



Consultation Document on Listing Eligibility and Conservation Actions

***Adclarkia cameroni* (brigalow woodland snail)**

You are invited to provide your views and supporting reasons related to:

- 1) the eligibility of *Adclarkia cameroni* (brigalow woodland snail) for inclusion on the EPBC Act threatened species list in the Endangered category; and
- 2) the necessary conservation actions for the above species.

Evidence provided by experts, stakeholders and the general public is welcome. Responses can be provided by any interested person.

Anyone may nominate a native species, ecological community or threatening process for listing under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or for a transfer of an item already on the list to a new listing category. The Threatened Species Scientific Committee (the Committee) undertakes the assessment of species to determine eligibility for inclusion in the list of threatened species and provides its recommendation to the Australian Government Minister for the Environment.

Responses are to be provided in writing either by email to:
species.consultation@environment.gov.au

or by mail to:

The Director
Terrestrial Species Conservation Section
Wildlife, Heritage and Marine Division
Department of the Environment
PO Box 787
Canberra ACT 2601

Responses must be submitted by Monday 1 August 2016.

Contents of this information package	Page
General background information about listing threatened species	2
Information about this consultation process	2
Draft information about the brigalow woodland snail and its eligibility for listing	3
Conservation actions for the species	8
References cited	11
Collective list of questions – your views	12

General background information about listing threatened species

The Australian Government helps protect species at risk of extinction by listing them as threatened under Part 13 of the EPBC Act. Once listed under the EPBC Act, the species becomes a Matter of National Environmental Significance (MNES) and must be protected from significant impacts through the assessment and approval provisions of the EPBC Act. More information about threatened species is available on the department's website at:

<http://www.environment.gov.au/biodiversity/threatened/index.html>.

Public nominations to list threatened species under the EPBC Act are received annually by the department. In order to determine if a species is eligible for listing as threatened under the EPBC Act, the Threatened Species Scientific Committee (the Committee) undertakes a rigorous scientific assessment of its status to determine if the species is eligible for listing against a set of criteria. These criteria are available on the Department's website at:

<http://www.environment.gov.au/biodiversity/threatened/pubs/guidelines-species.pdf>.

As part of the assessment process, the Committee consults with the public and stakeholders to obtain specific details about the species, as well as advice on what conservation actions might be appropriate. Information provided through the consultation process is considered by the Committee in its assessment. The Committee provides its advice on the assessment (together with comments received) to the Minister regarding the eligibility of the species for listing under a particular category and what conservation actions might be appropriate. The Minister decides to add, or not to add, the species to the list of threatened species under the EPBC Act. More detailed information about the listing process is at:

<http://www.environment.gov.au/biodiversity/threatened/nominations.html>.

To promote the recovery of listed threatened species and ecological communities, conservation advices and where required, recovery plans are made or adopted in accordance with Part 13 of the EPBC Act. Conservation advices provide guidance at the time of listing on known threats and priority recovery actions that can be undertaken at a local and regional level. Recovery plans describe key threats and identify specific recovery actions that can be undertaken to enable recovery activities to occur within a planned and logical national framework. Information about recovery plans is available on the department's website at:

<http://www.environment.gov.au/biodiversity/threatened/recovery.html>.

Information about this consultation process

Responses to this consultation can be provided electronically or in hard copy to the contact addresses provided on Page 1. All responses received will be provided in full to the Committee and then to the Australian Government Minister for the Environment.

In providing comments, please provide references to published data where possible. Should the Committee use the information you provide in formulating its advice, the information will be attributed to you and referenced as a 'personal communication' unless you provide references or otherwise attribute this information (please specify if your organisation requires that this information is attributed to your organisation instead of yourself). The final advice by the Committee will be published on the department's website following the listing decision by the Minister.

Information provided through consultation may be subject to freedom of information legislation and court processes. It is also important to note that under the EPBC Act, the deliberations and recommendations of the Committee are confidential until the Minister has made a final decision on the nomination, unless otherwise determined by the Minister.

Adclarkia cameroni

brigalow woodland snail

Taxonomy

Conventionally accepted as *Adclarkia cameroni* Stanistic, 2010.

