Internal use only	
Reference Number	/

Nomination to change the conservation class of a species under the Queensland *Nature Conservation Act 1992*

Complete this form to nominate a species for assessment of its conservation class under the *Nature Conservation Act 1992* (NC Act). Any subspecies, variety, race, hybrid, mutation or geographically separate population (hereafter 'species') can be nominated. The appropriate conservation class will be selected during an expert assessment process and, following approval processes, reflected in the next suitable update of the NC Act.

A species may be nominated to an appropriate conservation class from any other conservation class. The nomination assessment process may result in a species being recommended to the conservation class as nominated, or to a class better supported by scientific data and expert opinion. Assessments and nominations will be shared with the Commonwealth and other Australian jurisdictions within the species' distribution.

All plant and vertebrate species native to Queensland are protected under the NC Act and classified as Least Concern unless found eligible for a different conservation class. Invertebrate species are only protected under the NC Act if specifically named under a conservation class. A species can be nominated for listing or reassignment from any conservation class to:

A national threat category:

- Extinct (EX), Extinct in the Wild (EW), Critically Endangered (CR), Endangered (E) or Vulnerable (V) if it meets at least one of the International Union for Conservation of Nature (IUCN) criteria for species at risk of extinction

A state threat class:

- Near Threatened (NT) if the species meets at least one of the criteria for species at risk of becoming threatened in the future based on concerns relating to population dynamics or threats
- Least Concern (LC) if evidence is provided that no criteria for a higher class have been met, and the species won't become eligible for a higher class in the foreseeable future should conservation actions cease due to reclassification.

The assessment of species against the national threat categories reflected in this form complies with the Memorandum of Understanding for the Common Assessment Method (CAM) between the Commonwealth and Australian states and territories. The objective of the CAM is for partner jurisdictions to adopt each other's national assessments as appropriate. Information about the CAM can be found at https://www.qld.gov.au/environment/plants-animals/wildlife-permits/common-assessment.

To nominate a species with an Australian distribution that is not restricted to Queensland, use the nomination form and guidelines at http://www.environment.gov.au/biodiversity/threatened/nominations/forms-and-guidelines and email the completed form to the Australian Government at EPBC.nominations@environment.gov.au.

Important notes for completing this form

- **To enable a species eligibility for listing to be assessed against the criteria, please complete the form as comprehensively as possible by providing a response in each box with an orange border.**
- Completing a nomination is a demanding task. Nominators are encouraged to seek advice from experts where appropriate to assist in completing the nomination form.
- The opinion of scientific experts may be cited as personal communication with their approval. Please provide the experts names, qualifications and contact details (including employment in a government agency if relevant) in the reference list at the end of the form.
- Include any available information and analysis or state when the required information is not available.
- Figures, tables and maps can be included at the end of the form or provided as separate electronic files or hardcopy documents (referenced as appendices or attachments in your nomination).
- Cross-reference relevant areas of the nomination form where needed.
- **Reference all information sources**, both in the text and in a reference list at the end of the form.
- Identify confidential material and the reason it is sensitive. With the exception of information you have identified as confidential, nominations under the CAM process may be made available by a state, territory or the Commonwealth Government to experts or the public for comment.
- If the species is listed nationally, the Australian Government will publish nomination information on its website. Your details as nominator will not be released and will be treated as confidential information.
- Guidance on interpreting this nomination form can be found in the "*Guidelines for Assessing the Conservation Status of Native Species*" developed by the Australian Government under the EPBC Act here http://www.environment.gov.au/biodiversity/threatened/nominations/forms-and-guidelines. Although not fully relevant under the NC Act, the guidelines provide assistance on several aspects of this form. Please email SpeciesTechnical.Committee@des.qld.gov for further advice on completing the nomination.

Further information on selected questions

INTRODUCTION

Species native to Queensland may be nominated to any conservation class under the NC Act, including to transfer between classes. If the taxon at risk is a population or hybrid, or if you wish to know if it has been unsuccessfully nominated under the NC Act in the past, please contact the Queensland Department of Environment and Science for advice at SpeciesTechnical.Committee@des.qld.gov.au.

To search for a species' conservation class under the NC Act please refer to the *Nature Conservation (Wildlife) Regulation 2006*: https://www.legislation.qld.gov.au/view/html/inforce/current/sl-2006-0206.

You can also search the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) list of threatened species in the Species Profile and Threats Database (SPRAT) at www.environment.gov.au/cgi-bin/sprat/public/sprat.pl.

The full lists of threatened fauna and flora under the EPBC Act are available here:
www.environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl?wanted=fauna
www.environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl?wanted=flora.

You can find a list of nominated species that did not meet the assessment criteria for listing under the EPBC Act at www.environment.gov.au/biodiversity/threatened/unsuccessful-species.html.

A nomination to transfer a species from a threatened conservation class to Least Concern or Near Threatened under the NC Act need not address sections marked with an asterisk (*).

SCIENTIFIC AND COMMON NAMES OF NOMINATED SPECIES

- Provide the currently accepted scientific and common name(s) for the species (including Indigenous names, where known). Note any other scientific names that have been used recently such as superseded names.

TAXONOMY

- Record the species' authority and the taxonomic group to which it belongs (Family name is sufficient for plants; both Order and Family name are required for fauna).
- Is the species known to hybridise with other species? Describe any cross-breeding with other species in the wild, indicating where and how frequently this occurs.

DISTRIBUTION

- In accordance with the CAM, the Commonwealth is the default assessment 'lead' for species occurring across multiple Australian jurisdictions, and the nomination will be subject to the prioritisation and assessment process under the EPBC Act. Download the nomination form here http://www.environment.gov.au/system/files/pages/d72dfd1a-f0d8-4699-8d43-5d95bbb02428/files/nomination-form-species.pdf, and email it to epbc.nominations@environment.gov.au. Further information on the EPBC Act nomination, prioritisation and assessment process is available at http://www.environment.gov.au/biodiversity/threatened/nominations.
  Note: where the relevant jurisdictions agree, a State or Territory (rather than the Commonwealth) may take the lead on assessing a cross-jurisdictional species, in consultation with the Commonwealth and other jurisdictions.
- A nomination for a species endemic to Queensland or with its only Australian distribution in Queensland, for example a species only occurring in Queensland and Papua New Guinea, can be assessed under the NC Act. Please submit your completed nomination form to SpeciesTechnical.Committee@des.qld.gov.au.
- Describe the species' current geographic distribution within Queensland, and where applicable, outside Australia.
- Provide a map, if available, indicating latitude, longitude, map datum and location names
  - Indicate the percentage of the global population that occurs in Queensland, and what is its significance?
  - Is the Queensland population distinct, geographically isolated, or does part or all of the population migrate into/out of the Queensland jurisdiction?
  - Explain the relationship between the Queensland population and the global population.
  - Do global threats affect the Queensland population?
- Give locations of other existing or proposed populations such as populations that are captive, propagated, naturalised outside their range, recently re-introduced to the wild, and planned to be re-introduced. Note if these sites have been identified in recovery plans. Provide latitude, longitude, map datum and location name, where available, in an attached table.
- Give details of fauna species' home ranges/territories including any relevant daily and seasonal or irregular movement patterns, such as arrival/departure dates if migratory.
- Does the species occur within an EPBC Act listed ecological community? You will find a list of EPBC Act listed ecological communities here: www.environment.gov.au/cgi-bin/sprat/public/publiclookupcommunities.pl.

BIOLOGY/ECOLOGY

- **Life cycle**: Provide detail on the age at sexual maturity, average life expectancy, natural mortality rates, and generation length
  - "*Generation length*" is defined as the average age of parents of the current cohort (i.e. newborn individuals in the population), and reflects the turnover rate of breeding individuals in a population. Generation length is greater than the age at first breeding and less than the age of the oldest breeding individual, except in species that breed only once. Where generation length varies under threat, use the more natural pre-disturbance generation length. It is often calculated as = (longevity + age at maturity)/2. Provide details of the method(s) used to calculate the generation length.
- **Reproduction**: Provide detail on the reproductive requirements of this species.
  - **Flora**: When does the species flower and set fruit? What conditions are needed for this? What are the pollinating and seed dispersal mechanisms? If the species reproduces vegetatively, describe when, how and what conditions are needed. Does the species require a disturbance regime (e.g. fire, cleared ground) to reproduce?
  - **Fauna**: provide an overview of the species' breeding system and breeding success, including: when it breeds; what conditions are needed for breeding; whether there are any breeding behaviours that may make it vulnerable to a threatening process.
- **Habitat**
  - Provide information on aspect, topography, substrate, climate, forest type, associated species, sympatric species and anything else that is relevant to the species' habitat.
  - Explain how habitats are used (e.g. breeding, feeding, roosting, dispersing, basking, etc.).
  - Does the species use refuge habitat (e.g. in times of fire, drought or flood)? Describe this habitat.
- **Feeding (fauna):**

- Summarise the feeding behaviours, diet, and the timing/seasonality associated with these. Include any behaviour that may make the species vulnerable to a threatening process.

- **Movement (fauna)**: provide information on daily and seasonal movement patterns.

IDENTIFICATION OF KNOWN THREATS AND IMPACTS OF THE THREATS

- For each threat, describe:
  a. whether it is actual or potential
  b. how and where it impacts on this species
  c. what its effect has been so far (is the threat known or suspected?, does it only affect certain populations?) Present supporting information/research).
  d. its expected effect in the future (is the threat known or suspected?, does it only affect certain populations?, is there supporting research/information?) Present supporting information/research).
  e. its relative importance or the magnitude of the impact on the species.

- Identify and explain any additional biological characteristics particular to the species that are threatening to its survival (e.g. low genetic diversity).
- If subject to natural catastrophic events, i.e. events with a low predictability that are likely to severely affect the species, identify the type of event, its likely impact, and its likelihood of occurrence (e.g. a drought/cyclone in the area every 100 years). If **climate change** is an important threat to the species, provide referenced information on how climate change might significantly increase the species' vulnerability to extinction. Please refer to the *Guidelines for Assessing the Conservation Status of Native Species*: http://www.environment.gov.au/system/files/pages/d72dfd1a-f0d8-4699-8d43-5d95bbb02428/files/tssc-guidelines-assessing-species-2018.pdf.

*CONSERVATION ADVICE: THREAT ABATEMENT AND RECOVERY ACTIONS

- Describe how threats are or could be abated and/or species recovered.
- Identify who is undertaking these activities and how successful the activities have been to date.
- Describe any mitigation measures or approaches that have been developed specifically for the species at identified locations. Identify who is undertaking these activities and how successful the activities have been to date.
- For species nominated as Extinct in the Wild, provide location details for any naturalised or captive populations and the level of human intervention required to sustain the species.

IMPACT OF TRANSFERRING A THREATENED SPECIES TO NEAR THREATENED OR LEAST CONCERN

- Only complete this section if you are nominating a species for transfer to Near Threatened or Least Concern from a class of nationally threatened wildlife (Extinct, Extinct in the Wild, Critically Endangered, Endangered or Vulnerable).
- Provide details of the expected impact on the species if conservation actions ceased following its transfer out of a threatened wildlife class.

