The Minister approved this conservation advice and included this species in the Critically Endangered category, effective from 17/11/15

Conservation Advice

Phyllurus gulbaru

Gulbaru gecko

Taxonomy

Conventionally accepted as *Phyllurus gulbaru* (Hoskin et al., 2003).

Summary of assessment

Conservation status

Critically endangered: Criterion 2 B1,(a),(b)(i)(ii)(iii)(iv)(v), Criterion 3 B,(a),(b)(i-v) and Criterion 4(c).

Phyllurus gulbaru has been found to be eligible for listing under the following listing categories:

Criterion 2: B1 (a) (b) (i-v): Critically Endangered
Criterion 3: B (a) (b) (i-v): Endangered
Criterion 4: (c): Vulnerable

The highest category for which *Phyllurus gulbaru* is eligible to be listed is Critically 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 the Queensland Government as part of the process to systematically reviewing species that are inconsistently listed under the EPBC Act and relevant Queensland legislation/lists.

Public Consultation

Notice of the proposed amendment was made available for public comment for 35 business days between 17 November 2014 and 9 January 2015. Any comments received that are relevant to the survival of the species have been considered by the Committee.

Species Information

Description

The Gulbaru gecko is a grey reptile growing to 18 cm with irregular dark blotches on head body and limbs with a pair of large dark and white blotches immediately anterior to the tail base. Blotches align across limbs and digits are strongly banded. Body and limbs are covered in small granules intermixed with larger pale conical tubercules. The tail is long and cylindrical. The head is large, triangular, distinct from neck; covered in very small granules with larger pale conical tubercles at back and sides of head (Hoskin et al., 2003).

Distribution

The Gulbaru gecko has a very restricted distribution in Queensland (Hoskin et al., 2003). The species is located near a UNESCO World Heritage site. The Gulbaru gecko was discovered in 2001. The species has only been found at three sites despite extensive survey. The Gulbaru

gecko is threatened by unmanaged burning which continues to reduce the amount of suitable habitat available (Hoskin et al., 2003; Hoskin, 2007). The land tenure where the species has been identified includes National Park, State forest and state land which is used for grazing under an Occupation License (McLaughlin, pers com., 2015).

Cultural Significance

It is unknown whether the species has cultural significance for indigenous groups within Australia. 'Gulbaru' is the Aboriginal language name for the Paluma Range.

Relevant Biology/Ecology

The Gulbaru gecko has a very restricted distribution in two isolated sub-populations. Within the area, the Gulbaru gecko has only been found in a specific habitat type. The two sub-populations are separated by an expanse of unsuitable habitat. This species is rainforest dependent (Hoskin, pers. com., 2015a).

It is inferred that mating may occur at least until autumn and that females store sperm through winter (Hoskin et al., 2003). Females lay two eggs, which develop slowly. There has been reported failure of successful breeding of Gulburu gecko in captivity (Hoskin et al., 2003).

Threats

Current known threats to the Gulbaru gecko include unmanaged burning for the purposes of grazing, causing the conversion of rainforest to *Eucalyptus* woodland leading to isolation of small pockets of suitable habitat (Hoskin et al., 2003). The area of rainforest has been reduced over recent times to increasingly isolated slopes and gullies. Late dry season fires that encroach into the rainforest from nearby open forest and pastoral areas are of particular concern. Fires are a natural part of the landscape in this region but intense and more frequent burning can decrease the size of habitat at the rainforest edge. This has occurred over the last 13 years at one of the Gulbaru gecko sites (Hoskin, 2013, Hoskin pers. com., 2015a). The fires that burn up the slopes of the gorge most years (often late in the dry season) appear to be deliberately lit (Hoskin, 2007, Hoskin pers. com., 2015a).

Invasive grasses growing at the rainforest boundary provide a thick, highly flammable fuel load that can exacerbate these effects. Restriction of the Gulbaru gecko to specific habitat areas affords the species some protection from fire; but, it is dependent on surrounding rainforest vegetation which is vulnerable. Even small incursions from fire could further fragment populations (Hoskin, 2013).

Illegal collecting for the pet trade is a potential significant threat (Hoskin, pers. com., 2015a). Although not recorded for this species another leaf-tailed gecko species just to the south of the Gulbaru gecko's habitat has been illegally collected in the last two years. Leaf-tailed geckos are highly prized in the pet/reptile trade because they are spectacular, and highly localized rare species are highly sought after.

Introduced species are a potential threat. Predation by feral cats is a possible current threat and the introduced *Hemidactylus frenatus* (Asian house gecko) may impact the Gulbaru gecko in the near future. The Asian house gecko is currently invading bushland in the region (Louise Barnett, Conrad Hoskin et al., research in progress cited in Hoskin, pers. com., 2015a). There is potential for it to spread into the area. If it does, it may out-compete the Gulbaru gecko (Hoskin, pers. com., 2015a).