Species/Sub-species Information

Description

Shell medium to large (diameter 20 mm), thin, light brownish yellow, with a reddish band on the whorls (spirals) on the shell (Stanistic et al., 2010). The shell is somewhat flattened, with a low, domed spire. The whorls are rounded and tightly coiled; the last whorl is flared. The sutures (junctions between the whorls) are weakly present. The tip of the shell bares small rounded knobs (Stanistic et al., 2010). Much of the rest of the shell bares fine, scaly knobs on the upper half of the whorls, glossy underneath. The shell also bares very fine, wavy ridges running across each whorl. The animal is grey (Stanistic et al., 2010).

This species differs from *A. dulacca* by having a less flattened shell, with 'looser' coiling (Stanistic et al., 2010).

Distribution

The brigalow woodland snail (family Camaenidae) is endemic to south-east Queensland, where it occurs in a small number of remnant and scattered *Acacia harpophylla* (brigalow) and eucalypt woodland patches (such as road verges and riparian corridors) on the Condamine River floodplain, especially in the area around Dalby and Chinchilla (Stanistic 2011). These remnant vegetation patches are subject to many disturbances such as excessive drying due to clearing, stock grazing, and fire. The brigalow patches occur on alluvial black soils. The narrow Condamine River riparian corridor is an important refuge for the species, particularly in an area that has been largely cleared for cattle grazing and agriculture. Here the canopy cover is dense, scattered timber (flood debris) is greatest and environmental moisture is at its most stable, even in drier times (Stanistic 2011). The species was first discovered during a major survey of the Queensland Brigalow Lands Bioregion conducted in 1996-1997, and has been well surveyed (Stanistic 2011).

The extent of occurrence (EOO) was calculated to be 27 924 km², and the area of occupancy (AOO) 76 km², based on locality records from 1976 to the present (DotE 2016). However, the EOO and AOO are likely to be much less, because the approximately 19 known records include only seven with live individuals (Stanistic 2013). Most of the sampled current populations comprise juveniles and sub-adults, indicating that the brigalow woodland snail is breeding in some locations.

The current distribution of this species is severely fragmented. The brigalow communities within the Condamine River floodplain that were once contiguous in the area of the species' historical distribution have been extensively cleared for agriculture and farming, and the current distribution of the brigalow woodland snail reflects this broad scale clearing (Stanistic 2011).

One population occurs in the State owned St Ruth's Reserve, via Dalby (on the Condamine River), which is managed by Western Downs Regional Council. However, no management of the species in this reserve is currently being undertaken (Stanistic 2011). There are no other populations in reserve systems (Stanistic 2011). The brigalow woodland snail is likely to occur in or be associated with the 'Brigalow (*Acacia harpophylla* dominant and co-dominant)' ecological community, currently listed as Endangered under the EPBC Act (TSSC 2013).

Relevant Biology/Ecology

The brigalow woodland snail lives under logs (Stanisic et al., 2010), where it likely feeds on fungi, algae and other detritus, thereby recycling nutrients into the soil (Stanisic 2011). Feeding by this species has not been observed, but likely occurs during periods of higher humidity, such as evenings and rain events.

The brigalow woodland snail needs both canopy and on-ground timber cover for survival and egg-laying (Stanisic 2011). Generally, camaenids lay their eggs in depressions in the soil under logs and other debris, and although egg-laying has not been recorded for this species, it is highly likely that it follows a similar pattern (Stanisic 2011). Desiccation is the greatest threat to land snail eggs and hence, in addition to ground debris, an over-storey of trees and shrubs is also required in order to maintain high levels of relative humidity at the substrate level (Stanisic 2011). Land snails can aestivate during drier phases but the extent of this hibernation is limited by their body reserves (Stanisic 2011).

The age at sexual maturity is unknown, but is likely to be approximately two years, based on the growth patterns of other snails from the same family (Stanisic 2011). The life expectancy is also unknown, but is likely to be at least five years, based on the longevity of similar species (Stanisic 2011). Mature snails will lay eggs on an annual basis and, depending on the length of the summer rain period, could lay more than a single clutch of eggs in one year. The number of mature individuals is unknown, and there is no evidence that this species undergoes extreme natural fluctuation in population size (Stanisic 2011).