CURRENT LISTING CLASS AND CATEGORY

- Note: The term 'class' under the NC Act is equivalent to the term 'category' under the EPBC Act.
- Select the species' current class under the NC Act where applicable. Search the species' NC Act class here: https://www.legislation.qld.gov.au/view/html/inforce/current/sl-2006-0206.
- Select the species' current category under the EPBC Act where applicable. Search the Australian Government SPRAT Database here: www.environment.gov.au/cgi-bin/sprat/public/sprat.pl.

NOMINATED LISTING CLASS

- **After completing the section 'Eligibility against the criteria'** sufficient evidence should be available to determine your response to this section. Please select the NC Act class to which the species is being nominated.

REASONS FOR A NOMINATION TO TRANSFER TO ANOTHER CLASS

Please describe why the species is being nominated to transfer to another conservation class in Queensland:

- *Genuine.* The change in class is the result of a genuine status change that has taken place since the previous assessment. For example, the change is due to an increase in the rate of decline, a decrease in population or range size or habitat, or declines in these for the first time (owing to increasing/new threats).
- *Knowledge.* The change in class is the result of new knowledge, e.g. owing to new or newly synthesised information about the status of the taxon (e.g. better estimates for population size, range size or rate of decline).
- *Taxonomy.* The change in class is due to a taxonomic change adopted during the period since the previous assessment. Such changes include:

- *newly split* (the taxon is newly elevated to species level)
- *newly described* (the taxon is newly described as a species)
- *newly lumped* (the taxon is recognised following lumping of two previously recognised taxa)
- *no longer valid/recognised* (either the taxon is no longer valid, e.g. because it is now considered to be a hybrid, variant form or subspecies of another species, or the previously recognised taxon differs from a currently recognised one as a result of a split or lump).

- *Mistake*. The previous class was applied in error.
- *Other.* The change in class is the result of other reasons not easily covered by the above, and/or requires further explanation. Examples include change in assessor's attitude to risk and uncertainty.

INITIAL LISTING

- The reasons for the initial NC Act listing may be available in the original nomination for the species. This can be obtained by emailing the Department of Environment and Science's Species Technical Committee at SpeciesTechnical.Committee@des.qld.gov.au.
- The reasons for EPBC Act listing may also be available. Search for the species' EPBC Act listing and conservation advice for threatened species in the SPRAT Database www.environment.gov.au/cgi-bin/sprat/public/sprat.pl.
- If there is insufficient information to provide details of the reasons for the original listing, please state this.

CHANGES IN SITUATION LEADING TO THE NOMINATION TO TRANSFER TO ANOTHER CLASS

- Describe the changes that have occurred or are likely to occur to the species' population, range or habitat that influence the nomination to change the species' conservation class.

ELIGIBILITY AGAINST CRITERIA

- For a species to be eligible as Near Threatened or a class of threatened wildlife, it must be assessed as meeting **at least one** of the five 'criteria' on this nomination form. For example, for a species listed as Vulnerable to be transferred to the Endangered class, it must meet the threshold/s for at least one of the five criteria for Endangered.
- A species does not have to be found eligible for the same class under all criteria; however, all questions must be answered. If information is not available for a particular criterion, a statement to this effect is required.
- If you hold unpublished data that support assessment of a criterion, you must provide them with the nomination.
- Standards for assessing a species' conservation status in Australia align with the IUCN Red List Criteria and Categories. Please refer to the IUCN guidelines for explanations of how to address the criteria http://s3.amazonaws.com/iucnredlist-newcms/staging/public/attachments/3151/redlistguidelines.pdf.

DECLARATION

In signing this nomination form, you agree to grant the Queensland Government (as represented by the Department of Environment and Science) a perpetual, non-exclusive, worldwide, royalty-free licence to use, reproduce, publish, communicate and distribute information that you have provided in the nomination form that is not referenced to other sources with the exception of information specifically identified by you as confidential, in websites and publications and to promote those websites and publications in any medium.

As nominator, your details are automatically subject to the provisions of the *Privacy Act 1988* and will not be divulged to third parties. The Commonwealth, State and Territory governments have agreed to collaborate on national threatened species assessments using the CAM. As part of this collaboration, your nomination, including your details as nominator, may be provided to other government jurisdictions, who will also observe these privacy and confidentiality arrangements.

If you subsequently agree to be cited as the author of specific, cited information, you will be acknowledged in all publications and websites in which that information appears, in a manner consistent with the *Style Manual for Authors, Editors and Printers* (latest edition).

Nomination form to change the conservation class of a species in Queensland

Details of the nominated species

SCIENTIFIC NAME OF SPECIES (SUBSPECIES, VARIETY, ETC. TO BE SPECIFIED WHERE RELEVANT)

Euastacus monteithorum Morgan, 1989

COMMON NAME(S)

Monteith's spiny crayfish

TAXONOMY

Provide any relevant detail on the species' taxonomy (e.g. authors of taxon or naming authority, year and reference; synonyms; Family and Order).

Crayfish in the Order Decapoda, Family Parastacidae. Formally described in Morgan (1989).

*CONVENTIONAL ACCEPTANCE OF TAXONOMY

Is the species' taxonomy conventionally accepted?

☒Yes
☐No

If the species is not conventionally accepted, please provide the following information:

- a taxonomic description of the species in a form suitable for publication in conventional scientific literature

OR

- evidence that a scientific institution has a specimen of the species, and a written statement signed by a person who is a taxonomist and has relevant expertise (has worked with, or is a published author on, the group of species nominated) that the species is considered to be a new species.

Click or tap here to enter text.

*DESCRIPTION

Provide a description of the species. Include where relevant its distinguishing features, size and social structure. How distinct is this species in its appearance from other species? How likely is it to be misidentified?

Euastacus monteithorum is part of the poorly spinose group of *Euastacus* species, which is characterised by a small body size and relatively few spines (Coughran 2008). This species has been recorded weighing up to 44 g (Mathieson & Schulz 1998; McCormack 2012) and having an occipital carapace length (OCL) of up to 47.1 mm (Mathieson & Schulz 1998). This species generally has a dark green colour with orange leg joints, eye sockets and antennae, and with a hint of steel blue on the sides (McCormack 2012). However, colour is typically not a reliable diagnostic characteristic in freshwater crayfish as it can vary greatly within species, even within a section of stream (J. Furse pers. comm. 2020).

Euastacus monteithorum is most similar morphologically to *E. eungella* (Eungella spiny crayfish), and then to *E. bindal* (Mt. Elliot crayfish) (Morgan 1989), which are found 400 km and 700 km to the northwest respectively. *Euastacus monteithorum* can be differentiated from *E. eungella* as *E. monteithorum* lacks dorsal carpal spines, and differs from both species as *E. monteithorum* lacks a postorbital-ridge spine (Morgan 1989; Horwitz & Austin 1995). There are no other species of *Euastacus* reported from within 200 km of *E. monteithorum*'s distribution (McCormack 2012), however there is a crayfish species from the Genus *Cherax* reported from Kroombit Tops (Mathieson & Schulz 1998; McCormack 2012), namely *C. cairnsensis* (part of the taxonomically problematic *C. depressus* [orange-fingered yabby] complex; Short 2000). *Cherax* have often been collected in streams further downstream from *E. monteithorum*'s rainforest habitat (McCormack 2012) and in other areas unsuitable for *E. monteithorum,* like in muddy water (Clewley's Dam, Queensland Museum Accession W22474; Mathieson & Schulz 1998). However, *Cherax* have also been collected in *E. monteithorum* habitat (Three Moon Creek, Queensland Museum Accession W24159) and are known to co-occur with *E. monteithorum* in the headwaters of Kroombit and Three Moon creeks on the plateau itself (H. Hines pers. comm. 2020). The two genera can usually be differentiated as species of *Euastacus* typically have more spines than *Cherax*, but *E. monteithorum* is relatively smooth and so could be confused with *Cherax* (Coughran & Furse 2010). However, the taxa can be differentiated as the top edge of the chelae (the side with the fixed claw) is smooth for *Cherax* and rough for *E. monteithorum,* with small ridges and spines.

DISTRIBUTION

Provide a succinct overview of the species' known or estimated current and past distribution, including international/national distribution. Provide a map if available.

Is the species' habitat protected within the reserve system (e.g. national parks, Indigenous Protected Areas, or other conservation estates, private land covenants, etc.)? If so, which populations? Which reserves are actively managed for this species? To your knowledge, which reserves are being actively managed in way that provides incidental benefits for this species? Give details.

Euastacus monteithorum was described from a site at 860 m ASL in Kroombit Tops National Park, which is an isolated volcanic plateau (up to 940 m ASL) about 70 km southwest of Gladstone, Queensland (Morgan 1989) (Fig. 1). Kroombit Tops is an "upland mesic temperate outlier" (Hines 2014), which has a relatively cool climate and wet sclerophyll and rainforest, and is surrounded by warmer, drier lowlands. This area is at the north-western extreme of the South Eastern Queensland Bioregion (Subregion: Burnett - Curtis Hills and Ranges), only a few kilometres from the Brigalow Belt South Bioregion (Interim Biogeographic Regionalisation for Australia, IBRA7; Commonwealth of Australia 2012).

Euastacus monteithorum is found in the rainforest portions of a number of headwater creeks at about 800 m ASL in the eastern part of the plateau of Kroombit Tops National Park, and a number of drainages below the escarpment to the east down to about 500 m ASL (Hines 2014; H. Hines QPWS unpub. data). On the plateau, *E. monteithorum* has been recorded in the Fitzroy Drainage (Kroombit Creek [type location]; 786 – 889 m) and from a number of creeks in the Burnett Drainage (Munholme and Three Moon Creeks, 610 – 887 m) (Fig. 2). Over the eastern escarpment, *E. monteithorum* has been recorded in the Boyne Drainage (Degalgil, Diglum, Madsen Creeks, 490 – 855 m).

In 1998 a second disjunct subpopulation was discovered about 25 km southeast at Mt. Robert, in what is now Dawes National Park, at two sites in headwater creeks within the Boyne Drainage (Deception [560 m ASL] and Coppermine Creeks [610 m ASL]) (Hines 2014) (Fig. 1). Distributional data has been assembled from published sources: Morgan (1989), Ponniah & Hughes (2004), Sewell et al. (2006), Hines (2014); an unpublished report: Mathieson & Schulz (1998); databases: Atlas of Living Australia (www.ala.org.au), OZCAM (ozcam.org.au), Queensland Museum (VERNON Database via P. Davie and D. Potter); and personal communications: H. Hines (QPWS unpub. data), R. McCormack (Australian Aquatic Biological unpub. data).

