The Minister approved this conservation advice and included this species in the Endangered category, effective from 5 May 2016

Conservation Advice

Amytornis dorotheae

Carpentarian grasswren

Taxonomy

Conventionally accepted as *Amytornis dorotheae* (Mathews 1914).

Summary of assessment

Conservation status

Endangered: Criterion 2 B1, B2(a)(b)(i)(ii)(iii)(v);

The highest category for which *Amytornis dorotheae* is eligible to be listed is Endangered.

Amytornis dorotheae has been found to be eligible for listing under the following listing categories:
Criterion 1: A2(c), A4(c): Vulnerable
Criterion 2: B1, B2(a)(b)(i)(ii)(iii)(v): Endangered

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 information provided by a public nomination to list the Carpentarian grasswren.

Public Consultation

Notice of the proposed amendment and a consultation document was made available for public comment for >30 business days between 2 December 2015 and 22 January 2016. Any comments received that were relevant to the survival of the species were considered by the Committee as part of the assessment process.

Species/Sub-species Information

Description

The Carpentarian grasswren is a medium-sized grasswren with a moderately long tapered tail. The species reaches a length of 16 - 17.5 cm and weighs 21 - 25 g (Higgins et al., 2001). Adult plumage is rich rufous-brown above transitioning to blackish on the top and sides of the head with bold white streaks on the cap, neck and saddle, the underside of the body is white in upper areas changing to yellow-brown (males) or rich red-brown (females) in lower areas and flanks (Higgins et al., 2001). Both sexes also have a slim orange-brown eyebrow and black whisker mark extending from the bill to the edge of the breast (Pizzey & Knight 1997). Juveniles are less boldly streaked, duller in colouration and have a paler beak (Higgins et al., 2001).

Carpentarian grasswrens are similar in appearance to white-throated grasswrens *(Amytornis woodwardi)*, however Carpentarian grasswrens are notable smaller and slimmer (Higgins et al., 2001).

Distribution

The Carpentarian grasswren is endemic to the southern Gulf of Carpentaria region of northern Australia (Higgins et al., 2001). Historically the species was known from four separate areas between the Tawallah Range/Limmen Bight River in the Northern Territory and Gunpowder in north-west Queensland (McKean & Martin 1989; Murphy et al., 2011); Borroloola, Wollogorang, Boodjamulla and Mt Isa. However, there have been no records of the species in the Borroloola area since 1986 despite several targeted surveys in the last decade (McKean & Martin 1989; Garnett et al., 2011). Within the Wollogorang area of the Northern Territory the species now exists as a tiny isolated population approximately 6 km to the west of Calvert Hills Station (Nomination 2015). Systematic surveys of the Boodjamulla (Lawn Hill) area of Queensland in 2011 recorded the species in very low numbers, with suspected population declines resulting from significant reductions in suitable habitat following extensive fires in 2003, 2006 and 2011 (Harrington et al., 2011; Young 2011). The largest remaining specific population of Carpentarian grasswrens exists in the Mount Isa region of Queensland (Harrington et al., 2009); however availability of habitat in this region may have been reduced following wildfires in 2012.

Relevant Biology/Ecology

The Carpentarian grasswren is confined to sandstone outcrops in mature spinifex (*Triodia* spp.) hummock grassland in the northern part of its range, while in the southern part of its range it occupies long-unburnt spinifex with stony areas between the hummocks on which grow a range of short grasses, forbs and patchy low trees and shrubs (McKean & Martin 1989; Rowley & Russell 1997). Grasswrens normally abandon burnt areas, unless substantial unburnt pockets of spinifex remain (Garnett et al., 2011), with recolonisation occurring after three to four years depending on levels of rainfall, vegetation regeneration rates and the persistence of nearby source populations (Harrington et al., 2009).

Carpentarian grasswrens are both insectivorous and granivorous and forage for seeds and insects on the ground, in rock crevices and in leaf litter beneath spinifex tussocks or shrubs. They generally forage in pairs or small groups (Higgins et al., 2001). The movements and dispersal biology of the species are largely unknown, however it has been suggested that individuals occupy stable breeding territories of an estimated 1.5 km^2 in size (Garnett et al., 2011). Furthermore, while Carpentarian grasswrens are likely to disperse and establish new territories through relatively intact landscapes, their ability to disperse across burnt landscapes is believed to be limited. In order to satisfy their breeding and foraging needs, Carpentarian grasswrens require access to mature spinifex, this can be achieved by encouraging a fire age heterogeneity that retains older vegetation patches.