Snails in seasonally dry environments in the northern half of Australia in particular are generally considered to become sexually mature during their second wet season. The brigalow woodland snail would be expected to follow a similar pattern (Solem 1981, cited in Stanisic 2011). Natural mortality is likely to be most significant for the immature stages, when shell growth has not been fully completed (Stanisic 2011).

The brigalow woodland snail is of very limited mobility. Under favourable conditions, such as rain, this species can move between suitable areas of microhabitat, but the extent to which this occurs will be limited by the spatial arrangement of habitat patches.

Threats

Table 1 – Threats impacting the brigalow woodland snail in approximate order of severity of risk, based on available evidence

Threat factor	Threat type	Threat status	Evidence base
Habitat loss and fragmentation			
Land clearing	known	current	Habitat with tree cover and ground debris is critical to survival of native land snails, and increases the species' ability to disperse and recolonise (Stanisic 2011). Tree cover ensures a level of environmental moisture. Habitat clearing is likely to increase with the proposed gas extraction and coal mining developments in the region (Stanisic 2011). Land clearing also leads to loss of habitat.
Habitat disturbance	known	current	Accumulated ground debris provides important shelter for the species. Undisturbed habitat ameliorates the effects of drought events, as desiccation is the greatest threat to land snails generally (Stanisic 2011). The harvesting of timber on the ground for firewood may threaten

			this species.
Invasive species			
Predation by rats (<i>Rattus</i> spp.), mice (<i>Mus musculus</i>) and feral pigs (<i>Sus scrofa</i>)	known	current	Rats, mice and pigs are known to prey on land snails (Stanisic 2011). The incidence of predation is likely to be high, as rats and mice are nocturnal scavengers, and the brigalow woodland snail also likely feeds at night. Predation by invasive species is an ongoing threat at all locations (Stanisic 2011), although the impact is unknown.
Invasion of buffel grass	known	potential	Buffel grass (<i>Cenchrus ciliaris</i>) has replaced native grasses in some areas, and increases in fuel load are correlated with buffel grass invasion (Miller et al., 2010), leading to more intense fires.
Impacts of domestic species			
Trampling by cattle and horses	known	current	Cattle and horses—animals with solid hooves—directly kill the snails and destroy valuable microhabitat (logs and timber), which provides feeding and breeding habitat for snails (Stanisic 2011). Cattle are currently excluded from the St Ruth’s Reserve locality, but they are an ongoing threat to all other known populations (Stanisic 2011).
Fire			
High intensity	known	potential	Any fire can cause loss of individuals and negatively impact their habitat. Hot fires in particular not only affect canopy structure but also tend to eliminate ground debris, which is essential habitat for snails (Stanisic 2011). The low mobility of land snails means they are especially susceptible to the effects of fire.

Assessment of available information 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.	(a)	direct observation [except A3]
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.	(b)	an index of abundance appropriate to the taxon
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]	(c)	a decline in area of occupancy, extent of occurrence and/or quality of habitat
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)	the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites

based on any of the following

Evidence:

The generation length is unknown, but for this assessment is taken to be approximately 3.5 years, assuming that breeding can start after two years, and a life expectancy of five years. Three generations are therefore approximately 11 years, and any population reduction is considered over this period.

Habitat destruction is the greatest threat to land snail communities, and land clearance has affected 85 percent of the brigalow communities in Queensland (Stanisic et al., 2010). On a national scale, the brigalow (*Acacia harpophylla* dominant and co-dominant) Ecological Community has declined to approximately 10% of its former area (TSSC 2001). The greatest decline in extent of this Ecological Community occurred during the decade from 1960 to 1970, (TSSC 2001).

Historical decline in the extent of occurrence of the brigalow woodland snail can be inferred based on the reduction in brigalow habitat. The brigalow woodland snail now occurs mostly in small remnant vegetation patches that are subject to many deleterious disturbances such as excessive drying, stock grazing, and fire (Stanisic 2011). However, how much of the original brigalow habitat that was occupied by this species is unknown. Mortality is likely to be higher during extended periods of drought, and this is exacerbated by further clearance of remnant vegetation.