Euastacus monteithorum's Area of Occupancy (AOO) is 56 km^2, and Extent of Occurrence (EOO) is 112 km^2 (calculated with GeoCat, available at: geocat.kew.org; Bachman et al. 2011). *Euastacus monteithorum* is considered to inhabit two locations (upland rainforest communities of Kroombit Tops and Dawes National Parks) as defined by the IUCN (IUCN Standards and Petitions Subcommittee 2019), based on common threats (see Criterion B below for more information).

All of the recorded sites of *E. monteithorum* are within the Kroombit Tops and Dawes National Parks, and as such the species receives the umbrella protection afforded to a native species within a national park. It is not actively managed (H. Hines pers. comm 2020), but its presence is noted in management statements for both parks (QDNPRSR 2013; QDNPSR 2015). *Euastacus monteithorum* is often encountered and recorded during the surveying and monitoring of sympatric threatened frog species (H. Hines pers. comm. 2020).

The specimens from Dawes National Park have been assigned to *E. monteithorum*, but have not received a detailed taxonomic treatment. The intervening landscape between Kroombit Tops and Dawes National Parks (about 25 km) is not suitable habitat, and is unlikely to be successfully crossed by a small, cool-adapted crayfish. This distance is similar to that between entirely distinct, but related, species of *Euastacus* elsewhere in different isolated, upland rainforest mountain areas. For example, there are a number of poorly spinose *Euastacus* species separated by similar distances near the Queensland – NSW border (Furse et al. 2013). Other species of *Euastacus* also show significant genetic divergences between disjunct subpopulations within a species (Hurry et al. 2014). Therefore, it is possible that the Dawes and Kroombit Tops populations are not the same taxon. In the event that were true, there would be an obvious diminution in the sizes of the relevant distributions, with the Kroombit Tops population having a calculated EOO of 29 km^2 and AOO of 48 km^2, and the Dawes National Park population having an EOO and AOO of 4 km^2. However, they are treated as conspecific here.

BIOLOGY/ECOLOGY

Provide a summary of biological and ecological information.

Include information on:

- life cycle including age at sexual maturity, life expectancy and natural mortality rates
- specific biological characteristics
- the species' habitat requirements
- for fauna: feeding behaviour and food preference and daily/seasonal movement patterns
- for flora: pollination and seed dispersal patterns

Little is known about the life cycle of *Euastacus monteithorum,* however it is recognised that *Euastacus* species have a suite of common biological characteristics, and many of these characteristics apply to *E. monteithorum* (Furse & Coughran 2011). The life-cycle of *E. monteithorum* is likely similar to other small, upland *Euastacus* species, meaning slow growth, late-maturing females, and a slow reproductive cycle (K-selection) (Furse & Coughran 2011). In particular the species is likely to be biologically similar to *E. eungella*, to which it is likely closely related (Morgan 1989). *Euastacus eungella* is the closest genetic match to *E. monteithorum* on GenBank (blast.ncbi.nlm.nih.gov) (93.28% for the mitochondrial COI gene, 19 May, 2020).

Little is known about the life cycle of *E. monteithorum*. The largest recorded specimen was a female that weighed 44 g and had an OCL of 47.1 mm (Mathieson & Schulz 1998). It is not yet clear at precisely what size sexual maturity is reached, but McCormack (2012) suggested females may reach sexual maturity at an OCL of 35 mm (approx. 22 g). The timing of breeding has also not been studied, but anecdotal observations suggest that it may be a winter brooder, mating in the winter and brooding eggs until the summer (Furse & Coughran 2011). Freshly moulted large females have been observed in June, perhaps indicating the start (or possibly end) of the breeding season (McCormack 2012). A relatively large female (37.3 mm OCL) was observed in December with swollen reproductive pores, and so was perhaps gravid (A. Borsboom unpub. data). In January, a large female was observed with six juveniles under its tail (Mathieson & Schulz 1998), and in February a female was recorded with eggs; also in February, many juveniles (200+) were seen with two or more size cohorts (15 – 25 mm total length) (Hines QPWS unpub. data). The actual growth rates, population sizes and generation lengths of *E. monteithorum* are not known.

Like many spiny crayfish species, *E. monteithorum* is restricted to cooler upland habitats (Furse & Coughran 2011), but its precise thermal tolerance is not known. However, another montane rainforest species, *E. sulcatus* (Lamington spiny crayfish), becomes distressed at about 22ºC, and was effectively incapacitated at 27ºC, and all died (Bone et al. 2014). *Euastacus sulcatus* is much larger than *E. monteithorum* and so it is possible that *E. sulcatus* could handle temperature variation better.

Euastacus monteithorum, like many parastacid crayfish, hosts a species of ectocommensal temnocephalan flatworm (*Temnohaswellia capricornia*) (Sewell et al. 2006). The diet of *E. monteithorum* is not well understood, but the species may well be omnivorous, and it has taken bait of peanut paste/rolled oats (Mathieson & Schulz 1998).

Euastacus monteithorum makes extensive and common burrows in the streambank and bed (McCormack 2012; H. Hines pers. comm. 2020). Burrows also occur in steep scree slope rainforests at some distance from drainage lines, potentially burrowing down into the water table (H. Hines pers. comm. 2020). Burrow entrances have been found in dry drainage lines adjacent to basal stream flow (A. Borsboom pers. comm. 2020) in a sandy/gravel-loam substrate (Mathieson & Schulz 1998). Burrows have been found with two or more entrances (McCormack 2012). *Euastacus monteithorum* specimens have also been found in-stream under rocks, stones, and timber debris (in particular immature crayfish), and in simple, shallow burrows (McCormack 2012; A. Borsboom pers. comm. 2020). *Euastacus monteithorum* appears to spend most of its time in burrows, as it is rarely seen (H. Hines pers. comm. 2020), although it is occasionally observed in-stream or on the forest floor (Hines QPWS unpub. data), and is probably nocturnal (B. Dowling pers. comm. 2020).

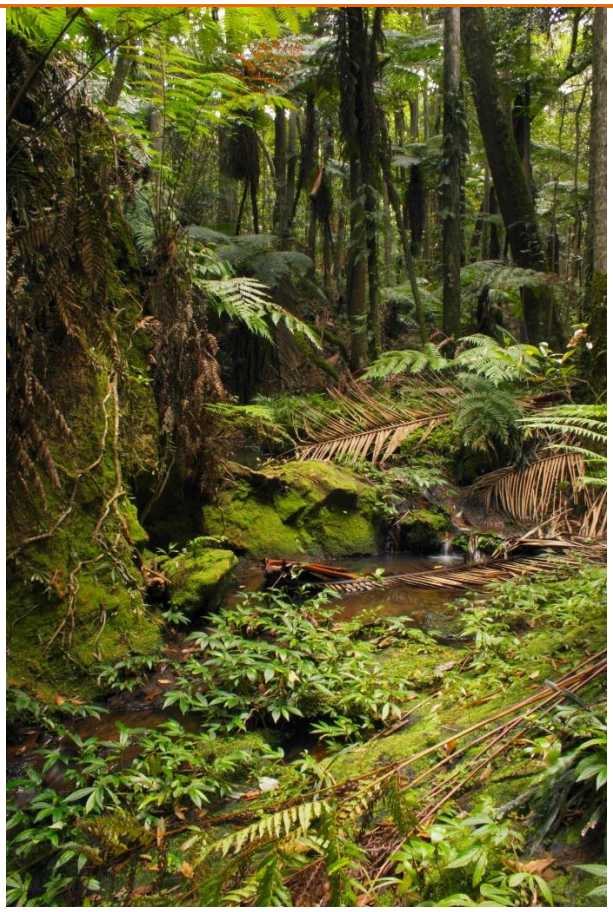


Fig. 3: Typical *Euastacus monteithorum* habitat at Kroombit Tops National Park (photo: H. Hines, QPWS, used with permission)

Euastacus monteithorum is found almost exclusively in gully rainforest, in particular in steep drainage lines and gullies (H. Hines pers, comm. 2020). Its habitat is in small, ephemeral clear-flowing creeks, some with permanent pools, shaded by palms and other dense subtropical rainforest, and in wet permanent seepage areas (McCormack 2012) (Fig. 3). Most sites are at over 800 m altitude, but a few sites below the escarpment and in Dawes National Park are as low as about 500 m.

Euastacus monteithorum is sympatric at Kroombit Tops with a number of critically endangered species, in particular the endemic frogs *Taudactylus pleione* (Kroombit tinker frog) and *Litoria kroombitensis* (Kroombit treefrog) (Hines 2014). Often *E. monteithorum*'s presence has been noted during frog surveys, as they have a very similar habitat preference for high altitude notophyll rainforest near creeks and seepage areas (Hoskin et al. 2013; Venz 2020). To estimate the precise distribution of *E. monteithorum*, it is necessary to know the location of suitable rainforest habitat, but this is imperfectly mapped at Kroombit Tops and Dawes National Parks (Hines 2014), thus it is not always possible to associate sites with particular vegetation types (Queensland Regional Ecosystem types; Queensland Herbarium 2019).

To improve this situation, more detailed rainforest mapping for Kroombit Tops (S. Pollock unpub. data) has been added to the data from the Regional Ecosystem Description Database (Queensland Herbarium 2019) and adapted for Venz (2020). When the new mapping is considered in combination with the existing mapping, nearly all *E. monteithorum* sites at Kroombit Tops (81%) are associated with Regional Ecosystem (RE) type 12.12.1 (Simple notophyll vine forest usually with abundant *Archontophoenix cunninghamiana* [gully vine forest] on Mesozoic to Proterozoic igneous rocks; Queensland Herbarium 2019), with most of the rest (10%) associated with 12.12.13 (Araucarian Complex microphyll to notophyll vine forest on Mesozoic to Proterozoic igneous rocks; Queensland Herbarium 2019) (Fig. 4). This *E. monteithorum* RE association is preliminary, as the method for defining frog sites (which are typically hundreds of metres long) may lead the site centroid to fall outside of the mapped rainforest RE polygon (H. Hines pers. comm 2020). However, these preliminary results do accord well with our knowledge of *E. monteithorum* habitat (Fig. 3).

