)?		Yes <input type="checkbox"/> No <input type="checkbox"/>
Has the change been observed, estimated, inferred or is it suspected (direct observation, index of abundance appropriate to the species)?		
When was the reduction or is it anticipated to occur?	Past <input type="checkbox"/>	Present <input type="checkbox"/> Future <input type="checkbox"/>
What is the period of time for the reduction (in years and generations)?		
Has there been a reduction in the number of subpopulations?		Yes <input type="checkbox"/> No <input type="checkbox"/>
<i>If Yes, provide details:</i>		
Are there extreme fluctuations in population size?		Yes <input type="checkbox"/> No <input type="checkbox"/>
<i>If Yes, provide details:</i>		
<b>5.5 Translocations and captive/enclosed subpopulations</b>		
Have there been translocations (introduction or re-introduction)?		Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Are there proposed translocations (introduction or re-introduction)?		Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Are there captive/enclosed/cultivated subpopulations?		Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Are there proposed captive/enclosed/cultivated subpopulations?		Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Are there self-sustaining translocated subpopulations?		Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
<i>If Yes, provide details:</i>		
Are there translocated subpopulations that are not self-sustaining?		Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
<i>If Yes, provide details:</i>		
Are there self-sustaining captive/enclosed subpopulations?		Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
<i>If Yes, provide details:</i>		
Are there captive/enclosed subpopulations that are not self-sustaining?		Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
<i>If Yes, provide details:</i>		
Other information on translocations and captive/enclosed subpopulations for the species (including failures):		
<b>5.6 Important subpopulations</b>		

Identify any subpopulations that are important or necessary for the long-term survival of the species and provide details for why they are considered as such (i.e. key breeding, edge or range, maintenance of genetic diversity):

## Section 6: Survey

### 6.1 Survey methods (Provide details)

What survey methods are applicable to the species?	Seine netting, as the species is free swimming the use of a seine net (with weighted lead line and floats) is recommended to ensure the entire water column is sampled. Scoop/dip netting has also been used.
Are there preferred or recommended survey methods that yield better results for the species?	Seine netting is the preferred method (see note above).
Are there special requirements, techniques, expertise or other considerations that are necessary when surveying for this species?	Knowledge of the preferred habit of the species is crucial. Knowledge of the morphology of this species and other fish in the south-west is also needed to ensure positive identification, see notes on differences between <i>G. nigrostriata</i> and <i>G. munda</i> .
Are there reasons why the species may not be detected during surveys?	Low sampling effort. Snags or other barriers preventing sufficient surveying.

Can the species be identified in the field?

Yes ☒ No ☐

Provide details:

It is only similar in appearance to the closely related *G. munda*, however this species has several distinguishing features e.g. the dorsal fin of *G. nigrostriata* originates anterior to the 5th anal ray, whereas in *G. munda* the dorsal fin originates posterior to the 5th anal ray. Immature *G. nigrostriata* have a thin irregular white stripe on the lower side of the body from the pectoral fin to the anal fin. This stripe is lacking in small *G. munda*. Mature *G. nigrostriata* are easily distinguished by the presence of two black lateral bands separated by an orange band. Meristic variation is also present - See Berra & Allen (1989).

Can the species be easily confused within similar species in the field?

Yes ☐ No ☒

Provide details:

Although similar in appearance to *G. munda*, closer inspection in the field of the features mentioned above allow for positive identification.

List any published survey guidelines, guidance statements, protocols, standard operating procedures or other documents that are relevant to conducting surveys for this species.

