

THREATENED SPECIES SCIENTIFIC COMMITTEE

Established under the *Environment Protection and Biodiversity Conservation Act 1999*

The Minister approved this conservation advice on 31/10/2015 and transferred this species from the Vulnerable to Endangered category, effective from 31/10/2015

Conservation Advice

Malurus coronatus coronatus

purple-crowned fairy-wren (western)

Taxonomy

Conventionally accepted as *Malurus coronatus coronatus* (Gould, 1858).

Summary of assessment

Conservation status

Endangered: Criterion 2 B2,(a),(b)(ii)(iii)(iv)(v)

The highest category for which *Malurus coronatus coronatus* is eligible to be listed is Endangered.

Malurus coronatus coronatus has been found to be eligible for listing under the following listing categories:

Criterion 2: B2,(a),(b)(ii)(iii)(iv)(v): Endangered

Criterion 3: C1: Vulnerable

Species can be listed as threatened under state and territory legislation. For information on the listing status of this species under relevant state or territory legislation, see <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>

Reason for conservation assessment by the Threatened Species Scientific Committee

This advice follows assessment of new information provided to the Committee to change the listing status of *Malurus coronatus coronatus*.

Public Consultation

Notice of the proposed amendment and a consultation document was made available for public comment for greater than 30 business days between 17 November 2014 and 9 January 2015. Any comments received that were relevant to the survival of the subspecies were considered by the Committee as part of the assessment process.

Species/Subspecies Information

Description

The purple-crowned fairy-wren (western) is a small bird measuring approximately 14 cm in length, with a wing-span of approximately 16 cm and weighing 9–13 g. Adult males in breeding plumage are mainly brown above and buff-white below, with a blue tail and a cap (i.e. forehead, crown and nape) that is purple except for a black spot on the crown and a black 'mask' that extends to form a collar around the nape. Adult males in non-breeding plumage differ by having a mainly brown cap, a brownish to blackish mask, and an off-white to pale grey orbital ring (Schodde & Mason, 1999; Higgins et al., 2001; Johnstone & Storr, 2004).

Adult females are similar to adult males in non-breeding plumage but have a brownish-grey to bluish-grey cap, a clean white orbital ring and a chestnut mask. Juveniles appear similar to the

adult female but have duller coloration (Schodde & Mason, 1999; Higgins et al., 2001; Johnstone & Storr, 2004).

The only other subspecies, *Malurus coronatus macgillivrayi* (purple-crowned fairy-wren (eastern)), differs in that it is smaller, the plumage of the crown and nape is slightly bluer, and the mantle and upper back has weak blue grey shading. *M. c. macgillivrayi* occurs in the Gulf of Carpentaria Drainage of western Queensland and north-eastern Northern Territory (Higgins et al., 2001).

Distribution

The purple-crowned fairy-wren (western) is patchily distributed in the Kimberley region of Western Australia – along the Fitzroy, Isdell, Drysdale, Durack and Pentecost River systems – and in the north-west Northern Territory along the Victoria River system (Rowley, 1993; Skroblin & Legge, 2013).

Its distribution has contracted greatly from its historical range. It formerly occurred on the Ord River, the upper reaches of the Pentecost River and Chamberlin River, and lower reaches of the Fitzroy River (Skroblin & Legge, 2010). It was recorded in high numbers along the lower Fitzroy River in the early 1900s, but was extirpated from this area after the introduction of pastoralism (approx. 150 km of occurrence lost; Smith & Johnstone, 1977; Rowley, 1993). It disappeared from the Ord River System after 2003, after a long decline, likely due to livestock grazing in the early 1900s, damming of the river in the 1970s, followed by habitat degradation from weed encroachment and grazing (likely > 150 km of occurrence lost; or 15% of the total original distribution; Skroblin & Legge, 2010, 2015). It has disappeared from all but one short stretch (3 km) of the Pentecost River catchment; historical sightings suggest that the species occurred throughout this catchment 100 years ago (loss of > 50 km of occurrence or 90% of the original subpopulation; Skroblin & Legge, 2013, 2015).