Carpentarian grasswrens build bulky domed nests, featuring a side entrance with a large lip, using dry spinifex stems, dry leaves and softer grasses (Higgins et al., 2001). Nests are built above ground, usually in the upper portion of spinifex clumps, and females lay two to three eggs that are oval shaped, pinkish-white and faintly spotted (Higgins et al., 2001). A generation time of 9.7 years (BirdLife International 2011) is derived from an age at first breeding of 2.3 years and a maximum longevity of 17.0 years, both values extrapolated from fairy-wrens (*Malurus* spp.) (Garnett et al., 2011).

Threats

The primary threat to Carpentarian grasswrens is increased fire frequency and intensity (Garnett et al., 2011; Murphy et al., 2011), as this causes changes to the vegetation communities in their sandstone habitats (Higgins et al., 2001). Fire caused the extirpation of the Borroloola subpopulation in the Northern Territory, has greatly reduced two other subpopulations and was probably responsible for the historical separation of the species into four specific subpopulations (Garnett et al., 2011). Inappropriate fire regimes are currently threatening the remaining subpopulations (Garnett et al., 2011; Harrington & Murphy 2015). Rainfall in the northern part of the historical range has increased over the last century (Woinarski et al., 2007) because the wet season has been starting earlier (Garnett & Williamson 2010). While this allows spinifex to recover from fire more quickly it also enables fires to be more frequent and extensive (Garnett et al., 2011). The extent of control burning across the species range may also have declined

(Garnett et al., 2011), thus allowing even fuel loads to accumulate over large expanses, which may result in more extensive fires.

The spread of introduced pasture grasses, such as buffel grass (*Cenchrus ciliaris),* may also contribute to more frequent fires that spread across a greater extent of the landscape and burn deeper into rocky refuges (Garnett et al., 2011). In northern Australia, fires fuelled by exotic pasture grasses, such as buffel grass, have been shown to be up to ten times hotter than those fuelled by native grasses in the same region, and this process is contributing to increases in the frequency and intensities of fires which are eliminating the mature spinifex clumps that provide critical habitat for the Carpentarian grasswren (Woinarski 2006). Buffel grass' characteristics of prolific seed production, opportunistic seed germination, a deep root system and an ability to easily resprout following fire allow the species to form dense monocultures and displace native herbs and forbs (Biosecurity SA 2012). The dominant monoculture patches formed by buffel grass also lack the structural features that provide habitat for birds such as the Carpentarian grasswren. Buffel grass has an extensive distribution across Australia and has become naturalised in several states including the Northern Territory and Queensland (Biosecurity SA 2012). Buffel grass has been identified as a 'transformer' species and is recognised as posing a significant threat to biodiversity across arid and semi-arid regions of Australia (Biosecurity SA 2012) Invasion of this species has the potential to become a serious threat to the Mt Isa population of Carpentarian grasswrens in the future.

Other potential threats to the species include ongoing, localised impacts from mining and associated development (Garnett et al., 2011). Feral cats also pose a potential threat to Carpentarian grasswrens, although there have not been any reports of predation, grasswrens are likely to be at risk from feral cats due to their ground-dwelling nature (Nomination 2015). Cat predation is likely to increase in post-fire landscapes as vegetation cover is reduced, and birds are forced to move through much more open landscapes and exist in small, suboptimal habitat patches (McGregor et al., 2015; Leahy et al., 2016).

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%**

A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.

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.

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*]

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.

based on any of the following:

(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:

Eligible under Criterion 1 A2 (c) and A4 (c) for listing as Vulnerable

Experts have inferred that the Carpentarian grasswren has undergone a reduction in population size of greater than 30 percent in [less than] a three generation period (29 years), based on ongoing reductions in the species' extent of occurrence and area of occupancy, and that the cause of the reduction may not have ceased (A2 (c)) (Harrington & Murphy 2015). Furthermore, experts also suspect that the species will undergo further declines in population size in the future as the causes of recent declines are likely to continue and intensify (A4 (c)) (Nomination 2015). In 2010 the *Action Plan for Australian Birds 2010* estimated that the Carpentarian grasswren had experienced a reduction in population size of 20 to 29 percent in the preceding three generation period (Garnett et al., 2011), however since that time fires have significantly reduced available habitat for the species.

Experts recently estimated that, between surveys carried out pre-2000 and surveys carried out post-2000, the species extent of occurrence had declined by around 33 percent and area of occupancy had decreased by around 35 percent with the bulk of these declines being primarily associated with severe fires in 2011 and 2012 (Harrington & Murphy 2015).