### 6.2 Survey effort

Has the species been well surveyed?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Have targeted surveys been conducted for the species?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Provide details of the successful and unsuccessful surveys undertaken for the	The most recent targeted survey was published by Ogston et al. (2016). A 12 month sampling survey (across three seasons and 53 sites) was conducted to identify distribution change and potential threats to both aestivating fish in the south-west, <i>Galaxiella nigrostriata</i> and <i>Lepidogalaxias salamandroides</i> . This study successfully

<i>species:</i>	identified the changes in EOO and AOO in this nomination form. Another recent targeted study was undertaken by Galeotti (2013).		
<b>6.3 Research</b> <i>(Provide details)</i>			
Has the species been well researched?		Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/> Partially <input type="checkbox"/>
What research has been or is being conducted?	Research has been conducted on various aspects of this species including morphometrics (Berra & Allen, 1989), biology (Smith et al., 2002), distribution (Morgan et al., 1998; Ogston et al., 2016), metapopulation theory (Galeotti, 2013), impacts of climate change (Ogston et al., 2016)		
What are the knowledge gaps for the species?	Salinity tolerances, water temperature and oxygen thresholds		
Research recommendations:	Salinity tolerances, water temperature and oxygen thresholds		
<b>6.4 Monitoring</b> <i>(Provide details)</i>			
Is the species being monitored, either directly (targeted) or indirectly (general monitoring)?	Not directly, however, the Freshwater Fish Group at Murdoch University regularly monitor the wetlands of the south-west, many of which contain this species.		
What methods are used for monitoring?	Seine netting, fyke netting.		
Monitoring recommendations:	Ongoing monitoring should occur, targeting the known locations for the Black-stripe minnow. As climate change models project a further drying in the region, more sites may be lost as suitable habitat for the species. Additional monitoring should occur at the more isolated wetlands north of Perth. Any changes to the environment in this region could potentially wipe out these isolated populations and cause even more drastic range reductions.		



## Section 7: Threats

### 7.1 Threats (detail how the species is being impacted, i.e. how severe, the extent, evidence of the impact)

Threat <i>(describe how the threat impacts on the species. Include abiotic and biotic causes, human related e.g. exploitation, and biological characteristics of the species e.g. low genetic diversity)</i>	Extent <i>(give details of impact on whole species or specific subpopulations)</i>	Impact <i>(what is the level of threat to the conservation of the species)</i>	Evidence	Time period <i>(past, present, future)</i>
Climate change – increased air and water temperatures, decreased rainfall, increased evaporation, lowering groundwater table	The entire south-western region has undergone drying and warming, and furthermore is projected to continue to be impacted into the future.	High (drying to occur even under low emissions scenarios)	The Southwestern Province of Australia has experienced climatic drying since the 1970's, with the total rainfall declining by 10 to 50 mm per decade (~16% overall reduction) causing annual stream flows to decline by ~50%. Mean annual air temperature has also increased between 0.10 and 0.30 °C per decade over that period, resulting in higher rates of evaporation from surface waters. Projections of climate change for the region indicate a further reduction (up to 20%) in mean annual rainfall and further warming (0.5 to 1.3 °C) by 2030. Moreover, large reductions in fresh groundwater levels (>10 m in some areas) are also projected to occur.	Since the 1970's until present time. Future projections based on a timeframe of 2030.
<i>Gambusia holbrooki</i> – invasive species, aggressive interactions, competition	Potential mortality of <i>G. nigrostriata</i> in permanent pools due to fin-nipping, harassment, competition by <i>G. holbrooki</i> .	Low (on a species scale) – due to <i>G. holbrooki</i> not being able to survive dry periods in the ephemeral wetlands, will only be a major threat in areas where <i>G. nigrostriata</i> survives in	It has been documented to aggressively interact with many native freshwater fishes in south-western Australia, including fin-nipping and causing mortality in <i>G. nigrostriata</i> (see Morgan et al., 2004).	Recent study documented this in 2004. <i>Gambusia holbrooki</i> is an ongoing threat in the south-west.

		permanent pools/refugia		
Human related – Land clearing/road widening	Isolated pools or sections of pools bordering long strips of roadway	Low (on a species scale), High (local scale) - Loss of individual sites causing potential isolation of other pools	We observed several modified pools along Windy Harbour Road due to road widening/heightening, as well as the complete loss of a wetland on Fouracres Rd due to road widening. Near Elleker pools were also degraded from road widening/land use change.	Loss of site on Fouracres Road occurred in 2015 (see Figure 3 below).