The loss of the Ord River population has isolated the Victoria River populations from those in the Kimberley by 250 km, a distance which the subspecies would be unable to traverse (Skroblin et al., 2014).

Relevant Biology/Ecology

The purple-crowned fairy-wren (western) inhabits dense, riparian vegetation in the wet-dry tropics of Western Australia and the Northern Territory (Smith & Johnstone, 1977; Boekel, 1979; Rowley & Russell, 1993, 1997). Its preferred habitat comprises a well-developed mid-storey under a dense canopy of emergent *Eucalyptus* and *Melaleuca* species (Garnett et al., 2011). In the Kimberley region, it usually occurs where the mid-storey is dominated by *Pandanus aquaticus* (Boekel, 1979) or *Barringtonia acutangula*, a freshwater mangrove (Skroblin & Legge, 2012), accompanied by a variety of shrubs. Along the Victoria River, and formerly on the lower Fitzroy River, it is usually associated with areas of dense river grass, *Chionachne cyanthopoda* (Rowley, 1993; van Doorn and Low Choy, 2009). Pairs or family parties forage in the shade, on the ground or in the undergrowth, and feed on a range of insects, other invertebrates and small quantities of seeds (Rowley & Russell, 1993; Woinarski et al., 2007).

The purple-crowned fairy-wren (western) is a cooperative breeder. Only the dominant pair in a population reproduces, and individuals can remain un-reproductive subordinates for several years. Subordinates help raise the offspring, improving productivity as well as the survival of the breeding pair (Kingma et al., 2010). Dispersal is sex-biased with most subordinate males remaining in their natal territory or moving to neighbouring territories, while females generally disperse further (Kingma et al., 2011).

Territories are maintained throughout the year, and usually the same site (or area) is used year after year (Rowley & Russell, 1993). At Drysdale River Crossing, the average length of territories (i.e. the average length of river and its associated riparian vegetation occupied by breeding groups) has been estimated to be 300 m (Rowley & Russell, 1993); at Timber Creek,

in the Northern Territory, the length of territories ranged from about 180 to 230 m (Rothwell, 1962).

The generation time is estimated at 8.3 years (Garnett et al., 2011).

Threats

The greatest threat to the purple-crowned fairy-wren (western) is the loss, degradation and fragmentation of habitat. Livestock and introduced herbivores eat and trample riparian vegetation which the subspecies relies on for foraging, nesting and shelter (Garnett et al., 2011; DLRM, 2012; Skroblin & Legge, 2012). Populations decreased 50% over a two-year period at two sites in the Victoria River District where grazing and trampling were allowed around habitat patches (van Doorn, 2007). Weed invasion also degrades habitat. The replacement of native riparian vegetation by weeds caused the historical loss of the subspecies on the lower Fitzroy River around the 1920s (Garnett et al., 2011). More frequent and/or more intense fires, which may be fuelled by heavy weed invasion, have also been detrimental in some places (Smith & Johnstone, 1977; DLRM, 2012).

Habitat fragmentation also isolates territories within subpopulations, disrupting population processes such as dispersal (Skroblin & Legge, 2013; Skroblin et al., 2014). Inbreeding may further threaten fragmented subpopulations, with substantially lowered hatching success recorded where inbreeding has occurred (Kingma et al., 2013).

Increased flood energy due to rangeland degradation has destroyed some areas of riparian vegetation and thus likely impacted on breeding success (Garnett et al., 2011; DLRM, 2012). Erosion, likely exacerbated by large floods, is widespread in the Victorian River District (Tropical Savannas CRC, 2006).

Predation by invasive species such as feral cats (*Felis catus*) and black rats (*Rattus rattus*) is also a threat. Habitat loss or degradation may further expose the purple-crowned fairy-wren (western) to predation through the reduction of shelter (Garnett et al., 2011), and weeds may increase the abundance of black rats (van Doorn, 2007).

Climate change, projected to result in an increased frequency of extreme events such as flooding, also threatens the subspecies. Flooding negatively impacts adult survival, territory occupation and nesting success (Rowley & Russell, 1993; Hall, pers comm. 2015). Interactions between climate change and habitat degradation are also likely, with the negative impacts of floods likely to be worse for populations living in degraded habitat (Hall, pers comm. 2015).