To calculate the species extent of occurrence experts used the minimum convex polygon method, where no internal angle exceeded 180 degrees. All point records for the species were separated into the four identified subpopulations, a convex hull was calculated for each subpopulation and areas for each subpopulation were summed to estimate a total extent of occurrence for the species (Harrington & Murphy 2015). This process was then repeated using only point records from the year 2000 onwards and the results of each calculation were compared to estimate the reduction in the species extent of occurrence over this time [equivalent to a 1.5 generation time period] (Harrington & Murphy 2015). To calculate the area of occupancy the species entire extent of occurrence was divided into 2 x 2 km grid cells (each cell representing 400 ha), grid cells that contained records of the species (from all years) were counted and the total number of cells was multiplied by 400 to estimate area of occupancy (Harrington & Murphy 2015). This process was also repeated using only point records from the year 2000 onwards and the results of each calculation were compared to estimate the reduction in area of occupancy over this time [equivalent to a 1.5 generation time period] (Harrington & Murphy 2015).

It is difficult to determine whether any portion of the recorded declines in area of occupancy presented above could be attributed to population movements, low detection probabilities or variations in survey effort. However, experts believe the four populations of Carpentarian grasswren are on different stages of a pathway towards extinction (Harrington & Murphy 2015). The Borroloola subpopulation already appears to be extinct, with multiple dedicated, systematic surveys having failed to find any Carpentarian grasswrens in this area since 1986 (Harrington & Murphy 2015). Therefore, the survey results presented above appear to indicate a true decline in the number of Carpentarian grasswrens and cannot be attributed to fluctuations in population size. Based on surveys conducted between 2008 and 2013 researchers estimate that, even when adjusting for low levels of detection, the number of sites currently occupied by Carpentarian grasswrens has declined by between 33 and 73 percent when compared to historic records (Harrington & Murphy 2015).

The major cause of recent declines in the species extent of occurrence, area of occupancy and quality of habitat is thought to be an increase in the frequency and intensity of fires. Inappropriate fire regimes are likely to continue to impact the species in the future as the species distribution becomes increasingly fragmented and individuals are forced to occupy smaller, isolated patches of unburnt habitat (Harrington & Murphy 2015). Unburnt habitat patches may also represent suboptimal habitat for the species in terms of vegetation structure and patch size. It can take three to four years for burnt patches to once again provide suitable habitat for the species as spinifex vegetation recovers (Perry et al., 2011) and the species has been noted to have poor dispersal capabilities across a burnt landscape.

The Committee considers that the species has undergone a substantial reduction in numbers in less than three generation lengths (29 years for this assessment), equivalent to at least 30 percent and both the reduction and the cause of the reduction have not ceased. Therefore, the species has been demonstrated to have met the relevant elements of Criterion 1 to make it eligible for listing as Vulnerable.

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)(i)(ii)(iii)(v) for listing as Endangered

Following recent declines in habitat availability and quantity, experts have estimated the Carpentarian grasswrens area of occupancy as 264 km^2 (restricted), the species remaining distribution is severely fragmented and there are inferred continuing declines in extent of occurrence, area of occupancy, quality of habitat and number of mature individuals (Harrington & Murphy 2015).

As described under Criterion 1 the species current area of occupancy was calculated using the number of occupied 2 x 2 km^2 grid cells. Of the four historic subpopulations of Carpentarian grasswrens, the Borroloola subpopulation is now thought to be locally extinct, a second subpopulation has been reduced to low numbers at a single location and the remaining two populations have also declined significantly and are now scattered across large areas that have been fragmented by an increase in the frequency, intensity and extent of wildfires (Harrington & Murphy 2015; Nomination 2015). Furthermore, experts recently estimated that, following severe fires in 2011 and 2012, the species extent of occurrence had declined by around 33 percent and area of occupancy had decreased by around 35 percent (Harrington & Murphy 2015). Ongoing declines in extent of occurrence, area of occupancy, quality of habitat and number of mature individuals are also inferred as remaining isolated subpopulations appear to be restricted to isolated fire refugia and at increased risk from potential future fire events (Harrington & Murphy 2015).

The Committee considers that the species' extent of occurrence is limited and its area of occupancy is restricted, and the geographic distribution is precarious for the survival of the species because its remaining occupancy is severely fragmented and there are inferred continuing declines in extent of occurrence, area of occupancy, quality of habitat and number of mature individuals. Therefore, the species has meets the relevant elements of Criterion 2 to make it eligible for listing as Endangered.