Climate change is a potential threat to the species, for example if it leads to drier conditions and greater potential for fire. An unlikely but obvious direct threat to the species is quarrying or mining, an activity that doesn't occur within the distribution but does occur nearby in the region (Hoskin, 2013, Hoskin pers. com., 2015a).

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

Criterion 1: Reduction in numbers (based on any of A1 – A4)

A1. An observed, estimated, inferred or suspected population very severe ≥90%, severe ≥70% substantial ≥50% size reduction over the last 10 years or three generations, whichever is the longer, where the causes of the reduction are clearly reversible AND understood AND ceased, based on (and specifying) any of the following:
(a) direct observation
(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.

A2. An observed, estimated, inferred or suspected population very severe ≥80%, severe ≥50% substantial ≥30% size reduction over the last 10 years or three generations, whichever is the longer**,** where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible**,** based on (and specifying) any of (a) to (e) under A1.

A3. A population size reduction very severe ≥80%, severe ≥50% substantial ≥30%, projected or suspected to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years), based on (and specifying) any of (b) to (e) under A1.

A4. An observed, estimated, inferred, projected or suspected population size reduction very severe ≥80%, severe ≥50% substantial ≥30% over any 10 year or three generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, and where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.

Evidence:

Insufficient data to determine eligibility

There are no data available to judge whether the species has undergone, is suspected to have undergone or is likely to undergo a reduction in numbers.

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

Criterion 2:

Geographic distribution (based on either of B1 or B2)
B1. Extent of occurrence estimated to be very restricted <100 km^2, restricted <5,000 km^2 or limited < 20,000 km^2
B2. Area of occupancy estimated to be very restricted <10 km^2, restricted <500 km^2 or limited <2,000 km^2
AND
Geographic distribution is precarious for the survival of the species,
(based on at least two of a–c)
a. Severely fragmented or known to exist at a limited location.
b. Continuing decline, observed, inferred or projected, in any of the following:
(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 the following:
(i) extent of occurrence
(ii) area of occupancy
(iii) number of locations or subpopulations
(iv) number of mature individuals

Evidence:

Eligible under Criterion 2 B1 (a) (b) (i-v) for listing as Critically endangered

The extent of occurrence is estimated to be 23 km^2 and area of occupancy estimated to be 8 km^2 (Hoskin, pers com., 2015b) (based on 2 km grid as recommended by IUCN). Consequently, the geographic distribution is very restricted.

The geographic distribution is fragmented and known to exist at a limited location, restricted to specific habitat areas (Hoskin et al., 2003).

The species has only been found at three sites despite extensive survey and is currently only found at 2 sites (Hoskin, pers com., 2015a). The species has not been found at the type locality since 2001 (Hoskin, pers com., 2015a). Considerable effort has been invested by experienced herpetologists in surveying suitable habitat in the surrounding area (Hoskin et al., 2003). Intensive surveys of the ranges to the north and south of the area have been undertaken by suitably qualified personnel have failed to find this species. Surveys have been undertaken in a variety of rainforest and open forest habitats (Hoskin, 2007).

The two subpopulations are separated by an expanse of unsuitable habitat. One subpopulation is very small located in the southern part of the habitat and a larger subpopulation in the northern part of the habitat (Hoskin, 2007). The larger area of suitable habitat is approximately 10 km^2 the other patch is approximately 4 km^2. In the larger patch the gecko is reasonably common, in the smaller patch it is rare (Hoskin, 2013). It is estimated that 95% of the individuals are in the major subpopulation in the northern part of the habitat (Hoskin, 2007).

The population size is estimated from the area of suitable habitat and observed densities, an estimate of 600 individuals (Hoskin, pers. com. 2015a).

The species is restricted to a very small area and continued reduction and fragmentation of this range by fire is undoubtedly having a serious impact (Hoskin, 2007).

It can be inferred that the area, extent and quality of habitat, subpopulations and number of individuals is expected to further decline as a result of threats (e.g. unmanaged burning for the purposes of grazing) and potential threats from climate change, collecting for the pet trade, introduced species and possibly quarrying (an activity that occurs in the region, though not currently within the distribution) (Hoskin, 2013) have not ceased.

The Committee considers that the species' extent of occurrence is very restricted, and the geographic distribution is precarious for the survival of the species because its occurrence is limited and decline in extent of occurrence, area of occupancy, habitat, number of individuals and number of locations may be inferred or projected.