Figure 3. Loss of site along Fouracres Road showing a) wetlands during wet season sampling b) the site when re-visited during the dry season (note the construction vehicle in the image and area cleared for the new road).

## Section 8: Management

<b>8.1 Current management</b>		
Is the species managed?	Yes, directly <input type="checkbox"/>	Yes, indirectly <input type="checkbox"/> No <input checked="" type="checkbox"/>
If Yes; provide details of current or past management actions:		
Does the species benefit from the management of another species or ecological community?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
If Yes; provide details:		
<b>8.2 Recovery planning</b>		
Is there an approved Recovery Plan (RP) or Interim Recovery Plan (IRP) for the species?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
List all relevant recovery plans or interim recovery plans (including draft, in-preparation, out-of-date, national and other State/Territory plans, and plans for other species or ecological communities that may benefit or be relevant to the nominated species)		
List other documents that may be relevant to the management of the species or the lands on which it occurs (i.e. area management plans, conservation advices, referral guidelines)		
<b>8.3 Management recommendations</b>		
See Section 4.3 Management implications in Ogston et al., 2016.		

## Section 9: Nominator details

<b>Nominator name(s):</b>	
<b>Contact details:</b>	
<b>Date submitted:</b>	09/03/2016
If the nomination has been refereed or reviewed by experts, please provide their names and contact details:	
Dr David Morgan, Dr Stephen Beatty	

## Section 10: References

<b>9.1 References</b>
Berra, T. M., Allen, G. R. (1989). Clarification of the differences between <i>Galaxiella nigrostriata</i> (Shipway, 1953) and <i>Galaxiella munda</i> McDowall, 1978 (Pisces: Galaxiidae) from Western Australia. <i>Rec. West. Aus. Mus.</i> , 14(3), 293-297.
Galeotti, D. M. (2013). Metapopulation theory explains Black-stripe Minnow (Pisces: Galaxiidae, <i>Galaxiella</i>

*nigrostriata*) distribution in seasonal wetlands in south-west Western Australia. (Master of Science (Environmental Management)), Edith Cowan University, Joondalup, Western Australia.

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Morgan, D. L., Gill, H. S., Maddern, M. G., & Beatty, S. J. (2004). Distribution and impacts of introduced freshwater fishes in Western Australia. *New Zealand Journal of Marine and Freshwater Research*, 38(3), 511-523. doi: 10.1080/00288330.2004.9517257

Morgan, D.L., Gill, H.S., Potter, I.C. (1998). Distribution, identification and biology of freshwater fishes in south-western Australia. *Rec. West. Aust. Mus. (Suppl. 56)*, 1–97.

Ogston, G., Beatty, S. J., Morgan, D. L., Pusey, B. J., Lymbery, A. J. (2016). Living on burrowed time: aestivating fishes face extinction due to climate change. *Biological Conservation*, 195, 235-244.  
doi:10.1016/j.biocon.2016.01.008

Smith, K. D., Knott, B., Jasinska, E. J. (2002). Biology of the black-stripe minnow *Galaxiella nigrostriata*, (Galaxiidae) in an acidic, black-water lake in Melaleuca Park near Perth, Western Australia. *Rec. West. Aus. Mus.*, 21, 277-284

# SUMMARY OF THE FIVE CRITERIA (A-E) USED TO EVALUATE IF A TAXON BELONGS IN AN IUCN RED LIST THREATENED CATEGORY (CRITICALLY ENDANGERED, ENDANGERED OR VULNERABLE).<sup>1</sup>

