

## 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](mailto: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](mailto: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](mailto: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](http://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](http://www.environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl?wanted=fauna)  
[www.environment.gov.au/cgi-bin/sprat/public/publicthreatenedlist.pl?wanted=flora](http://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](http://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](mailto: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](mailto: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](http://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:
  - whether it is actual or potential
  - how and where it impacts on this species
  - what its effect has been so far (is the threat known or suspected?, does it only affect certain populations?) Present supporting information/research).
  - 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).
  - 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](http://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](mailto: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](http://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 jagara* Morgan, 1988

### COMMON NAME(S)

Jagara hairy crayfish, Mount Mistake spiny cray

### 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 by Morgan (1988).

### \*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.

McCormack et al. (2010) recommend a taxonomic reassessment given the poor state of the type material and recently discovered specimens.

### \*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?

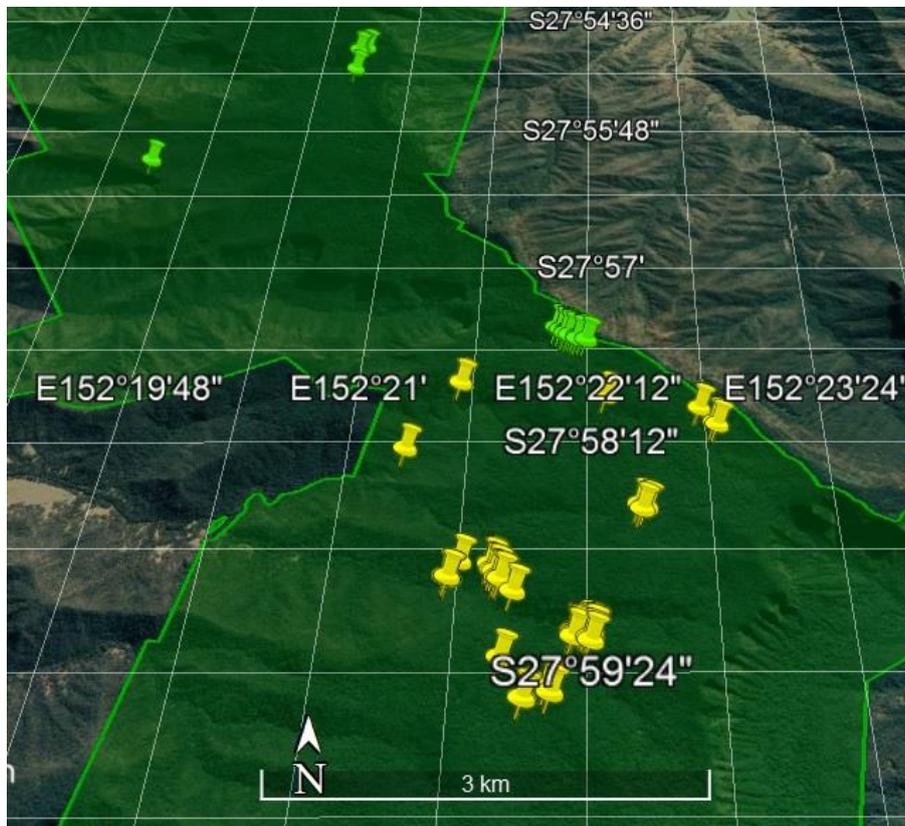
*Euastacus jagara* is one of the smaller species of *Euastacus*, with a maximum weight of 53 g, and a maximum recorded occipital carapace length (OCL) ~50 mm (McCormack et al. 2010), but most fully grown specimens have an OCL of 30-40 mm. It is dark green or green-blue to orange-brown on its back, with a blue tint on the underside, and it has light blue-brown legs and mottled chelae (McCormack 2012). However, colour is typically not a reliable diagnostic characteristic in freshwater crayfish as it can vary greatly within each species, even within a section of stream (J. Furse pers. comm. 2020). Unlike many *Euastacus* species, it has few spines, especially on the abdomen (McCormack et al. 2010). It can be separated from other crayfish in the region by 3-6 mesial carpal spines, as well as small spines anterior to mesial carpal spines, small suborbital spines, no spines above the propodal cutting edge, and dense covering of setation (hence "hairy") (McCormack et al. 2010). *Euastacus jagara* has not been found sympatric with other crayfish species. The larger congeneric species *Euastacus sulcatus* (max OCL ~100 mm, Coughran 2008; reportedly as large as 120 mm, weight > 1 kg; McCormack 2012) has been recorded to the immediate south of *E. jagara*'s distribution. Other crayfish taxa, *Cherax* spp. (*C. destructor*, *C. depressus*), are recorded in lower sections of the same creeks as *E. jagara*, but apparently they are separated by altitude from *E. jagara* (McCormack et al. 2010).