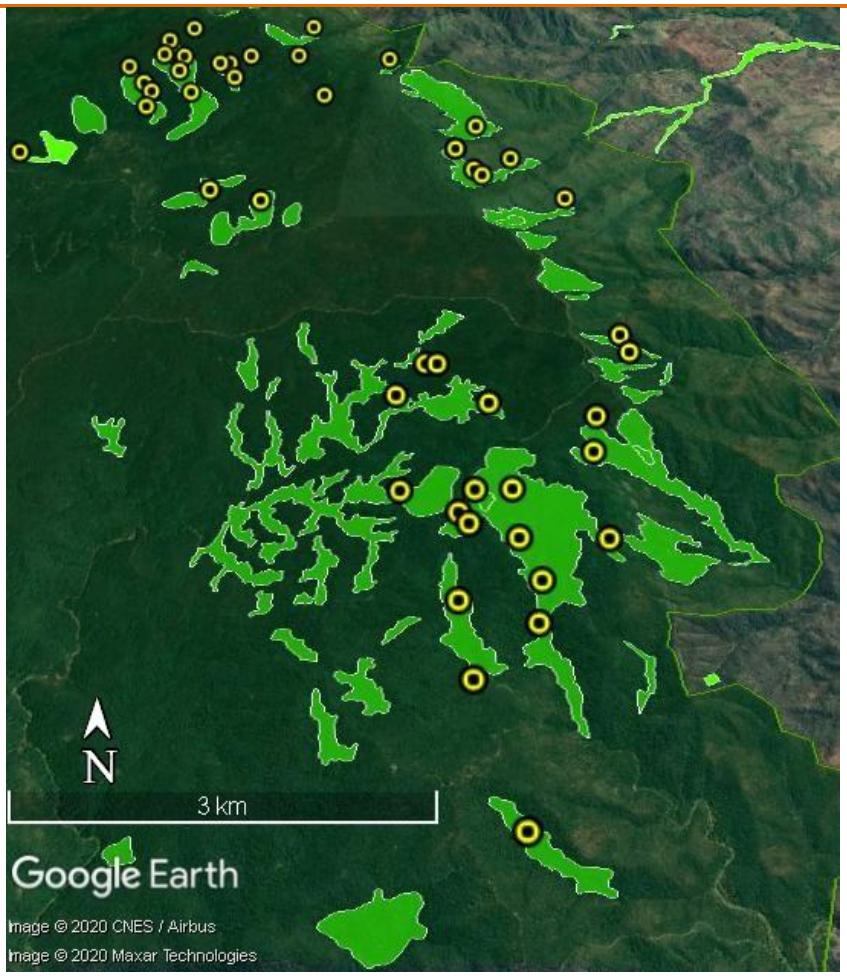


Fig. 4: Rainforest patches (light green shading) in the eastern portion of Kroombit Tops National Park (green outline) (yellow circles = known *E. monteithorum* records, rainforest = Regional Ecosystem 12.12.1, 12.12.13, or unspecified rainforest) (Queensland Herbarium 2019; S. Pollock unpub. data; Venz 2020). Displayed in Google Earth Pro (version 7.3.2.5776).

The mapping at Dawes National Park is at an even less fine scale, with most of the Park mapped into composite blocks of multiple REs of lower altitude sclerophyll forest (some of which was previously cleared; QDNPRSR 2013), mostly consisting of combinations of REs 12.11.6, 12.12.5, 12.12.6, 12.12.7, 12.12.20, 12.12.23, 12.3.3. However, the same notophyll vine forest REs (12.12.1, 12.12.13) are also mapped at Dawes National Park and just outside. The eastern *E. monteithorum* site at Dawes (Coppermine Creek) is mapped as 12.12.1, and the western site (Deception Creek) is mapped in a composite block that contains 5% of 12.12.13, so these REs are likely to also represent *E. monteithorum* habitat at Dawes National Park (see Fig. 5).

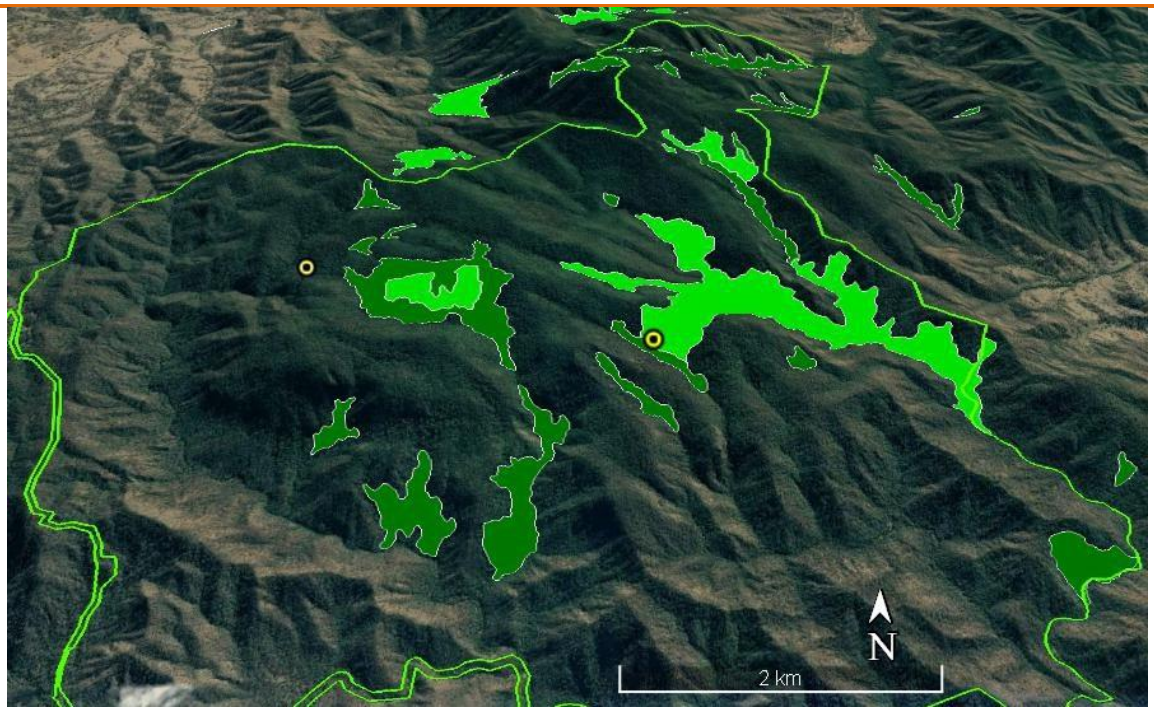


Fig. 5: Rainforest patches in the northern portion of Dawes National Park (green outline) and surrounds (yellow circles = known *E. monteithorum* records, dark green shading = RE 12.12.1, light green shading = RE 12.12.13) (Queensland Herbarium 2019). Displayed in Google Earth Pro (version 7.3.2.5776).

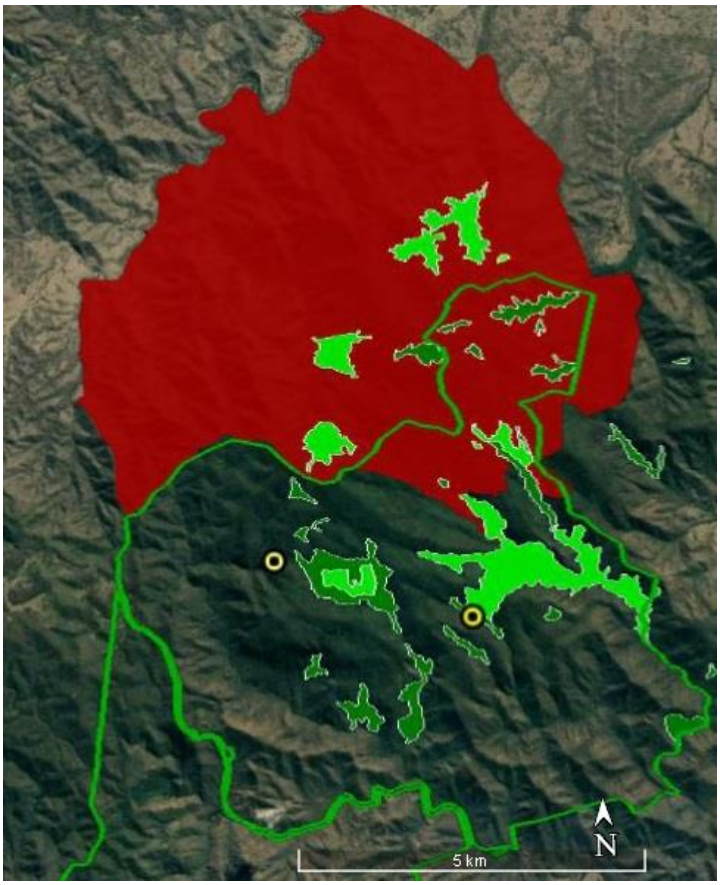
Threats

IDENTIFICATION OF KNOWN THREATS AND IMPACT OF THE THREATS

Identify any known threats to the species in the table below. Describe **past, current or future** threats, whether the threats are **actual or potential**, and the **type and level of impact** you believe each threat is having on the species.

Past threats	Impact of threat
Bushfire	Bushfire is a common feature of the general Australian environment, however this is typically more prevalent in sclerophyll forests than rainforests (Murphy et al. 2012). *Euastacus monteithorum* may have been buffered to some extent as dense rainforest burns much less often than open woodland. The notophyll vine forest that is *E. monteithorum*'s home (mostly QLD RE 12.12.1, some 12.12.13) is fire sensitive and does not usually burn (Queensland Herbarium 2019). The small, restricted distribution of *E. monteithorum* places it at great risk in the event that fire does impact its very limited area. The rainforest patches that are home to *E. monteithorum* are surrounded by much more flammable eucalypt forest. Fire season at Kroombit Tops is usually July to November, or anytime during drought (Hines 2014). Fire can sweep quickly through steep areas and through montane heath (B. Dowling pers. comm. 2020). At times of low soil moisture and high temperatures, fire can enter the rainforest, including in the narrow rainforest gullies (H. Hines pers. comm. 2020). This occurred in 1994, 2007, 2013 and 2018, when bushfires reached rainforest sites on the plateau, leading to some damage (canopy gaps and lantana establishment) (Hines et al. 1999; Venz 2020). After these fires, significant incursions were not observed in the Kroombit Tops rainforest, but there were likely short-term changes in water quality and chemistry (H. Hines pers. comm. 2020). When bushfires do reach the rainforest, it can transform ecosystem structure and function and change the boundary between it and the sclerophyll forest (Hunter 2003), and lead to the establishment of more fire prone native and invasive species. This has happened at Kroombit Tops and Dawes National Parks, where the ecosystem has changed in some places because of infrequent planned and occasional bushfires (QDNPSR 2015). Lantana (*Lantana camara*; both parks) and Madeira vine (*Anredera cordifolia*; at Dawes National Park) have spread in the wake of fires, fostering more fire, and slowing rainforest regeneration (QDNPRSR