The greatest decline in distribution of the brigalow woodland snail also likely occurred during the 1960s, which is much earlier than the last 11 years, the appropriate period for assessment under this criterion. Although the brigalow woodland snail is subject to current threats, and may still be declining, there are no available data on historical distribution or current abundance. Future decline is likely if proposed development of gas tenements and coal mines are approved (Stanisic 2011), but again there are insufficient data to quantify the level of decline.

The data presented above appear to be insufficient to demonstrate if the species is eligible for listing under this criterion. However, the purpose of this consultation document is to elicit additional information to better understand the species' status. This conclusion should therefore be considered to be tentative at this stage, as it may be changed as a result of responses to this consultation process.

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 km²	< 5,000 km²	< 20,000 km²

B2. Area of occupancy (AOO)	< 10 km ²	< 500 km ²	< 2,000 km ²
AND at least 2 of the following 3 conditions indicating distribution is precarious for survival:			
(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:

The extent of occurrence was calculated to be 27 924 km², using the IUCN convex hull/minimum convex polygon method, based on the mapping of point records from 1976 to 2016 obtained from state governments, museums and CSIRO (DotE 2016). The area of occupancy was calculated to be 76 km², based on locality records from 1976 to 2016 (DotE 2016), using the 2x2 km grid cell method described in the IUCN Red List Guidelines 2014 (IUCN, 2014).

The distribution of the brigalow woodland snail is severely fragmented. The brigalow communities within the Condamine River floodplain that were once contiguous in the area of the species' historical distribution have been extensively cleared for agriculture and farming, and the known locations of the brigalow woodland snail reflect this broad scale clearing (Stanisic 2011). The brigalow woodland snail now occurs mostly in small remnant vegetation patches that are subject to many disturbances such as excessive drying due to clearing, stock grazing, and fire (Stanisic 2011). Mortality is likely to be higher during extended periods of drought, and this is exacerbated by further clearance of remnant vegetation.

The brigalow woodland snail is subject to current threats, and may still be declining, although there are no available data on historical distribution or current abundance. Future decline is likely if proposed development of gas tenements and coal mines are approved, but again there are insufficient data to quantify the level of decline. The species has very limited mobility, and the capacity for dispersal is therefore also very limited. There is no evidence that this species undergoes extreme natural fluctuation in population size (Stanisic 2011).

In summary, the area of occupancy is <500 km², with a severely fragmented distribution and likely continuing decline in area, extent, and quality of habitat as well as a likely decline in the number of mature individuals due to the effects of land clearing, invasive and domestic species, and intense fires.

The data presented above appear to demonstrate that the species is **eligible for listing as Endangered** under this criterion. However, the purpose of this consultation document is to elicit additional information to better understand the species' status. This conclusion should therefore be considered to be tentative at this stage, as it may be changed as a result of responses to this consultation process.

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	High rate 20% in 5 years or 2 generation	Substantial rate 10% in 10 years or 3 generations

	(whichever is longer)	(whichever is longer)	(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:

There are no estimates for the number of mature individuals.

The data presented above appear to be insufficient to demonstrate if the species is eligible for listing under this criterion. However, the purpose of this consultation document is to elicit additional information to better understand the species' status. This conclusion should therefore be considered to be tentative at this stage, as it may be changed as a result of responses to this consultation process.

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

Evidence:

There are no estimates for the number of mature individuals.

The data presented above appear to be insufficient to demonstrate if the species is eligible for listing under this criterion. However, the purpose of this consultation document is to elicit additional information to better understand the species' status. This conclusion should therefore be considered to be tentative at this stage, as it may be changed as a result of responses to this consultation process.

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:

Population viability analysis appears not to have been undertaken, and there are insufficient data to demonstrate if the species is eligible for listing under this criterion. However, the purpose of this consultation document is to elicit additional information to better understand the species' status. This conclusion should therefore be considered to be tentative at this stage, as it may be changed as a result of responses to this consultation process.

Conservation Actions

Recovery Plan

A decision about whether there should be a recovery plan for this species has not yet been determined. The purpose of this consultation document is to elicit additional information to help inform this decision.

Primary Conservation Actions

1. Prevent land clearing and resulting habitat destruction at all known localities.
2. Maintain and enhance existing and potential habitat.