How judged by the Committee in relation to the EPBC Act Criteria and Regulations

Criterion 1. Population size reduction (reduction in total numbers)			
Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4			
	Critically Endangered Very severe reduction	Endangered Severe reduction	Vulnerable Substantial reduction
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3, A4	≥ 80%	≥ 50%	≥ 30%
<p>A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.</p> <p>A2 Population reduction observed, estimated, inferred or suspected in the past where the causes of the reduction may not have ceased OR may not be understood OR may not be reversible.</p> <p>A3 Population reduction, projected or suspected to be met in the future (up to a maximum of 100 years) [(a) cannot be used for A3]</p> <p>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.</p>	<p style="text-align: center;"><i>based on any of the following:</i></p> <ul style="list-style-type: none"> (a) direct observation [except A3] (b) an index of abundance appropriate to the taxon (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat (d) actual or potential levels of exploitation (e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites 		

Evidence:

Not eligible

Population declines of the purple-crowned fairy-wren (western) have occurred historically, and have continued to occur over the past 25 years (three generations). Populations in the Ord River declined during the 1970s and were extirpated from the river's upper reaches after 2003 (Skroblin & Legge, 2010). The Drysdale subpopulation has suffered declines of up to 70% in the past three generations; in 1993 it was estimated to contain 1500 individuals (Rowley, 1993) but surveys in 2009 suggest a population size of only 400-700 (Skroblin & Legge, 2013). Many sections of the Drysdale River system that were surveyed during 2007–2008 were highly impacted by cattle (Skroblin & Legge, 2012) and frequent intense fires (Legge et al., 2011).

Declines over the past 25 years have been recorded in the Isdell and Pentecost populations, which are remnants of much larger historical populations (Rowley, 1993; Skroblin & Legge, 2010), and on the Victoria River where a decline of around 10% has occurred (van Doorn, 2007; Department of Environment and Conservation, 2009; Skroblin & Legge, 2015). Population declines have probably occurred elsewhere due to ongoing degradation of riparian vegetation (National Land and Resources Audit 2002; Department of Environment and Conservation, 2009). Numbers have not declined at Drysdale River Crossing where the habitat remains unchanged (Rowley, 1993; Skroblin & Legge, 2010), but have increased at Annie Creek at Mornington Wildlife Sanctuary where the habitat is well protected (Peters et al., unpublished data).

The Northern Territory population is predicted to decline by more than 10% over the next three generations (Woinarski et al., 2007), a prediction which may also be valid across the Kimberley (Garnett et al., 2011). Within the last 25 years, the total population is estimated to have declined by 14% (Skroblin & Legge, 2015). An expert committee, convened by BirdLife Australia in 2010 to review the conservation status of all Australian birds, considered that past, current or future population declines are unlikely to exceed 30% in any three generation period (Garnett et al., 2011).

Following assessment of the information, the Committee has determined that the subspecies is not eligible for listing in any category under this Criterion as the past, current or future population declines are thought unlikely to exceed 30% in any 3-generation period.

Criterion 2. Geographic distribution as indicators for either extent of occurrence AND/OR area of occupancy			
	Critically Endangered Very restricted	Endangered Restricted	Vulnerable Limited
B1. Extent of occurrence (EOO)	< 100 km ²	< 5,000 km ²	< 20,000 km ²
B2. Area of occupancy (AOO)	< 10 km ²	< 500 km ²	< 2,000 km ²
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			

Evidence:

Eligible under Criterion 2 B2,(a),(b)(ii)(iii)(iv)(v) as Endangered

Garnett et al. (2011) estimate the extent of occurrence to be 169 000 km² and the area of occupancy to be < 500 km (linear). The area of occupancy is calculated on the basis of the length of river occupied (due to the subspecies' linear habitat): 370 km in the Kimberley Region (Skroblin & Legge, 2013) and 130 km in the Victoria River District (van Doorn, 2007). If the IUCN criteria of using a 2 km x 2 km grid for calculating the AOO is applied, then the species would be eligible as Vulnerable (instead of Endangered) under this Criterion.