Criterion 3:

The estimated total number of mature individuals is very low <250, low <2,500 or limited<10,000; **and** either of (A) or (B) is true

(A) evidence suggests that the number will continue to decline at a very high rate (25% in 3 years or 1 generation, whichever is longer, up to 100 years), high rate (20% in 5 years or 2 generations, whichever is longer, up to 100 years) or substantial rate (10% in 10 years or 3 generations, whichever is longer, up to 100 years); or

(B) the number is likely to continue to decline and its geographic distribution is precarious for its survival (based on at least two of a – c):
   a. Severely fragmented or known to exist at a limited location.
   b. Continuing decline, observed, inferred or projected, in any of the following:
      (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 the following:
      (i) extent of occurrence
      (ii) area of occupancy
      (iii) number of locations or subpopulations
      (iv) number of mature individuals

Evidence:

Eligible under Criterion 3B (a) (b) (i-v) for listing as endangered

The population size is estimated from the area of suitable habitat and observed densities, an estimate of 600 individuals (Hoskin, pers. com., 2015a) which is low (<2500 mature individuals).

The geographic distribution is fragmented and known to exist at a limited location. As described for criterion 2 it can be inferred that the area, extent and quality of habitat is expected to further decline as a result of threats (e.g. unmanaged burning for the purposes of grazing) and potential threats from climate change, introduced species, illegal collection and quarrying have not ceased (Hoskin, 2013).

The Committee considers that the estimated total number of mature individuals of this species is low, and the geographic distribution is precarious for the survival of the species because its occurrence is limited and decline in extent of occurrence, area of occupancy, habitat, number of individuals and number of locations may be inferred or projected.

Criterion 4:

Estimated total number of mature individuals:

(a) Extremely low < 50
(b) Very low < 250
(c) Low < 1000

Evidence:

Eligible under Criterion 4 (c) for listing as vulnerable.

The population size is estimated from the area of suitable habitat and observed densities, an estimate of 600 individuals (Hoskin, pers. com., 2015a) which is low (<1000 mature individuals).

The Committee considers that the total number of mature individuals is 600 which is low.

Criterion 5:

Probability of extinction in the wild based on quantitative analysis is at least:

(a) 50% in the immediate future (i.e. 10 years or three generations, whichever is longer, up to a maximum of 100 years); or

(b) 20% in the near future (i.e. 20 year or five generations, whichever is longer, up to a maximum of 100 years); or

(c) 10% in the medium-term future (i.e. within 100 years).

Evidence:

Not eligible

Population viability analysis has not been undertaken.

Conservation Actions

Recovery Plan

There should not be a recovery plan for *Phyllurus gulbaru* as the approved conservation advice for the species provides sufficient direction to implement priority actions and mitigate against key threats.

Primary Conservation Objectives

1. Increase the number and size of wild populations
2. Maintain and enhance valued habitat
3. Enable recovery of additional sites and/or populations
4. Investigate options for linking, enhancing or establishing additional populations
5. Raise awareness of the Gulbaru gecko within the local community
6. Effectively administer the recovery effort

Conservation and Management Actions

1. Liaise with land owners/managers to determine ways to exclude fire from the rainforest
2. Protect and rehabilitate rainforest vegetation, particularly areas recently affected by unmanaged burning
3. Manage the populations to maintain genetic diversity
4. Monitor populations to identify key threats
5. Investigate formal conservation arrangements such as the use of covenants, conservation agreements or inclusion in reserve tenure
6. Monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary.

Monitoring priorities

1. Design and implement a monitoring program of the known occurrences of the species.

Information and research priorities

1. More precisely assess population size, distribution, ecological requirements and the relative impacts of threatening processes
2. Undertake survey work in suitable habitat and potential habitat to locate any additional populations
3. Investigate causes of low breeding success in captivity
4. Undertake research on breeding cycles and other aspects of biology
5. Undertake genetic analyses to:
    - assess current gene flow (using markers and analyses capable of distinguishing population divergence on an evolutionary timescale, from that which might be due to more recent impacts); and
    - identify populations with low genetic diversity that might benefit from artificial introduction of genetic material from other populations from which they have relatively recently diverged.

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 Critically Endangered category:

Phyllurus gulbaru

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

Threatened Species Scientific Committee

03/03/2015

References cited in the advice

Hoskin, C. J., Couper, P. J. and Schneider C. J. (2003). A new species of Phyllurus (Lacertilia : Gekkondidae) and a revised phylogeny and key for the Australian leaf-tailed geckos, Australian Journal of Zoology, 51: 153-164.

Hoskin, C. (2007). Nomination to list *Phyllurus gulbaru* as Endangered under the *Nature Conservation Act 1992.* Queensland Government.

Hoskin, C. (2013). Australian endangered species: Gulbaru Gecko. Article in The Conservation 22 August 2013. Available on the internet at: http://theconversation.com/australian-endangered-species-gulbaru-gecko-17219

Hoskin, C. (2015a). Personal communication, 9 January 2015. Species Expert.

Hoskin, C. (2015b). Personal communication, 14 January 2015. Species Expert.

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