A. Population size reduction. Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4			
	Critically Endangered	Endangered	Vulnerable
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3 & A4	≥ 80%	≥ 50%	≥ 30%
A1 Population reduction observed, estimated, inferred, or suspected in the past where the causes of the reduction are clearly reversible AND understood AND have ceased.	based on any of the following:	(a) direct observation [except A3]	
A2 Population reduction observed, estimated, inferred, or suspected in the past where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.		(b) an index of abundance appropriate to the taxon	
A3 Population reduction projected, inferred or suspected to be met in the future (up to a maximum of 100 years) [(a) cannot be used for A3].		(c) a decline in area of occupancy (AOO), extent of occurrence (EOO) and/or habitat quality	
A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.		(d) actual or potential levels of exploitation	
		(e) effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.	
B. Geographic range in the form of either B1 (extent of occurrence) AND/OR B2 (area of occupancy)			
	Critically Endangered	Endangered	Vulnerable
B1. Extent of occurrence (EOO)	< 100 km <sup>2</sup>	< 5,000 km <sup>2</sup>	< 20,000 km <sup>2</sup>
B2. Area of occupancy (AOO)	< 10 km <sup>2</sup>	< 500 km <sup>2</sup>	< 2,000 km <sup>2</sup>
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented OR Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals			
(c) Extreme fluctuations in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals			
C. Small population size and decline			
	Critically Endangered	Endangered	Vulnerable
Number of mature individuals	< 250	< 2,500	< 10,000
AND at least one of C1 or C2			
C1. An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future):	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)
C2. An observed, estimated, projected or inferred continuing decline AND at least 1 of the following 3 conditions:			
(a) (i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
(ii) % of mature individuals in one subpopulation =	90–100%	95–100%	100%
(b) Extreme fluctuations in the number of mature individuals			
D. Very small or restricted population			
	Critically Endangered	Endangered	Vulnerable
D. Number of mature individuals	< 50	< 250	D1. < 1,000
D2. Only applies to the VU category Restricted area of occupancy or number of locations with a plausible future threat that could drive the taxon to CR or EX in a very short time.	-	-	D2. typically: AOO < 20 km <sup>2</sup> or number of locations ≤ 5
E. Quantitative Analysis			
	Critically Endangered	Endangered	Vulnerable
Indicating the probability of extinction in the wild to be:	≥ 50% in 10 years or 3 generations, whichever is longer (100 years max.)	≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.)	≥ 10% in 100 years

<sup>1</sup> Use of this summary sheet requires full understanding of the *IUCN Red List Categories and Criteria* and *Guidelines for Using the IUCN Red List Categories and Criteria*. Please refer to both documents for explanations of terms and concepts used here.