## 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.

This highland rainforest-restricted species (~710-1030 m ASL) is only known from a few small upland, headwater creeks in Main Range National Park, Queensland, straddling the Great Dividing Range (McCormack 2012). These include Flaggy Creek (type location, on Mt. Mistake) and Shady Creek (tributaries of Blackfellow Creek, Brisbane Basin, Coastal Drainage Division), and a number of unnamed tributaries of Dalrymple Creek (Condamine-Balonne Basin, Murray-Darling Division) (see Fig. 1) (McCormack et al. 2010; BAAM 2017; R. McCormack pers comm 2020; J. Coughran pers comm 2020; H. Hines pers comm 2020; McCormack 2021). They may be reasonably abundant locally at inhabited sites, in particular above 920 m (McCormack et al. 2010). Numerous other surveys in the surrounding area have failed to locate further populations (McCormack et al. 2010; McCormack 2021). The entire distribution of the species is within the Main Range National Park, restricted to the higher altitude rainforest community. As such, the species receives a reasonable measure of protection, however it is not actively managed (S. Finlayson pers comm 2020). The species is mentioned in the *Main Range National Park and Spicers Gap Road Conservation Park Management Statement* (Queensland Department of Environment and Science 2013) as occurring within the park and being potentially threatened, but it is not listed as one of the species of conservation significance.



**Fig. 1:** *Euastacus jagara* distribution records (Brisbane River Basin sites = green pins, Condamine-Balonne Basin = yellow pins [McCormack et al. 2010; BAAM 2017; R. McCormack pers comm 2020; J. Coughran pers comm 2020; H. Hines pers comm 2020; McCormack 2021], Green shaded area = Main Range National Park). Displayed in Google Earth Pro (version 7.3.2.5776).

## 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

The biology of this species is not well understood. Breeding season starts between May and July (McCormack 2012), but the precise timing of the breeding season is not clear and may vary. It may align with the presence of large males and females appearing in the streams in the autumn, similar to some other *Euastacus* species (McCormack et al. 2010). However, there is considerable within-species variation for other *Euastacus* species (Coughran 2006), so more work is required. Gravid females have been found in both the winter and summer, ranging in size from 39.2-44.7 mm OCL, and carrying 50-70 mustard to brown eggs (McCormack et al. 2010). Their fecundity is probably low and they have relatively large eggs, similar to other smaller species of *Euastacus* (McCormack et al. 2010). Their growth rates, population sizes and generation length are not known.

In the small streams where *E. jagara* occurs, the downstream limit of its distribution closely accords with the change in habitat from rainforest (e.g. hoop pines, tree ferns, palms) to open forest. In particular, the presence of Rainforest Spinach (*Elatostema reticulatum*) is a good local indicator of suitable *E. jagara* habitat (McCormack et al. 2010). *Euastacus jagara* may need the finer high-altitude soils to make its burrows. These are large, intricate structures with multiple entrances, which extend into the streambank or occur nearby in the adjacent forest by several metres. Often many burrows are adjacent to each other, resulting in apparently high local population densities (McCormack et al. 2010). Larger adults appear to spend most of the year in the burrows, but emerge into the creeks for breeding season (McCormack 2012). Juveniles are also found in damp seepage areas a little way away from the creeks (McCormack 2012). *Euastacus jagara* inhabit all parts of the streams, in riffles and pools (McCormack et al. 2010).