The population is severely fragmented, with small isolated remnant subpopulations and limitations to the subspecies' dispersal. It currently occurs as six genetically distinct subpopulations that differ in size and isolation (Skroblin et al., 2014). Without changes in land management, it is likely that future declines within the next three generations will include the extinction of the small and isolated subpopulations on the Isdell and Pentecost river systems (Skroblin & Legge, 2013). Both these populations occur along short stretches of river (9 km and 3 km respectively) which puts them at high risk of local extirpation following single fire or flooding events (Pimm et al., 1988). Extinction of these populations would represent a 33% loss in the number of genetically distinct subpopulations. The isolation of these two populations makes it highly unlikely that these river systems will be recolonised by birds from other subpopulations following extinction (Skroblin et al., 2014).

Degradation and loss of riparian vegetation across northern Australia is ongoing (National Land and Resources Audit, 2002). In the Kimberley Region, 77% of suitable habitat for the purple-crowned fairy-wren (western) occurs on pastoral land, with only a small proportion present within protected areas (Skroblin, 2012; Skroblin & Legge, 2013). This habitat is at continuing high risk of degradation through grazing and trampling of riparian vegetation by cattle (Skroblin & Legge, 2015). Along the Victoria River, most suitable habitat now only occurs within Gregory National Park, with little remaining on pastoral properties (van Doorn, 2007). However, occurrence within conservation areas provides little extra protection for the subspecies, as feral herbivores (cattle, horses, buffalo and pigs) continue to threaten the subspecies' habitat within conservation reserves (van Doorn, 2007; Skroblin & Legge, 2013). Mismanaged fire regimes is a potential issue across the entire distribution (Skroblin & Legge, 2015), although this is being mitigated in the Kimberley portion of the distribution (Legge et al., 2011).

The Committee considers that the subspecies' area of occupancy is restricted, and the geographic distribution is precarious for the survival of the subspecies because it is severely fragmented, and there is a projected continuing decline in area of occupancy, habitat, number of individuals and number of locations.

Criterion 3. Population size and decline			
	Critically Endangered Very low	Endangered Low	Vulnerable Limited
Estimated number of mature individuals	< 250	< 2,500	< 10,000
AND either (C1) or (C2) is true			
C1 An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future)	Very high rate 25% in 3 years or 1 generation (whichever is longer)	High rate 20% in 5 years or 2 generation (whichever is longer)	Substantial rate 10% in 10 years or 3 generations (whichever is longer)
C2 An observed, estimated, projected or inferred continuing decline AND its geographic distribution is precarious for its survival based on at least 1 of the following 3 conditions:			
(a) (i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
(a) (ii) % of mature individuals in one subpopulation =	90 – 100%	95 – 100%	100%
(b) Extreme fluctuations in the number of mature individuals			

Evidence:

Eligible under Criterion 3 C1 as Vulnerable

The population is estimated at < 5000 individuals in a single subpopulation in the Victoria River District, Northern Territory (van Doorn, 2007; Skroblin & Legge, 2015), and < 4500 individuals in five subpopulations in the Kimberley, Western Australia (Skroblin & Legge, 2013). Distribution and adult population size estimates in the Kimberley region were based on presence/absence surveys undertaken over 2007–2010 on 14 river systems (Skroblin & Legge 2010), and habitat mapping along 4000 km of waterway (Skroblin & Legge, 2013). For the Victoria River, the population size estimate was based on habitat mapping undertaken in 2003 along 170 km of the river (van Doorn, 2007).

However, habitat degradation has continued along some rivers where the purple-crowned fairy-wren (western) occurs, and it is likely that population sizes have decreased across parts of its distribution since these estimates were made (Skroblin & Legge, 2015). In addition, because the subspecies is a cooperative breeder, its breeding potential is limited by the number of territories that are available, rather than by the number of adult individuals within the population. For the Kimberley region, a total population size estimate of 2800–4800 individuals (Skroblin & Legge, 2013) equates to a breeding population of 2000–3000 individuals. For the Northern Territory, a total population of <5000 (van Doorn 2007) would likely contain < 4500 breeding individuals (territories have 2.6 ± 0.7 individuals) (Skroblin & Legge, 2015).