FORM VERSION OF IUCN RED LIST SUMMARY OF THE FIVE CRITERIA (A-E) to assist with determining eligible criteria					
Check boxes in one or more of the following fields to support your nomination; refer to summary table above for explanations					
<b>A. Population size reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4</b>					
A1 <input type="checkbox"/>	and one of the following	≥ 90% <input type="checkbox"/>	≥ 70% <input type="checkbox"/>	≥ 50% <input type="checkbox"/>	
	and any of the following	(a) <input type="checkbox"/>	(b) <input type="checkbox"/>	(c) <input type="checkbox"/>	(d) <input type="checkbox"/> (e) <input type="checkbox"/>
A2 <input checked="" type="checkbox"/>	and one of the following	≥ 80% <input type="checkbox"/>	≥ 50% <input checked="" type="checkbox"/>	≥ 30% <input type="checkbox"/>	
	and any of the following	(a) <input type="checkbox"/>	(b) <input type="checkbox"/>	(c) <input checked="" type="checkbox"/>	(d) <input type="checkbox"/> (e) <input type="checkbox"/>
A3 <input type="checkbox"/>	and one of the following	≥ 80% <input type="checkbox"/>	≥ 50% <input type="checkbox"/>	≥ 30% <input type="checkbox"/>	
	and any of the following	(b) <input type="checkbox"/>	(c) <input type="checkbox"/>	(d) <input type="checkbox"/>	(e) <input type="checkbox"/>
A4 <input checked="" type="checkbox"/>	and one of the following	≥ 80% <input type="checkbox"/>	≥ 50% <input checked="" type="checkbox"/>	≥ 30% <input type="checkbox"/>	
	and any of the following	(a) <input type="checkbox"/>	(b) <input type="checkbox"/>	(c) <input checked="" type="checkbox"/>	(d) <input type="checkbox"/> (e) <input type="checkbox"/>
<b>B. Geographic range in the form of either B1 (extent of occurrence) and/or B2 (area of occupancy)</b>					
	and one of the following	< 100 km <sup>2</sup> <input type="checkbox"/>	< 5,000 km <sup>2</sup> <input type="checkbox"/>	< 20,000 km <sup>2</sup> <input type="checkbox"/>	
B1 <input type="checkbox"/>		(a) <input type="checkbox"/>	and one of the following	1 <input type="checkbox"/>	≤ 5 <input type="checkbox"/> ≤ 10 <input type="checkbox"/>
	and at least two of the following three conditions [(a), (b), (c)]	(b) <input type="checkbox"/>	and any of the following	(i) <input type="checkbox"/>	(ii) <input type="checkbox"/> (iii) <input type="checkbox"/> (iv) <input type="checkbox"/> (v) <input type="checkbox"/>
		(c) <input type="checkbox"/>	and any of the following	(i) <input type="checkbox"/>	(ii) <input type="checkbox"/> (iii) <input type="checkbox"/> (iv) <input type="checkbox"/>
	and one of the following	< 10 km <sup>2</sup> <input type="checkbox"/>	< 500 km <sup>2</sup> <input type="checkbox"/>	< 2,000 km <sup>2</sup> <input type="checkbox"/>	
B2 <input type="checkbox"/>		(a) <input type="checkbox"/>	and one of the following	1 <input type="checkbox"/>	≤ 5 <input type="checkbox"/> ≤ 10 <input type="checkbox"/>
	and at least two of the following three conditions [(a), (b), (c)]	(b) <input type="checkbox"/>	and any of the following	(i) <input type="checkbox"/>	(ii) <input type="checkbox"/> (iii) <input type="checkbox"/> (iv) <input type="checkbox"/> (v) <input type="checkbox"/>
		(c) <input type="checkbox"/>	and any of the following	(i) <input type="checkbox"/>	(ii) <input type="checkbox"/> (iii) <input type="checkbox"/> (iv) <input type="checkbox"/>
<b>C. Small population size and decline</b>					
C1 <input type="checkbox"/>	and one of the following	< 250 <input type="checkbox"/>	< 2,500 <input type="checkbox"/>	< 10,000 <input type="checkbox"/>	
	and one of the following	25 % <input type="checkbox"/>	20 % <input type="checkbox"/>	10 % <input type="checkbox"/>	
C2 <input type="checkbox"/>	and one of the following	< 250 <input type="checkbox"/>	< 2,500 <input type="checkbox"/>	< 10,000 <input type="checkbox"/>	
	and at least two of the following three conditions [(a)(i), (a)(ii), (b)] plus applicable size and/or percentage	(a)(i) <input type="checkbox"/>	≤ 50 <input type="checkbox"/>	≤ 250 <input type="checkbox"/>	< 1,000 <input type="checkbox"/>
		(a)(ii) <input type="checkbox"/>	90 - 100 % <input type="checkbox"/>	95 - 100 % <input type="checkbox"/>	100 % <input type="checkbox"/>
		(b) <input type="checkbox"/>			
<b>D. Very small or restricted population</b>					
D <input type="checkbox"/>	and one of the following	< 50 <input type="checkbox"/>	< 250 <input type="checkbox"/>	D1 (< 1,000) <input type="checkbox"/>	
D2 <input type="checkbox"/>	and one of the following	< 20 km <sup>2</sup> <input type="checkbox"/>	≤ 5 <input type="checkbox"/>		
<b>E. Quantitative analysis</b>					
E <input type="checkbox"/>	and one of the following	≥ 50 <input type="checkbox"/>	≥ 20 % <input type="checkbox"/>	≥ 10 % <input type="checkbox"/>	

The following table is to assist with determining eligibility under criteria B, C & D