	2013). The effects of these fire regimes may be amplified by interactions with drought (see below). It is not clear what the direct impact of fire on crayfish populations may be, however another rainforest crayfish (Ellen Clark's Crayfish; *Euastacus clarkae*) suffered a mass kill directly after a fire (McCormack 2015). Similarly, *E. bispinosus* (Glenelg spiny crayfish) abundances declined after fire events, perhaps due to associated reduction of habitat quality (Johnston et al. 2014). Indirect impacts of fire are potentially long-lasting, and include serious habitat degradation and/or destruction, and ensuing water quality issues that highly impact freshwater species (Bryant et al. 2012). Sediment and ash run-off from fires can degrade water quality, leading to a change in the pH of the water and low dissolved oxygen (Silva et al. 2020). Level of past impact = low.
Drought	Drought is a common feature of the general Australian environment, including in Southeast and Central Queensland over a long timescale (Barr et al. 2019; QDES 2019). Severe drought is obviously a challenge for a freshwater species. Annual rainfall over the last 20 years at Kroombit Tops has shown a downward trend (Hoskin et al. 2013), potentially reducing habitat area for aquatic species, including *E. monteithorum.* Level of past impact = low.
Feral pigs	"Predation, habitat degradation, competition and disease transmission by feral pigs (*Sus scrofa*)" was listed by the Federal Government in 2001 as a key threatening process under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Commonwealth of Australia 2017). Negative impacts can be direct (predation, digging, rooting, wallowing) and indirect (changing plant species composition, water quality) (Commonwealth of Australia 2017; Negus et al. 2019). As such, feral pigs are declared a Class 2 pest animal under the *Pest and Stock Route Management Act 2002* (QDNPRSR 2013). feral pigs are thought to consume crayfish and damage their habitat (Commonwealth of Australia 2017). They are considered a major threat for genera of burrowing crayfish, e.g. *Engaeus* (TAS, VIC)*, Engaewa* (WA) (Commonwealth of Australia 2017). Feral pigs cause significant damage due to digging in rainforests, in both the highlands and lowlands (Mitchell & Mayer 1997). Habitat destruction caused by pigs to stream beds and banks is evident and obvious in many places in Australia (Steward et al. 2018; J. Coughran & J. Furse pers. comm. 2020). Feral pigs were not known from Kroombit Tops in 1983, and were first reported in the western section of the Park in 1998 (Hines 2014). From the early 2000s, evidence of pig impacts was detected in the eastern section of the Park (home to *E. monteithorum*) in rainforest gullies below the escarpment (Hines 2014), in particular during the dry season (QDNPRSR 2013). It is not clear what the feral pig situation is at Dawes National Park, however they are reported from nearby valleys (Hines 2014) and national parks (Bulburin NP; QDES 2020). Level of past impact = low.
Unauthorised collection	All *Euastacus* species are "no take" species under the Queensland *Fisheries Act 1994* (Furse & Coughran 2011). It is unknown if *E. monteithorum* in particular has been the object of illegal collecting for the aquarium trade (Coughran & Furse 2012), however collapsible pots have been found in Kroombit Creek (B. Dowling pers. comm. 2020). As *E. monteithorum* is rare, it could be targeted for illegal collection as it may be valuable on the black market. For this reason, *E. monteithorum* could be particularly at risk. Another possibility is that *E. monteithorum* could be inadvertently captured instead of *Cherax*, which are commonly caught as bait, even though this would be illegal within a national park. *Euastacus monteithorum* are relatively smooth and thus could be mistaken for *Cherax* (Coughran & Furse 2010). Given the very small, restricted distribution of *E. monteithorum*, any removal of specimens could be very harmful to the population as a whole. Level of past impact = unknown/low.
Current threats	**Impact of threat**
Bushfire	During the bushfire season of 2019-20, fires are not known to have directly impacted *E. monteithorum* sites. The bushfire at Kroombit Tops NP was about 10 km to the northwest of known *E. monteithorum* sites, in a separate part of the Park. This fire covered a larger area than the entire distribution of *E. monteithorum* in Kroombit Tops National Park. A big fire also burned in the northern part of

	Dawes NP, stopping about 1 km from the two known *E. monteithorum* sites in the Park. This fire encompassed an area about the size of the Park, and burned a largely unsampled area that contains suitable rainforest habitat for *E. monteithorum* (RE 12.12.1, 12.12.13) (Fig. 6). Level of current impact = moderate.  **Fig. 6:** Extent of bushfires (in red) between August & December 2019 (Queensland Government 2020) to the north of Dawes National Park (green outline) (yellow circles = known *E. monteithorum* records, dark green shading = RE 12.12.1, light green shading = RE 12.12.13) (Queensland Herbarium 2019). Displayed in Google Earth Pro (version 7.3.2.5776).
Climate change	Contemporary human-induced climate change has already begun to affect the Kroombit Tops area. Annual rainfall over the last few decades at Kroombit Tops has shown a downward trend (Hoskin et al. 2013) (see Drought below). Despite this, Kroombit Tops has also experienced a number of extreme flood events in the last 10 years, resulting from massive rainfalls over only a few hours (Venz 2020), often associated with tropical cyclones. Level of current impact = low/moderate.
Drought	Severe drought is a potential driver of habitat and population loss for *E. monteithorum*, even within a national park. Recent rainfall deficits (2017 – 2019) have been extreme in Southeast Queensland, with cool season rain the lowest on record in most of subtropical Queensland (BOM 2019). Reduced rainfall means less water in the creeks from run-off and lower water tables, potentially adversely affecting the crayfish directly, and indirectly via impacts on their rainforest environment. In late 2019, creeks on the plateau were reduced to small pools with very poor water quality (H. Hines pers. comm. 2020). The drought depleted much surface and ground water prior to the fires, including at Kroombit Tops National Park (H. Hines pers. comm. 2020). Level of current impact = low/moderate.
Feral pigs	Feral pigs and associated damage are now seen throughout the Kroombit Tops NP (Hines 2014), including on the plateau at *E. monteithorum* sites (QDES 2020). Pig numbers and impacts currently appear to be the greatest in the last 20 years in eastern Kroombit Tops (Venz 2020), and they are considered a threat for Kroombit Tops National Park (QDNPRSR 2013). Level of current impact = low/ moderate.

Unauthorised collecting	Australian crayfish are for sale in Australia and overseas (legally and illegally, including online), although it is not known if *E. monteithorum* are among these. Level of current threat – unknown/low.
Future threats – actual	**Impact of threat**
Bushfire	Climate projections for Central Queensland indicate the high likelihood of harsher fire weather, with drier fuel, a hotter, drier climate, and more wind, leading to more frequent and more extreme bushfires (Hoskin et al. 2013; QDES 2019). This means that fires like those of 2019-2020 may not be unusual events in the near future. A drier climate will make the upland rainforest habitat of *E. monteithorum* more likely to burn, especially with the encroachment of more fire-prone sclerophyll forest species and lantana and other weeds moving up the slope in response to a warming climate. The entire distribution of *E. monteithorum* is in an area of proven fire risk, and because it has such a small, restricted distribution (which will shrink further with climate change), there is a real possibility of future extinction in the wild given the predicted more intense and more frequent bushfires of the future. Level of future impact = high.
Climate change	The Earth is warming rapidly and the climate changing. Global climate projections predict a greater than 99% probability that most of the years between 2019 and 2028 will be in the top 10 warmest years on record for the planet (Arguez et al. 2020). Climate modelling for Queensland in general (QFES 2019), and Central Queensland (QDES 2019) and the Fitzroy NRM Region in particular (Hoskin et al. 2013), predicts significant, rapid future changes to climate. This includes higher temperatures, more hot days, reduced water availability, increasing drought, more frequent and extreme weather events, and harsher fire weather. Climate change works in concert with, and as an intensifier of, many of the previously mentioned threats (e.g. bushfires, droughts, invasive species). Similarly, more extreme weather events, such as cyclones and floods, can also severely impact freshwater crayfish. These events have already increased (Kossin et al. 2020), and are predicted to continue to do so (QDES 2019). Intense storm events can scour high-altitude streams and this can be deadly to juvenile *Euastacus* that seek refuge under leaves/fallen palm fronds, small loose rocks and logs (R. McCormack pers. comm. 2020). Mass mortality has been recorded in *E. valentulus* (strong crayfish) in southern Queensland when a very intense rain storm and flash flood which definitely killed hundreds, and probably thousands, of crayfish locally (Furse et al. 2012). Most of the crayfish killed in this event were about the same size as adult *E. monteithorum* (30-40 mm OCL). There are also reports of *E. sulcatus* in Lamington NP having been killed in large numbers in large log jams following flooding associated with Ex-Tropical Cyclone Debbie in March 2017 (W. Buch pers. comm. 2020). Temperatures are predicted to increase in the area by 0.6 – 1.2°C by 2030 (over 1990 levels) (Hoskin et al. 2013) and 1.0 – 3.8°C by 2070 (QDES 2019). Periodic, dangerous heatwaves are predicted to be more intense and more common (QFES 2019). *Euastacus monteithorum*, and the isolated cool montane rainforests of the Kroombit Tops area, are at great risk from climate change, since they are refugia for many cool-adapted flora and fauna species, *E. monteithorum* among them (Hines 2014). Available habitat will shrink as narrow, suitable “climatic envelopes” migrate up the mountains in the face of rising temperatures, and may eventually disappear completely (Krockenberger et al. 2003). For example, a rise of only 1.0°C by 2030 could result in a 50% decrease in the area of upland tropical rainforests (Hilbert et al. 2001). Many of these habitats may already be near a threshold of survival (Murphy et al. 2012), having progressively shrunk in the face of the natural warming and drying of the last few million years, and are now facing the accelerated warming due to human activities. Climate change is a real threat to freshwater crayfish since *Euastacus* are very sensitive to changes in temperature, tend to be highly specialised, and often have distributions that are highly fragmented and very limited (“short-range endemics” *sensu* Harvey 2002) (Richman et al. 2015; Hossain et al. 2018). These factors combine to make them particularly vulnerable to the effects of intensifying climate change (Richman et al. 2015). Many *Euastacus* species in eastern Australia are already “climate refugees” (Bone et al. 2014), having been restricted to cool