Garnett et al. (2011) estimate the total number of mature individuals at 5000–9500, while Skroblin & Legge (2015) estimate the total number to be at most 9000. The population size is likely to continue to decline by more than 10% over the next three generations, due to continued degradation of habitat and impacts from invasive species (Woinarski et al., 2007; Garnett et al.,

2011). Within the last 25 years, the total population is estimated to have declined by 14% (Skroblin & Legge, 2015).

The Committee considers that the estimated total number of mature individuals is < 10,000 (limited), and there is a projected continuing substantial rate of decline over the next three generations.

Criterion 4. Number of mature individuals			
	Critically Endangered Extremely low	Endangered Very Low	Vulnerable Low
Number of mature individuals	< 50	< 250	< 1,000

Evidence:

Not eligible

The total number of mature individuals is estimated at 5000–9500 (Garnett et al., 2011; Skroblin & Legge, 2015).

The total number of mature individuals is not considered extremely low, very low or low. Therefore, the subspecies has not been demonstrated to have met this required element of this criterion.

Criterion 5. Quantitative Analysis			
	Critically Endangered Immediate future	Endangered Near future	Vulnerable Medium-term future
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

Evidence:

Insufficient data to determine eligibility

Population viability analysis has not been undertaken.

Conservation Actions

Recovery Plan

The purple-crowned fairy-wren (western) is listed as Endangered in Western Australia and Vulnerable in the Northern Territory. In Western Australia, the ‘Kimberley Science and Conservation Strategy 2011’ (Government of Western Australia, 2011) seeks to address threats in the Kimberley, including to the purple-crowned fairy-wren (western) which has been identified as a key threatened species. In the Northern Territory, broad conservation objectives for the subspecies have been identified (Department of Land Resource Management, 2012) and a number of recovery actions for the purple-crowned fairy-wren (western), identified as a priority species for management within Gregory National Park, are outlined in the Judburra/Gregory National Park Joint Management Plan 2011 (DNREAS, 2011).

The Committee recommends that a national recovery plan is not developed for *Malurus coronatus coronatus* (purple-crowned fairy-wren (western)), as a recovery plan would not have a conservation benefit above existing mechanisms.

Conservation and Management Actions

Primary Conservation Action

- Exclude livestock and feral herbivores from riparian vegetation at key sites.
- Where livestock and feral herbivores have access to rivers, provide alternative watering points away from these riparian areas.
- Reduce the abundance of feral herbivores at key sites.
- Reduce the frequency of intense fires that affect riparian vegetation.
- Identify and remove weeds at key sites.
- Implement erosion control measures.
- Restore and maintain habitat quality and connectivity, including the structural complexity of the riparian shrub-layer.
- Engage multiple landholders and stakeholders in management actions – including pastoral property owners with purple-crowned fairy-wrens (western) or habitat on their properties, non-government organisations, relevant state government agencies, natural resource management bodies, ranger groups and Indigenous groups.
- Increase landholder awareness of the purple-crowned fairy-wren (western) and its habitat, as well as actions to protect the species.

Survey and monitoring priorities

- Determine population sizes and trends at key accessible subpopulations.
- Determine the population persistence of rarely visited, less-accessible subpopulations.
- Implement a regional-scale monitoring program for habitat quality and purple-crowned fairy-wren (western) occurrence.

Information and research priorities

- Assess the impact of predation by black rats (*Rattus rattus*) and feral cats (*Felis catus*).
- Investigate the ability of the subspecies to disperse, and the impact of habitat fragmentation on population connectivity.
- Investigate whether the size and/or isolation of habitat patches along rivers influences the subspecies' occurrence, abundance and genetics.
- Undertake a population viability analysis to investigate the impact of threatening processes on future population trends of subpopulations.

Recommendations

- (i) The Committee recommends that the list referred to in section 178 of the EPBC Act be amended by **including** in the list in the Endangered category:

Malurus coronatus coronatus

- (ii) The Committee recommends that there should not be a recovery plan for this subspecies.

Threatened Species Scientific Committee

04/06/2015

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