The diet of *E. jagara* is not well understood, but the species is probably omnivorous, as individuals are attracted to meat in traps, and also appear to scavenge fallen rainforest fruit, which they bring back to their burrows (McCormack 2012). These crayfish are largely nocturnal, with increased activity until around midnight, after which they have been observed at their burrow entrances but not on the forest floor (McCormack et al. 2010; McCormack 2012; McCormack 2021). Occasionally they are also active during the day.

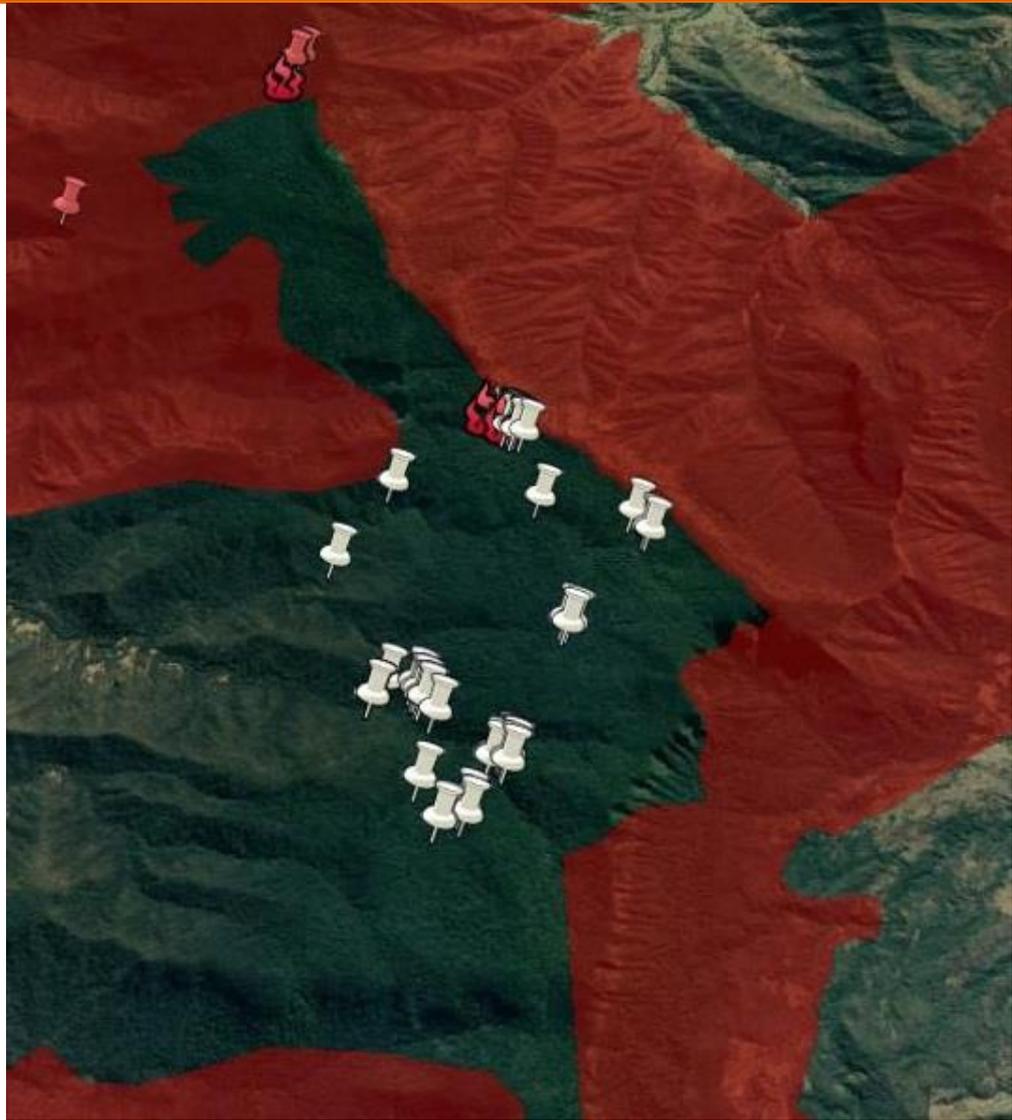
## Threats

### 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 (Murphy et al. 2012). <i>E. jagara</i> may have been buffered to some extent as dense rainforest burns less often than open woodland. Nevertheless, the very small, restricted distribution of the species places it at risk in the event that fire does impact its restricted area. Level of past impact = low.
Unauthorised collecting	All spiny crayfishes ( <i>Euastacus</i> ) are "not take" species under the Queensland <i>Fisheries Act 1994</i> , however, it is unknown if <i>E. jagara</i> has been the subject of illegal collecting for the aquarium trade (Coughran & Furse 2010). If <i>E. jagara</i> has been targeted, there is the possibility that collectors who have handled other crayfish species could introduce new pathogens to the isolated <i>E. jagara</i> populations. It is also possible that <i>E. jagara</i> could be collected as fishing bait by mistake, as their smoother appearance makes them look more like other crayfish species ( <i>Cherax</i> spp.), which often serve as bait (Coughran & Furse 2010). However, <i>E. jagara</i> 's isolation may protect it somewhat from both of these threatening processes. Level of past impact = unknown/low.
Cane toads	Cane toads ( <i>Rhinella marina</i> ) are potential threats to crayfishes (Coughran & Furse 2012), however there is evidence that some crayfish species can feed on them without ill effect (Shine 2010). Adult Cane toads could probably eat juvenile crayfish. Level of past impact = unknown.
Feral pigs	The "Predation, habitat degradation, competition and disease transmission by feral pigs ( <i>Sus scrofa</i> )" was listed by the Federal Government in 2001 as a key threatening process under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act) (Commonwealth of