	montane areas by the increase in Australia's temperature and aridity over the last few million years (Ponniah & Hughes 2004). This is certainly the case for *E. monteithorum*, which is restricted to isolated montane subtropical rainforest (>500 m ASL). The precise thermal tolerance of *E. monteithorum* is not known, but another montane rainforest species, *E. sulcatus,* becomes distressed at about 22ºC, and was effectively incapacitated at 27ºC, and all died (Bone et al. 2014). *Euastacus sulcatus* is much larger than *E. monteithorum* and so perhaps *E. sulcatus* can handle temperature variation better, but as there are no thermal studies on *E. monteithorum,* this is unclear. However, increased temperatures will almost certainly severely impact *E. monteithorum*. Higher temperatures, increased drought, and an intensified bushfire regime will also likely cause a change in the species composition of riparian vegetation and condition of the rainforest through changes in soil moisture levels, evapotranspiration and foliage damage during extreme heat events (A. Borsboom pers. comm. 2020), which would restrict the distribution of *E. monteithorum* further. As the rainforest habitat degrades with climate change, the pressure from invasive species is predicted to increase, including from feral pigs and lantana. Bland (2017) undertook a large-scale meta-analysis that considered the multiple interacting factors that influence extinction risk in freshwater crayfish. The single most important factor in extinction risk was range size, with high-altitude habitat also leading to a higher risk of extinction. Both of these factors are relevant to *E. monteithorum*. Another study (Owen et al. 2015) considered freshwater crayfish species from around the world, and ranked them according to a combination of evolutionary distinctiveness and conservation status (EDGE); in effect, which species are the most unique evolutionarily and are most at risk. *Euastacus monteithorum* scored 6th highest of 719 species in one analysis and 8th of 719 in the other (tied with *E. eungella*) (Owen et al. 2015). Because of its highly restricted, small distribution, any impact on one part of the population is likely to influence the entire species' distribution, and greatly increase extinction risk. Even a small adverse change could have a long-term impact, since a single stochastic event (fire, cyclone, heatwave, etc.) could potentially wipe out an already reduced/weakened population as a result of climate change. The options for persistence of *E. monteithorum* in the face of climate change are limited. *E. sulcatus* has shown some ability to adapt to higher temperatures, although this was a very small effect, much smaller than the predicted increases in temperature (Bone et al. 2014). Adaptation does not seem likely as *E. monteithorum* is almost certainly cool-adapted, and has been so for a long time. The rate of current climate change makes this unlikely. Another possibility is that *E. monteithorum* could move to cooler, higher altitudes to retain its preferred climate envelope. This is not likely as *E. monteithorum* has already been found at a similar height (889 m) to the highest local altitudes (940 m). A third possibility is that *E. monteithorum* could migrate to other, cooler areas. This is very unlikely due to the hundreds of kilometres of hot, dry lowlands that surround *E. monteithorum*'s current distribution. Level of future impact = high.
Drought	The frequency and intensity of drought in central Queensland is likely to increase (see Climate change above) (QDES 2019). Predictions for the Fitzroy NRM Region (where Kroombit Tops is located) based on 18 global climate models vary, with worst case scenarios indicating a decrease in rainfall by 15% (1990 – 2030), but the most likely scenario suggesting rainfall will remain about the same as currently (Hoskin et al. 2013). However, water available to *E. monteithorum* and the surrounding rainforest is likely to decrease, as increased evaporation will result from the predicted higher temperatures (Hoskin et al. 2013), and the moisture from cloud stripping (Hines 2014) will also likely decrease (Wallace & McJanet 2013). Level of future impact = moderate/high.
Feral pigs	Feral pigs will continue to provide a threat to *E. monteithorum*, not only to individuals and local populations, but also to the general quality of the species' habitat. This threat is likely to increase if the habitat degrades through bushfire, climate change, and further invasive species impacts. Level of future impact = low/moderate.
Future threats – potential	**Impact of threat**

Unauthorised collecting	The level of future unauthorised collecting is difficult to estimate. However, *E. monteithorum*'s rarity and very small distribution places it at a great risk of depletion of numbers from any level of exploitation or collection (legal or otherwise) or an accidental introduction of a pathogen during this collection (see Crayfish plague below). Level of future impact = unknown/low.
Crayfish plague	*Aphanomyces astaci* (crayfish plague) is a highly contagious fungal disease that is uniformly fatal (100% mortality) to susceptible species (e.g., Panteleit et al. 2017), and it is considered one of the world's worst invasive species (Lowe et al. 2000). Many strains of the disease prefer cooler temperatures, which is also the preference of *E. monteithorum*. Crayfish plague is not currently known in Australia, but is documented as fatal to Australian freshwater crayfish (Unestam 1975), and it poses an extremely high risk to native freshwater crayfish species (DAWE 2019). Illegally imported specimens of the North American crayfish species known to carry the disease have been seized in multiple Australian states (Department of Primary Industries & Regional Development 2021; Business Queensland 2021), but not known to be infected. A single, illegally-imported crayfish infected with crayfish plague has the capacity to devastate the entire Australian crayfish fauna. Increasing illegal wildlife/aquarium trade appreciably increases the risk and probability of the disease's introduction to Australia. Level of future impact = unknown.

*CONSERVATION ADVICE: THREAT ABATEMENT AND RECOVERY ACTIONS

Give an overview of recovery and threat abatement/mitigation actions that are underway, have been formally proposed or that you would like to recommend. Address all threats listed or state threats that lack conservation advice.

Current threats	Abatement or recovery action underway
Bushfire	Active fire management is carried out at Kroombit Tops and Dawes National Parks. Before the 1990s, planned burns to reduce fuel loads were conducted in winter, but after 1996 planned burns were switched to times of higher soil moisture (spring – autumn) (Hines 2014). Inappropriate fire regimes can foster invasive species (QDNPRSR 2013). More recently, planned fires are carried out to protect the natural values and ecological requirements of those communities, on top of the need to protect property and reduce fuel loads (Hines 2014). A mosaic burning regime (outside the rainforest) can lessen the severity of bushfires and allow natural biodiversity to persist, providing a greater opportunity for it to adapt naturally to climate change (QDNPRSR 2013; QDNPSR 2015). At Kroombit Tops, the plan is to increase planned burns in small areas in 5-6 year cycles to achieve a mosaic (Venz 2020). As well as planned burns, firebreaks are maintained to arrest bushfire spread (B. Dowling pers. comm. 2020). The particular upland vine rainforest ecosystem that is home to *E. monteithorum* (QLD RE 12.12.1, 12.12.13) is fire sensitive, and as such requires that the surrounding areas be actively managed for fire, as this community does not burn regularly (Queensland Herbarium 2019). This community needs active protection from fires in extreme conditions such as after long droughts, which is why the drier, more fire-prone forests that surround it are managed to reduce the risk of fire spreading to the rainforest (QDNPRSR 2013; QDNPSR 2015).
Feral pigs	There is an active feral pig prevention program at Kroombit Tops NP (Peter Pickering pers. comm. 2020), but not at Dawes NP. The program includes aerial baiting via helicopters approximately twice a year, in particular along drainage lines below the eastern escarpment (B. Dowling pers. comm. 2020; Venz 2020). There is also monitoring and ground-baiting about three times a year (with some cameras to record species) (QDNPRSR 2013; B. Dowling pers. comm. 2020; Venz 2020). Further, there is occasional ground-based shooting in collaboration with the Sporting Shooters Association (Venz 2020). Despite these measures, feral pig numbers are currently very high and impacts are increasing in crayfish habitat (H. Hines pers. comm. 2020; Venz 2020). A pilot program that started in 2015 has been trialling a pig-proof fence at a site on Degalgil Creek, which has seen the habitat recover well. This shows the damage for which pigs are responsible, but fencing is not a practical solution over wide areas given its cost, difficulty of erection and maintenance (Negus et al. 2019), and the large amount of overland flow of water during floods (Venz 2020).

	Feral pig management activities may need to increase in bushfire areas. Even where the relevant habitat did not burn, predation pressure from pigs may increase as hungry pigs move out of adjacent burned areas into unburned ones.
	Abatement or recovery action proposed
Bushfire	Increased weed management is a potentially import step to limit the spread of bushfires into the rainforest (Venz 2020). The reduction of lantana and Madeira vine would slow the spread of fire into the rainforest and allow the rainforest to regenerate more quickly (QDNPSR 2015). Preliminary data from experimental studies suggest that transferring rainforest seedlings collected after planned burns to germinate in newly burned bushfire areas may be a way to increase the speed of recovery in some cases (Queensland Herbarium 2019).
Unauthorised collecting	Regular checks should be made of the internet to see if individuals of *E. monteithorum* are offered for sale, and if so, the relevant parties prosecuted for illegal collecting, possession or sale. Further, information on correct hygiene protocols should be made available to those collecting legally to avoid introducing pathogens (for example: www.aabio.com.au/new/wp-content/uploads/2012/02/Hygiene-Protocol-2010.pdf). The Queensland Government is working on protocols at the moment (J. Furse pers. comm. 2020).
Future threats – actual	**Abatement or recovery action underway**
	Abatement or recovery action proposed
Climate change	Detailed monitoring of the health of both *E. monteithorum* populations (numbers, distribution, population dynamics, etc.) and its habitat (vegetation, water availability, water quality parameters) should be undertaken to see if these are being adversely affected by the various factors associated with climate change. Given that *E. monteithorum* is potentially threatened by rising temperatures due to climate change, obtaining some data on its thermal tolerance is particularly vital. This is a common issue, as only 6% of crayfish worldwide have any data available on their thermal tolerance (Bland 2017). Species-specific thermal tolerance thresholds and environmental parameters (Richman et al 2015) are important information for understanding *E. monteithorum's* long-term extinction risk. Baseline water temperatures at a number of sites in streams known to be home to *E. monteithorum* should be collected to monitor any temperature change over time. In conjunction with this, there should be yearly standardised population monitoring of crayfish in the same streams to track any population change. As there is very little background information on *E. monteithorum*, research should focus on population assessment and monitoring, biology, life history, habitat requirements, and resilience to invasive species and disease. Because the actual population status and health of most crayfish species is so poorly known, 88% of all crayfish listings use range-based criteria rather than data on population decline (Richman et al. 2015).
Future threats – potential	**Abatement or recovery action underway**
	Abatement or recovery action proposed

IMPACT OF TRANSFERRING A THREATENED SPECIES TO NEAR THREATENED OR LEAST CONCERN

Omit this section and proceed to 'Listing class/category' if the nomination does not involve transferring a species from a threatened class to Least Concern or Near Threatened.

If the threatened species (Extinct, Extinct in the Wild, Critically Endangered, Endangered or Vulnerable) were moved to Least Concern or Near Threatened, what would be the impact if conservation actions for the species were reduced or ceased? Would the species decline at such a rate that it would be eligible for listing under a threatened class again in the foreseeable future? Provide evidence, expert advice and appropriate references to support your response.

Conservation action	Impact on the species if abatement/recovery action is reduced or ceases

Listing class/category

CURRENT LISTING CLASS/CATEGORY

[Please mark the boxes that apply by double clicking them with your mouse.]

In what class is the species currently listed under the **NC Act**?

☐Extinct	☐Extinct in the Wild	☐Critically Endangered	☐Endangered
☐Vulnerable	☐Near Threatened	☐Least Concern	☒Not listed

In what category is the species currently listed under the **EPBC Act**?

☐Extinct	☐Extinct in the Wild	☐Critically Endangered	☐Endangered
☐Vulnerable	☐Conservation Dependent		☒Not listed

NOMINATED LISTING CLASS

To what class under the **NC Act** is the species being nominated?

☐Extinct	☐Extinct in the Wild	☐Critically Endangered	☒Endangered
☐Vulnerable	☐Near Threatened	☐Least Concern	☐Not listed

Nominating a species to transfer to another class

REASON FOR A NOMINATION TO TRANSFER TO ANOTHER CLASS

What is the reason for the nomination?

☐Genuine change of status	☒New knowledge	☐Mistake	☐Other
Taxonomic change - ☐'split'	☐newly described	☐'lumped'	☐no longer valid

INITIAL LISTING

Describe the reasons for the species' initial listing under the NC Act and/or the EPBC Act and, if available, the criteria under which it was formerly considered eligible.

Click or tap here to enter text.

CHANGES IN SITUATION LEADING TO THE NOMINATION TO TRANSFER TO ANOTHER CLASS

Please complete (a), (b) OR (c) as appropriate to the nomination.

(a) Critically Endangered, Endangered, Vulnerable or Near Threatened

Describe the change in circumstances that make the species eligible for listing in a class other than Extinct and Extinct in the Wild.