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**
	(ii) % of mature individuals in one subpopulation =	**90 – 100%**	**95 – 100%**	**100%**
(b)	Extreme fluctuations in the number of mature individuals			

Evidence:

Insufficient data to determine eligibility

In 2010 the *Action Plan for Australian Birds 2010* estimated the number of mature individuals for the species to be 14 000 and decreasing (Garnett et al., 2011). Following recent reductions in the species extent of occurrence and area of occupancy, experts now estimate the number of mature individuals to be between 5550 and 11 050 (Nomination 2015). However, both of these population size estimates were considered to be of low reliability due to a lack of robust survey data, of comparable effort, across the entire species distribution (Garnett et al., 2011; Nomination 2015).

The Committee considers that there is insufficient information to determine the eligibility of the species for listing in any category under this criterion.

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

In 2010 the *Action Plan for Australian Birds 2010* estimated the number of mature individuals for the species to be 14 000 and decreasing (Garnett et al., 2011). Following recent reductions in the species extent of occurrence and area of occupancy experts now estimate the number of mature individuals to be between 5550 and 11 050 (Nomination 2015). However, both of these population size estimates were considered to be of low reliability due to a lack of robust survey data, of comparable effort, across the entire species distribution (Garnett et al., 2011;

Nomination 2015). Nevertheless, both estimates of population size clearly exceed the threshold of less than 1000 mature individuals required to be eligible for listing under this criterion.

The total number of mature individuals is between 5550 and 11 050 which is not considered extremely low, very low or low. Therefore, the species 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 Committee recommends that there should not be a recovery plan for *Amytornis dorotheae* (Carpentarian grasswren), as approved conservation advice provides sufficient direction to implement priority actions and mitigate against key threats.

Conservation and Management Actions

Fire

- Implement fire management (including prescribed burning and fire suppression activities) that aims to increase the extent of long-unburnt spinifex distributed in numerous patches across the landscape. This is likely to require reducing the extent and frequency of large-scale fires using a combination of strategic firebreaks, and introducing vegetation age heterogeneity into areas of same-age vegetation with small-scale, low-intensity patch burning. Fire management should also explicitly consider how to slow the spread of buffel grass.

- Provide maps of known occurrences of Carpentarian grasswrens to Traditional Owner groups, Indigenous Protected Area managers, pastoralists and local and state Rural Fire Services, and seek inclusion of mitigation measures in bushfire risk management plans and controlled burn operation maps.

Translocations

- Once appropriate fire management regimes are established to maintain the availability of suitable habitat across local and regional landscapes, plan for and carry out translocations of Carpentarian grasswrens into or historic areas of suitable habitat.

Invasive species

- Map the distribution of buffel grass across the species area of occupancy, consider the potential impacts of buffel grass distribution on fire management and, if necessary,

undertake weed control at key sites. Weed control is likely to require a multi-faceted approach that seeks to prevent further invasion of buffel grass where it has yet to become fully established, and actively target established patches that may facilitate the spread of extensive wildfires into areas supporting grasswrens.

- If predation by feral cats is found to be impacting upon the survival of Carpentarian grasswrens, implement a cat control management program at key sites.

Habitat loss disturbance and modifications

- Ensure natural resources managers are aware of the species' occurrence and provide protection measures against potential threats from mining and other resource extraction activities.

- Ensure that pastoral lessees and Indigenous communities are aware of the species' occurrence and provide protection measures against potential threats from land clearance and other developments.

Stakeholder Engagement

- Undertake consultation with private landholders, pastoral lessees and Indigenous communities in the region to improve management for Carpentarian grasswrens on private land.

Survey and Monitoring priorities

- More precisely assess population size, distribution, ecological requirements and the relative impacts of threatening processes by undertaking regular monitoring at key sites across the species range.

- Analyse data to determine population trends at key monitoring sites.

- Monitor fire patterns from across the species' distribution and model impacts on the availability of suitable habitat.

- Monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary.

Information and research priorities

- Assess the effect of buffel grass on Carpentarian grasswren habitat occupancy.

- Determine the relationship of buffel grass to fire data.

- Investigate the other potential impacts that buffel grass may be having upon Carpentarian grasswrens through its modification of vegetation communities and impacts on structural heterogeneity across habitat.

- Determine the impacts of feral cat predation on grasswrens.

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:

Amytornis dorotheae

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

Threatened Species Scientific Committee

01/03/2016

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