Conservation and Management Priorities

Land clearing

- Prevent clearing of all brigalow habitat within the species' range, and in other areas where the brigalow woodland snail may occur.
- Investigate formal conservation arrangements, management agreements and covenants on private land, and for crown and private land investigate and/or secure inclusion in reserve tenure if possible. Seek to increase the level of legislative protection and active management planning for localities where this species occurs.

Habitat disturbance and modifications

- Retain a buffer of native vegetation and leaf litter around all occurrences of this species.
- Manage any other likely, potential or emerging threats to habitat quality, such as further invasion of weeds and habitat modification by removal of firewood.
- Erect appropriate signage to indicate conservation of individuals or groups of this species, and to help prevent accidental trampling.
- Ensure land managers are aware of the species' occurrence and provide protection measures against key and potential threats.

Invasive species

- Identify and control buffel grass and any other weeds that could threaten the brigalow woodland snail using appropriate methods, such as the careful use of herbicides or digging and removal. Ensure that any mechanical disturbance and overspray associated with chemical control are minimised, and do not impact this species.
- Manage predation and possible trampling by feral pigs at important sites through exclusion fencing or other barriers. Where possible, control feral pigs using appropriate methods (DEH 2005).
- Where possible, manage predation by rats and mice using appropriate methods (e.g. DEWHA 2009). Consider monitoring the impact of feral predator control after any large fire or large rain event.

Impacts of domestic species

- If livestock or horses occur in the area, manage trampling (and potential grazing of native vegetation) at important sites through exclusion fencing or other barriers.

Fire

- Prevent all high intensity fires. Fires must be managed to ensure that prevailing fire regimes do not disrupt the life cycle of the brigalow woodland snail, that they support rather than degrade the habitat necessary to this species, that they do not promote invasion of exotic species, and that they do not increase impacts of grazing/predation.
- If fire operations are necessary, physical damage to the habitat and individuals of the brigalow woodland snail must be avoided during and after operations.
- Fire management authorities and land management agencies should use suitable maps and install field markers to avoid damage to this species.
- Ensure that a high proportion of the habitat is maintained with a post-fire age sufficient to provide adequate canopy cover (or habitat) to the brigalow woodland snail.
- Ensure that areas of dense ground cover/leaf litter are retained within the habitat if any prescribed low intensity fires are implemented.

Stakeholder Engagement

- Raise awareness of the brigalow woodland snail within the local community. Engage with the relevant land managers (especially managers of private land and the Western Downs Regional Council) and encourage these key stakeholders to contribute to the implementation of conservation management actions.
- Land managers (including pastoralists and the Western Downs Regional Council) should be given information about managing fire for the benefit of the threatened species.
- Prepare a management strategy with input and from local experts.

Survey and Monitoring priorities

- Conduct targeted surveys throughout the range of the brigalow woodland snail to better define population distribution and abundance. Accurately identify potentially suitable habitat and undertake survey work to locate and map any additional populations. The brigalow woodland snail lives under forest debris and is best detected by turning logs and raking accumulated leaves. The presence of dead shells, particularly of juvenile and sub-adult snails, is usually an indication of living adults (Stanisic 2011). The best times for survey are during the months of summer storms and rain (generally October to March). The snail is nocturnal, suggesting that night surveys would be preferable; however, given the difficulty with night observation of snails in their habitat, daylight searching can be equally effective (Stanisic 2011). Survey effort for recording presence/absence should be at least two person hours targeting areas of preferred snail microhabitat. At all times disturbance should be minimised to avoid damage to live snails (Stanisic 2011).
- Establish and maintain a monitoring programme based on these data to:
 - determine trends in population size and distribution, mortality and timing of life history stages;
 - determine threats and their relative impacts; and
 - monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary.

- Precise fire history records must be kept for the habitat and current populations (confirmed and suspected) of the brigalow woodland snail.