<b>What is the total number of mature individuals?</b>						
Global	< 50 <input type="checkbox"/>	< 250 <input type="checkbox"/>	< 1,000 <input type="checkbox"/>	< 2,500 <input type="checkbox"/>	< 10,000 <input type="checkbox"/>	Unknown <input type="checkbox"/>
National	< 50 <input type="checkbox"/>	< 250 <input type="checkbox"/>	< 1,000 <input type="checkbox"/>	< 2,500 <input type="checkbox"/>	< 10,000 <input type="checkbox"/>	Unknown <input type="checkbox"/>
WA	< 50 <input type="checkbox"/>	< 250 <input type="checkbox"/>	< 1,000 <input type="checkbox"/>	< 2,500 <input type="checkbox"/>	< 10,000 <input type="checkbox"/>	Unknown <input type="checkbox"/>
How has this number been determined or calculated? suspected						
<b>Reliability of total number of individuals (other than for 'unknown' above)</b>						
Global	Known <input type="checkbox"/>	Estimated <input type="checkbox"/>	Modelled <input type="checkbox"/>	Expert opinion <input type="checkbox"/>		
National	Known <input type="checkbox"/>	Estimated <input type="checkbox"/>	Modelled <input type="checkbox"/>	Expert opinion <input type="checkbox"/>		
WA	Known <input type="checkbox"/>	Estimated <input type="checkbox"/>	Modelled <input type="checkbox"/>	Expert opinion <input type="checkbox"/>		
If from expert opinion, provide name of expert: Authors and reviewers						
<b>How many subpopulations/locations?</b>						
Global	1 <input type="checkbox"/>	≤ 5 <input type="checkbox"/>	≤ 10 <input type="checkbox"/>	Unknown <input type="checkbox"/>		
National	1 <input type="checkbox"/>	≤ 5 <input type="checkbox"/>	≤ 10 <input type="checkbox"/>	Unknown <input type="checkbox"/>		
WA	1 <input type="checkbox"/>	≤ 5 <input type="checkbox"/>	≤ 10 <input type="checkbox"/>	Unknown <input type="checkbox"/>		
How has this number been determined or calculated?						
<b>Reliability of number of populations/locations (other than for unknown above)</b>						
Global	Known <input type="checkbox"/>	Estimated <input type="checkbox"/>	Modelled <input type="checkbox"/>	Expert opinion <input type="checkbox"/>		
National	Known <input type="checkbox"/>	Estimated <input type="checkbox"/>	Modelled <input type="checkbox"/>	Expert opinion <input type="checkbox"/>		
WA	Known <input type="checkbox"/>	Estimated <input type="checkbox"/>	Modelled <input type="checkbox"/>	Expert opinion <input type="checkbox"/>		
If from expert opinion, provide name of expert:						
<b>What is the total number and percentage of mature individuals in each subpopulation/location?</b> (include all known subpopulations/ locations; add subpop./ location name or reference below and add additional rows as required)						
Subpop./ location 1	1 <input type="checkbox"/>	≤ 5 <input type="checkbox"/>	≤ 10 <input type="checkbox"/>	Unknown <input type="checkbox"/>		
	90 - 100 % <input type="checkbox"/>	95 – 100 % <input type="checkbox"/>	100 % <input type="checkbox"/>	Unknown <input type="checkbox"/>		
Subpop./ location 2	1 <input type="checkbox"/>	≤ 5 <input type="checkbox"/>	≤ 10 <input type="checkbox"/>	Unknown <input type="checkbox"/>		
	90 - 100 % <input type="checkbox"/>	95 – 100 % <input type="checkbox"/>	100 % <input type="checkbox"/>	Unknown <input type="checkbox"/>		
How has this number been determined or calculated?						
<b>Reliability of the total number of mature individuals in each subpopulation/location? (other than for unknown above)</b>						
	Known <input type="checkbox"/>	Estimated <input type="checkbox"/>	Modelled <input type="checkbox"/>	Expert opinion <input type="checkbox"/>		
If from expert opinion, provide name of expert:						