Euastacus monteithorum is being nominated as Endangered (EN) because of its very restricted distribution (EOO = 112 km^2; AOO = 56 km^2) in two locations (upland rainforest communities of Kroombit Tops and Dawes National Parks). The entire population is threatened by bushfire, drought, feral pigs, and other factors (floods, invasive species, rainforest habitat loss) predicted to increase and intensify with climate change.

(b) Extinct in the Wild

A native species is eligible to be included in the Extinct in the Wild class if: (a) thorough searches have been conducted for the species; and (b) the species has not been seen in the wild over a period appropriate for its life cycle or form. The species may still survive in cultivation, captivity or as a naturalised population (or populations) well outside the historic range.

Describe how circumstances have changed that now make the species eligible for listing as Extinct in the Wild. Provide details of the last valid record or observation of the species in the wild.

Click or tap here to enter text.

(c) Extinct

A native species is eligible to be included in the Extinct class if there is no reasonable doubt that the last member of the species has died. A taxon is presumed Extinct when exhaustive surveys in the known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual.

Describe how circumstances have changed that now make the species eligible for listing as Extinct. Provide details of the last valid record or observation for the species in the wild and captivity.

Click or tap here to enter text.

Eligibility against the criteria

Standard of scientific evidence and adequacy of survey

For this assessment is it considered that the survey of the species has been adequate and there is sufficient scientific evidence to support the listing outcome.

CRITERION A

Population size reduction (reduction in total numbers) measured over the longer of 10 years or 3 generations based on any of A1 to A4

	Critically Endangered (CR)	Endangered (EN)	Vulnerable (VU)	Near Threatened (NT)
A1	**≥ 90%**	**≥ 70%**	**≥ 50%**	**≥ 20%**
A2, A3, A4	**≥ 80%**	**≥ 50%**	**≥ 30%**	**≥ 20%**

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 (a) to (e)

(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, hybridisation, pathogens, pollutants, competitors or parasites

Please identify whether the species meets A1, A2, A3 or A4. Include an explanation, supported by data and information, on how the species meets the criterion (A1 – A4). If available include information on:

- whether the population trend is increasing, decreasing or static
- estimated generation length and method used to estimate the generation length

You must provide a response. If there is no evidence to demonstrate a population size reduction, this must be stated.

Insufficient data to determine eligibility.

There are not adequate population data to assess this as little is known about the population size of *E. monteithorum*. Nothing is known about any past or current changes. It is very likely that the population size will decline in the face of climate change (especially with hotter weather and less moisture) since this species is a cool mountain specialist restricted to upland rainforest creeks. As temperatures increase, the available amount of suitable habitat is likely to decrease as the areas of rainforest habitat contract higher up the mountain. There will also be likely population reduction due to more frequent and intense bushfires and droughts. Given the current small size of this species' distribution, any further reductions will make it susceptible to a single stochastic event that could drive it to extinction.

CRITERION B:

Geographic distribution is precarious for either extent of occurrence AND/OR area of occupancy				
	Critically Endangered (CR)	**Endangered (EN)**	**Vulnerable (VU)**	**Near Threatened (NT)**
B1. Extent of occurrence (EOO)	**< 100 km²**	**< 5,000 km²**	**< 20,000 km²**	**< 40,000 km²**
B2. Area of occupancy (AOO)	**< 10 km²**	**< 500 km²**	**< 2,000 km²**	**< 4,000 km²**
AND at least 2 of the following 3 conditions for CR, EN or VU:				AND (b) for NT
(a) Severely fragmented OR Number of locations	**= 1**	**≤ 5**	**≤ 10**	**Not applicable**
(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				**≥ 10% within the longer of 10 years or 3 generations**
(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				**Not applicable**

Please refer to the 'Guidelines for Using the IUCN Red List Categories and Criteria' for assistance with interpreting the criterion particularly in relation to calculating 'extent of occurrence', 'area of occupancy' and understanding of the definition and use of 'severely fragmented', 'locations', 'continuing decline' and 'extreme fluctuations'.

Please identify whether the species meets B1 or B2. Except for Near Threatened species, include an explanation, supported by data and information, on how the species meets at least 2 of (a), (b) or (c). For Near Threatened species, include an explanation, supported by data and information, on how the species meets (b).

Please note that locations must be defined by a threat. A location is a geographically or ecologically distinct area in which a single threatening event can rapidly affect all individuals of the species present.

If available, include information on:

- Whether there are smaller populations of the species within the total population and, if so, the degree of geographic separation between the smaller populations within the total population
- Any biological, geographic, human induced or other barriers enforcing separation

You must provide a response. If there is no evidence to demonstrate that the geographic distribution is precarious for either extent of occurrence AND/OR area of occupancy, this must be stated.

Euastacus monteithorum meets the thresholds for listing as **Endangered (EN)** under criteria **B1ab(iii)** and **B2ab(iii)** based on two locations threatened by bushfire, drought, climate change and feral pigs.

Euastacus monteithorum meets Criteria B1 and B2 based on:

1) B1: EOO of 112 km^2. Most of the calculated EOO area for *E. monteithorum* is made up of highly unsuitable environments for this species (hot, dry lowlands between Kroombit Tops and Dawes National Parks; non-rainforest habitats in the uplands).

2) B2: AOO of 56 km^2. As this species is restricted to the linear-like stream network and near-stream habitats, the actual area of habitation will be much smaller. *Euastacus monteithorum* was previously assessed under IUCN criteria (Coughran & Furse 2010) as Critically Endangered B1ab(iii) + B2ab(iii). This assessment did not include all of the currently known sites at Kroombit Tops National Park, or any sites at Dawes National Park, and so the calculated EOO and AOO both now exceed the threshold values for Critically Endangered (100 km^2 and 10 km^2 respectively).

a: Known from two locations, namely the upland subtropical rainforest communities of Kroombit Tops and Dawes National Parks. One stochastic event could drive the species to extinction. The bushfires of 2019 impacted both parks, and future bushfires are predicted to become more frequent and have higher fire severity due to climate change, even in rainforests. Climate change, and in particular a warming climate, will impact the entire species population simultaneously, however Kroombit Tops should provide a refuge for a bit longer than Dawes National Park, given its higher altitude. Rising temperatures will impact *E. monteithorum*'s physiology directly, as well as making the species' current habitat less suitable, and will reduce the potential area of occupancy. *Euastacus monteithorum* is restricted to the cool, higher altitude areas, with little chance of natural migration, as the nearest suitable habitat is hundreds of kilometres away in every direction. Drought and heatwaves are also predicted to intensify and worsen, and would impact the whole population negatively.

b(iii): Projected decline in area, extent and/or quality of habitat are inferred due to bushfires, climate change, and drought. This decline could be very rapid, via future intense bushfires, heat wave, drought, flooding, or slow, mediated through the various interacting effects of climate change.

As always, there is some uncertainty over the precise distribution of any species, as a full census is very rarely possible. Kroombit Tops National Park has been surveyed a number of times, often as part of frog conservation work. However, a small nocturnal crayfish living in a burrow is easily missed. Burrows may have been recorded in the western portion of Three Moon Creek (H. Hines pers. comm. 2020) (see Fig. 2), from where there are no current definite *E. monteithorum* records. Further, there are a number of potential rainforest patches on the plateau that represent potentially suitable habitat (Fig. 4). Dawes NP has not been well sampled (H. Hines pers. comm. 2020), and so the two known sites there are almost certainly an underestimate, especially given that there are suitable rainforest patches present (Fig. 5), although it must be noted that the rainforest patch mapping could be improved.

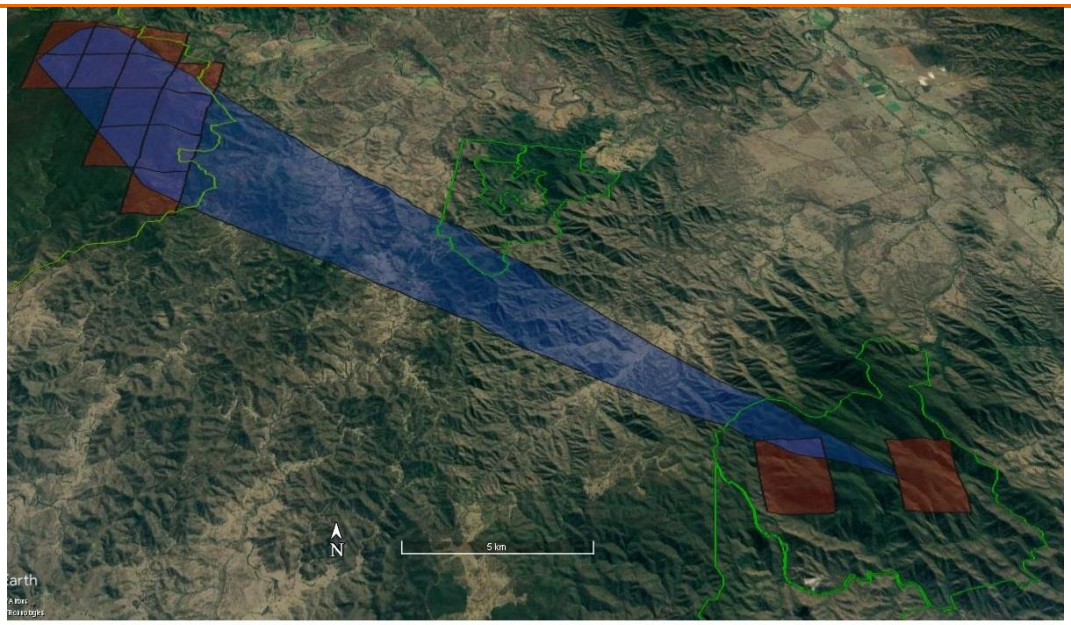
To try to account for sites in which *E. monteithorum* may be resident but currently unsampled, a "best case scenario" analysis has been added. This recalculates EOO and AOO for both Kroombit Tops and Dawes NPs (individually and together) with the optimistic assumption that all of the suitable rainforest patches (highlighted in Figs 4 and 5) currently host *E. monteithorum.* This makes the currently known sites considered alone a "worst case scenario".

When all suitable rainforest patches are assumed to be occupied by *E. monteithorum*, EOO and AOO increase by 60% and 42% at Kroombit Tops and by 322% and 450% at Dawes (Table 1). Overall, when both parks are considered together, EOO increases by 136% and AOO by 100%. Dawes increases much more because it is not well sampled.