Information and Research priorities

- Prioritise management actions at all sites based on the currency, degree and nature of threats.
- Assess the species' ecological requirements relevant to the persistence of the species. Investigate the impact of microhabitat and substrate on presence and abundance of the brigalow woodland snail at each locality. Assess the relative importance of: coverage of the canopy layer, coverage of the herbaceous layer, size and percentage of on-ground timber cover, size and percentage of rock cover, and leaf litter cover. Assess how they affect moisture/relative humidity at each locality. Assess the presence and abundance of co-occurring species at each locality.
- Where possible, assess the disturbance history at all localities. Where possible, differentiate between the time since disturbance, type of disturbance (e.g. fire history, mechanical disturbance, etc.), and presence of the brigalow woodland snail.
- Investigate optimum conditions and habitat for egg-laying. Record microhabitat characteristics at all sites where eggs are observed.

References cited in the advice

- Department of the Environment (DotE) (2016). Area of occupancy and extent of occurrence for *Adclarkia cameroni*. Unpublished report, Australian Government Department of the Environment, Canberra.
- IUCN (International Union for Conservation of Nature) (2014). Guidelines for using the IUCN Red List categories and Criteria, version 11. Available on the Internet at: <http://www.iucnredlist.org/documents/RedListGuidelines.pdf>
- Miller, G., Friedel, M., Adam, P. & Chewings, V. (2010). Ecological impacts of buffel grass (*Cenchrus ciliaris* L.) invasion in central Australia—does field evidence support a fire-invasion feedback? *The Rangeland Journal* 32, 353-365.
- Solem, A. (1981). Camaenid land snails from Western and central Australia (Mollusca: Pulmonata: Camaenidae) II. Taxa from the Kimberley, Amplirhagada (Iredale, 1933). *Records of the Western Australian Museum, Supplement No 11*, 143-320.
- Stanisic, J. (2008). Recovery plan for the boggomoss snail *Adclarkia dawsonensis*. Report to Department of the Environment, Water, Heritage and the Arts, Canberra. Environmental Protection Agency, Brisbane.
- Stanisic, J., Shea, M., Potter, D. & Griffiths, O. (2010). Australian land snails. A field guide to eastern Australian species. Vol. 1. Bioculture Press, Rivière des Anguilles, Mauritius.
- TSSC (Threatened Species Scientific Committee) (2001). Commonwealth listing advice on brigalow (*Acacia harpophylla* dominant and co-dominant). Department of the Environment, Canberra.

TSSC (Threatened Species Scientific Committee) (2013). Approved conservation advice for the brigalow (*Acacia harpophylla* dominant and co-dominant) ecological community. Department of the Environment, Canberra.

Other sources cited in the advice

DEH (Department of the Environment and Heritage) (2005). *Threat abatement plan for predation, habitat degradation, competition and disease transmission by feral pigs*. Department of the Environment and Heritage, Canberra.

Available on the Internet at:

<http://www.environment.gov.au/resource/threat-abatement-plan-predation-habitat-degradation-competition-and-disease-transmission>

DEWHA (Department of the Environment, Water, Heritage and the Arts) (2009). Threat abatement plan to reduce the impacts of exotic rodents on biodiversity on Australian offshore islands of less than 100 000 hectares. Department of the Environment, Water, Heritage and the Arts, Canberra.

Available on the Internet at:

<http://www.environment.gov.au/biodiversity/threatened/publications/tap/reduce-impacts-exotic-rodents-biodiversity-australian-offshore>

Stanisic, J. (2011). Personal communication by email, 19 September 2011, Biodiversity Assessment and Management Pty Ltd.

Stanisic, J. (2013). Additional information on *Adclarkia cameroni* Stanisic, 2010. Personal communication by email, 9 September 2013, Biodiversity Assessment and Management Pty Ltd.

Collective list of questions – your views

*(Note: for the purpose of this assessment, generation length for *Adclarkia cameroni* has been estimated at 3.5 years. The listing guidelines for criterion 1 consider decline over a period of three generation lengths or 10 years, whichever is longer. As three generations are equal to approximately 11 years, decline is considered over this period.*

Biological information

1. Can you provide any additional or alternative references, information or estimates on longevity, average life span and generation length?
2. Is this species subject to a lack of recruitment? Can you provide any information regarding the level of and general requirements for recruitment?
3. Can you provide any additional biological information for this species?

Population size

4. Has the survey effort for this species been adequate to determine its national adult population size? If not, please provide justification for your response.
5. Can you provide an estimate of the current population size of mature adults of this species (national extent)? Please provide supporting justification or other information.

If, because of uncertainty, you are unable to provide a single number, you may wish to provide an estimated range. If so, please choose one of the ranges suggested in the table

below of possible species numbers, and also choose the level of confidence you have in this estimate:

Current number of mature individuals is estimated to be in the range of: <input type="checkbox"/> 1–50 <input type="checkbox"/> 51–250 <input type="checkbox"/> 251–1000 <input type="checkbox"/> >1000 <input type="checkbox"/> >10 000
Level of your confidence in this estimate: <input type="checkbox"/> 0–30% - low level of certainty/ a bit of a guess/ not much information to go on <input type="checkbox"/> 31–50% - more than a guess, some level of supporting evidence <input type="checkbox"/> 51–95% - reasonably certain, information suggests this range <input type="checkbox"/> 95–100% -high level of certainty, information indicates quantity within this range <input type="checkbox"/> 99–100% - very high level of certainty, data are accurate within this range

Evidence of total population size change

6. Are you able to provide an estimate of the total population size three generations ago (during approximately 2005)? Please provide justification for your response.

If, because of uncertainty, you are unable to provide a single number, you may wish to provide an estimated range. If so, please choose one of the ranges suggested in the table below of possible species numbers, and also choose the level of confidence you have in this estimate.

Number of mature individuals is estimated to be in the range of: <input type="checkbox"/> 1–50 <input type="checkbox"/> 51–250 <input type="checkbox"/> 251–1000 <input type="checkbox"/> >1000 <input type="checkbox"/> >10 000
Level of your confidence in this estimate: <input type="checkbox"/> 0–30% - low level of certainty/ a bit of a guess/ not much information to go on <input type="checkbox"/> 31–50% - more than a guess, some level of supporting evidence <input type="checkbox"/> 51–95% - reasonably certain, information suggests this range <input type="checkbox"/> 95–100% -high level of certainty, information indicates quantity within this range <input type="checkbox"/> 99–100% - very high level of certainty, data are accurate within this range

7. Are you able to comment on the extent of decline in the species' total population size over the last approximately 10 years? Please provide justification for your response.

If, because of uncertainty, you are unable to provide an estimate of decline, you may wish to provide an estimated range. If so, please choose one of the ranges suggested in the table below of ranges of decline, and also choose the level of confidence you have in this estimated range.

Decline estimated to be in the range of:
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- 1–30%
 31–50%
 51–80%
 81–100%
 90–100%

Level of your confidence in this estimated decline:

- 0–30% - low level of certainty/ a bit of a guess/ not much information to go on
 31–50% - more than a guess, some level of supporting evidence
 51–95% - reasonably certain, suggests this range of decline
 95–100% -high level of certainty, information indicates a decline within this range
 99–100% - very high level of certainty, data are accurate within this range

8. Please provide (if known) any additional evidence which shows the population is stable, increasing or declining.

Current Distribution/range/extent of occurrence, area of occupancy

9. Does this information consider the entire geographic extent and national extent of the species? If not, please provide justification for your response.
10. Has the survey effort for this species been adequate to determine its national distribution? If not, please provide justification for your response.
11. Is the distribution as described valid? If not, please provide justification for your response and provide alternative information.
12. Do you have any information on the *current* populations? Can you provide extent of occurrence data (based on convex polygon around all current populations) and area of occupancy data (based on the sum of each 2km x 2km grid over each current record)? Can you provide a distribution map of the current populations?
13. Do you agree that the way the current extent of occurrence and/or area of occupancy have been estimated is appropriate? Please provide justification for your response.

Can you provide estimates (or if you disagree with the estimates provided, alternative estimates) of the extent of occurrence and/or area of occupancy.

If, because of uncertainty, you are unable to provide an estimate of extent of occurrence, you may wish to provide an estimated range. If so, please choose one of the ranges suggested in the table below of ranges of extent of occurrence, and also choose the level of confidence you have in this estimated range.