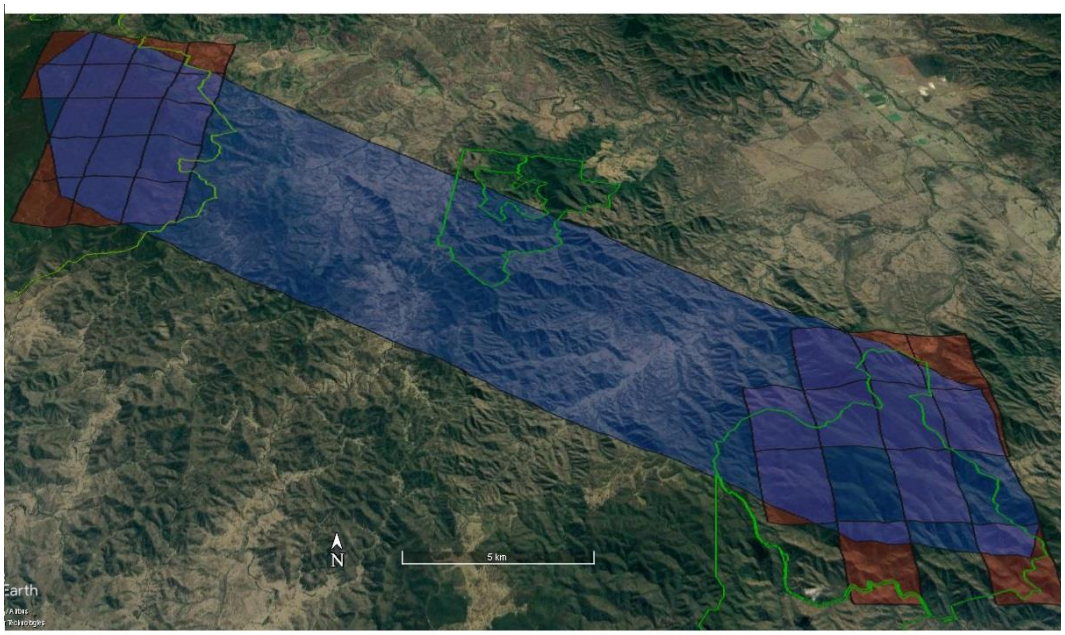
Table 1. *E. monteithorum* EOO and AOO calculations (in km^2) for Kroombit Tops and Dawes National Parks using: a) only currently known sites ("worst case"); b) also including potential sites from suitable rainforest patches (from Fig. 4, 5) ("best case") (numbers in red equate to Critically Endangered).

	Kroombit Tops (km^2)	**Dawes** (km^2)	**Both** (km^2)
EOO			
a) only known sites	29	8	112
b) incl. potential sites	46	34	264
AOO			
a) only known sites	48	8	56
b) incl. potential sites	68	44	112

If the populations in the two parks were to be considered separate taxa, each would qualify as Critically Endangered, but there are no current data to support this differentiation. Realistically, the worst case (current data) is likely an underestimate (Fig. 7a), while the best case scenario (Fig. 7b) is probably an overestimate. This makes the actual situation probably somewhere between the two scenarios, and equates to an Endangered Category for *E. monteithorum* for both EOO (> 100 km^2 and < 5000 km^2) and AOO (> 10 km^2 & < 500 km^2).



a) Worst Case (only known sites)



b) Best Case (including suitable rainforest patches)

Fig. 7: *E. monteithorum* Extent of Occurrence (EOO; blue shading) and Area of Occupancy (AOO; red rectangles) for Kroombit Tops (left) and Dawes National Parks (right) (both green outlines) under two scenarios: a) only considering currently known sites ("worst case"); b) also including potential sites from other rainforest patches ("best case"). Displayed in Google Earth Pro (version 7.3.2.5776).

CRITERION C

Small population size and decline					
		Critically Endangered (CR)	**Endangered (EN)**	**Vulnerable (VU)**	**Near Threatened (NT)**
Estimated number of mature individuals		**< 250**	**< 2,500**	**< 10,000**	**< 20,000**
AND either (C1) or (C2) is true					AND (C1) is true
C1 An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in the future		**25% in 3 years or 1 generation (whichever is longer)**	**20% in 5 years or 2 generations (whichever is longer)**	**10% in 10 years or 3 generations (whichever is longer)**	**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 (a) or (b):					
(a)	(i) Number of mature individuals in each subpopulation	**≤ 50**	**≤ 250**	**≤ 1,000**	**Not applicable**
	OR				
	(ii) % of mature individuals in one subpopulation =	**90 – 100%**	**95 – 100%**	**100%**	**Not applicable**
(b) Extreme fluctuations in the number of mature individuals		**Applicable**	**Applicable**	**Applicable**	**Not applicable**

Please identify the estimated total number of mature individuals and either an answer to C1 or C2. Include an explanation, supported by data and information, on how the species meets the criteria. Note: If the estimated total number of mature individuals is unknown but presumed to be likely to be >10 000, you are not required to provide evidence in support of C1 or C2, just state that the number is likely to be >10 000.

You must provide a response. If there is no evidence to demonstrate small population size and decline this must be stated.

There are **insufficient data** to assess *Euastacus monteithorum* against the thresholds for listing under Criterion C as there is little information available to determine a robust estimate of the number of mature individuals.

CRITERION D:

Very small population				
	Critically Endangered (CR)	**Endangered (EN)**	**Vulnerable (VU)**	**Near Threatened (NT)**
D1. Number of mature individuals	**< 50**	**< 250**	**D1. < 1,000**	**D1. < 3,000**
OR				
D2. [Only applies to the VU and NT categories] Restricted area of occupancy or number of locations with a plausible future threat that could drive the taxon to CR or EX in a very short time.	**Not applicable**	**Not applicable**	**D2. Typically: AOO < 20 km² or number of locations ≤ 5**	**D2. Typically: AOO < 40 km² or number of locations ≤ 10**

Please identify the estimated total number of mature individuals and evidence of how the figure was derived.

For Criterion D2, please provide information on the species' area of occupancy, number of locations and plausible threats.

You must provide a response. If there is no evidence to demonstrate eligibility, this must be stated.

There are **insufficient data** to assess *Euastacus monteithorum* against the thresholds for listing under Criterion D1 as there is little information available to determine a robust estimate of the number of mature

individuals. However, *Euastacus monteithorum* does qualify under Criterion D2 as **Vulnerable (VU)**. This is because it is found in two locations, and the combined threats of enhanced bushfires, drought, and heatwaves associated with climate change could drive the species towards extinction in a short timeframe.

CRITERION E:

Quantitative Analysis				
	Critically Endangered (CR)	**Endangered (EN)**	**Vulnerable (VU)**	**Near Threatened (NT)**
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% within 100 years**	**≥ 5% within 100 years**

Please identify the probability of extinction and evidence of how the analysis was undertaken.

You must provide a response. If there has been no quantitative analysis undertaken this must be stated.

Euastacus monteithorum is **not eligible** for listing under this criterion because no quantitative analysis of the probability of extinction of the populations is available.

SUMMARY OF CRITERIA UNDER WHICH THE SPECIES IS ELIGIBLE FOR LISTING AS: CR, EN, V, NT, EW or EX

Please mark the criteria and sub-criteria that apply.

☐Criterion A	☐A1 (specify at least one of the following) ☐a) ☐b) ☐c) ☐ d) ☐e); **AND/OR** ☐A2 (specify at least one of the following) ☐a) ☐b) ☐c) ☐d) ☐e); **AND/OR** ☐A3 (specify at least one of the following) ☐a) ☐b) ☐c) ☐d) ☐e); **AND/OR** ☐A4 (specify at least one of the following) ☐a) ☐b) ☐c) ☐d) ☐e)
☒Criterion B **Endangered**	☒B1 (specify at least two of the following) ☒a) ☒biii) ☐c); **AND/OR** ☒B2 (specify at least two of the following, other than NT) ☒a) ☒biii) ☐c)
☐Criterion C	☐estimated number of mature individuals **AND** ☐C1 **OR** ☐C2 ☐a (i) **OR** ☐a (ii) **OR** ☐C2 ☐b)
☒Criterion D **Vulnerable**	☐D1 **OR** ☒ D2
☐Criterion E	
☐EX	
☐EW	
☐LC	Species nominated to change from a higher conservation class to Least Concern. No above boxes apply.

Other Considerations

*INDIGENOUS CULTURAL SIGNIFICANCE

Is the species known to have cultural significance for Indigenous groups within Australia? If so, to which groups? Provide information on the nature of this significance if publicly available.

It is not known if Indigenous people attach any particular cultural significance to *Euastacus monteithorum*. Both parks are within the lands of the Port Curtis Coral Coast Indigenous Group representing the Bailai, Gooreng Gooreng and Gurang peoples (QDNPRSR 2013; QDNPSR 2015).

FURTHER STUDIES

Identify relevant studies or management documentation that might relate to the species (e.g. research projects, national park management plans, recovery plans, conservation plans, threat abatement plans, etc.).

ADDITIONAL COMMENTS/INFORMATION

Please include any additional comments or information on the species such as survey or monitoring information, and maps that would assist with the consideration of the nomination.

Click or tap here to enter text.

IMAGES OF THE SPECIES

Please include or attach images of the species if available, and indicate if you are in a position to authorise their use.

Fig. 8: *Euastacus monteithorum*, Kroombit Tops National Park.
Top photo by Ed Meyer, Bottom photo by Harry Hines (QPWS). Both photos used with permission.

Reviewers and references

REVIEWER(S)

Has this nomination been peer-reviewed? Have relevant experts been consulted on this nomination? If so, please include their names, current professional positions and contact details.

This nomination has been peer-reviewed by Dr. James Furse (Griffith University) and Dr. Harry Hines (QPWS), and was read and commented on by Dr. Jonathan Marshall and Dr. Alisha Steward (Water Planning Ecology, DES).

A number of experts were consulted in preparing this nomination, all of whom kindly provided specific data, background information, advice or guidance. These include Harry Hines (QPWS), Rob McCormack (Australian Aquatic Biological), Jason Coughran (Sheridan College), James Furse (Griffith University), Adrian Borsboom (Queensland Herbarium), Brett Dowling (QPWS), and Peter Pickering (QPWS).

REFERENCE LIST

Please list key references/documentation you have referred to in your nomination.

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Nominator's Details

Note: Your details are subject to the provisions of the *Privacy Act 1988* and will not be divulged to third parties, except for state and territory governments and scientific committees that have agreed to collaborate on national threatened species assessments using a CAM. If there are multiple nominators please include details below for all nominators.

TITLE (e.g. Mr/Mrs/Dr/Professor/etc.)

Dr

FULL NAME

Timothy J. Page

ORGANISATION OR COMPANY NAME (IF APPLICABLE)

Griffith University

CONTACT DETAILS

DECLARATION

I declare that, to the best of my knowledge, the information in this nomination and its attachments is true and correct.

Signed: * *If submitting by email, please attach an electronic signature*	Date: 2/06/2020 (original submission) 5/10/2021 (minor revision)

Lodging your nomination

Completed nominations may be lodged either:
1. by email in Microsoft Word format to: SpeciesTechnical.Committee@des.qld.gov.au
2. by mail to: The Chair
   Species Technical Committee
   Queensland Herbarium
   Mount Coot-tha Rd
   Toowong QLD 4066

*** If submitting by mail, you must include an electronic copy on a memory stick.**

Recommended citation:

Page, T.J. (2021). Nomination to change the conservation class of *Euastacus monteithorum* under the Queensland *Nature Conservation Act 1992* (minor revision of 2020 version). Department of Environment and Science, Brisbane.