Extent of occurrence is estimated to be in the range of:

- <100 km²
 100 – 5 000 km²
 5 001 – 20 000 km²
 >20 000 km²

Level of your confidence in this estimated extent of occurrence

- 0–30% - low level of certainty/ a bit of a guess/ not much data to go on
 31–50% - more than a guess, some level of supporting evidence
 51–95% - reasonably certain, data suggests this range of decline

- 95–100% -high level of certainty, data indicates a decline within this range
- 99–100% - very high level of certainty, data is accurate within this range

If, because of uncertainty, you are unable to provide an estimate of area of occupancy, you may wish to provide an estimated range. If so, please choose one of the ranges suggested in the table below of ranges of area of occupancy, and also choose the level of confidence you have in this estimated range.

Area of occupancy is estimated to be in the range of:

- <10 km²
- 11 – 500 km²
- 501 – 2000 km²
- >2000 km²

Level of your confidence in this estimated extent of occurrence:

- 0–30% - low level of certainty/ a bit of a guess/ not much data to go on
- 31–50% - more than a guess, some level of supporting evidence
- 51–95% - reasonably certain, data suggests this range of decline
- 95–100% -high level of certainty, data indicates a decline within this range
- 99–100% - very high level of certainty, data is accurate within this range

Past Distribution/range/extent of occurrence, area of occupancy

14. Can you provide estimates of the former extent of occurrence and/or area of occupancy of this species? Please provide justification for your response.

If, because of uncertainty, you are unable to provide an estimate of past extent of occurrence, you may wish to provide an estimated range. If so, please choose one of the ranges suggested in the table below of ranges of past extent of occurrence, and also choose the level of confidence you have in this estimated range.

Past extent of occurrence is estimated to be in the range of:

- <100 km²
- 100 – 5 000 km²
- 5 001 – 20 000 km²
- >20 000 km²

Level of your confidence in this estimated extent of occurrence

- 0–30% - low level of certainty/ a bit of a guess/ not much data to go on
- 31–50% - more than a guess, some level of supporting evidence
- 51–95% - reasonably certain, data suggests this range of decline
- 95–100% -high level of certainty, data indicates a decline within this range
- 99–100% - very high level of certainty, data is accurate within this range

If, because of uncertainty, you are unable to provide an estimate of past area of occupancy, you may wish to provide an estimated range. If so, please choose one of the ranges

suggested in the table below of ranges of past area of occupancy, and also choose the level of confidence you have in this estimated range:

Past area of occupancy is estimated to be in the range of: <input type="checkbox"/> <10 km ² <input type="checkbox"/> 11 – 500 km ² <input type="checkbox"/> 501 – 2000 km ² <input type="checkbox"/> >2000 km ²
Level of your confidence in this estimated extent of occurrence: <input type="checkbox"/> 0–30% - low level of certainty/ a bit of a guess/ not much data to go on <input type="checkbox"/> 31–50% - more than a guess, some level of supporting evidence <input type="checkbox"/> 51–95% - reasonably certain, data suggests this range of decline <input type="checkbox"/> 95–100% -high level of certainty, data indicates a decline within this range <input type="checkbox"/> 99–100% - very high level of certainty, data is accurate within this range

Change in status/rate of change

15. Is the information used to assess the nationally threatened status of the species robust? Have all the underlying assumptions been made explicit? Please provide justification for your response.

General

16. Can you provide additional data or information relevant to this assessment?
17. Have you been involved in developing this nomination? If so in what capacity?

Threats

18. Do you agree that the threats listed are correct and that their effect on the species is significant?
19. To what degree are the identified threats likely to impact on the species in the future?
20. What threats are impacting on different populations, how variable are the threats and what is the relative importance of the different populations? Please provide evidence and background information.
21. Do you consider the harvesting of timber on the ground for firewood to be a threat?
22. Do you consider that predatory snail species threaten the brigalow woodland snail?
23. Can you provide additional or alternative information on threats, past, current or potential that may adversely affect this species at any stage of its life cycle?
24. Can you provide supporting data/justification or other information for your responses to these questions about threats?

Management

25. What planning, management and recovery actions are currently in place supporting protection and recovery of the species? To what extent have they been effective?

26. Can you recommend any additional or alternative specific threat abatement or conservation actions that would aid the protection and recovery of the species?
 27. What individuals or organisations are currently, or potentially could be, involved in management and recovery of the species?
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