	<p>Australia 2017). Negative impacts can be direct (predation, digging and rooting) and indirect (changing plant species composition, water quality) (Commonwealth of Australia 2017). Feral pigs (<i>Sus scrofa</i>) are thought to consume crayfish species and damage their habitat (McCormack et al. 2010; Commonwealth of Australia 2017). Feral pigs are considered a major threat for genera of burrowing crayfish (e.g. <i>Engaeus</i>, <i>Engaewa</i>), which are not found in Queensland (Commonwealth of Australia 2017). Feral pigs have been shown to adversely affect tropical Queensland lowland freshwater systems (habitat destruction, water quality) (Mitchell et al. 2010).</p> <p>Little is currently known about the impact of Feral pigs on upland rainforest freshwater systems in general, and on <i>E. jagara</i> in particular. However, they are considered a major threat for rainforest-dwelling frogs (Commonwealth of Australia 2017). Habitat destruction caused by Feral pigs to the stream bed and banks is evident and obvious (J. Coughran pers comm 2020). Anecdotal information from a Feral pig hunter has reported pigs' guts full of freshwater crayfish (J. Coughran pers comm 2020), which may explain some of the rooting behaviour if they are actively hunting crayfish. Level of past impact = moderate.</p>
<b>Current threats</b>	<b>Impact of threat</b>
Bushfire	<p>Recent very intense and broad-scale fire activity (2019-2020) has taken place in many parts of Queensland, burning about 6,617,430 ha (3.8% of the State) and impacting at least 648 threatened species (Threatened Species Operations 2020). These fires were associated with a severe drought, which would have already depleted much surface water prior to the fires. Bushfires occurred at sites known to host <i>E. jagara</i>, and in areas that virtually encircle the entire known distribution of the species (Fig. 3). Some of the northern Brisbane River sites were within the fire zone, and most of the other sites are within 1 kilometre of the fire front; with no sites more than 2.1 km from the bushfire-affected areas. McCormack (2021) largely confirmed the fire impacted GIS layer displayed in Figure 3, finding two northern sites had been impacted by a fire of low-level severity (burnt understory with unburnt canopy), although areas of high fire severity were only 1 kilometre distant (AUS GEEBAM; Commonwealth of Australia 2020).</p> <p>It is not clear what the direct impact of fire on crayfish populations may be, however another rainforest crayfish (<i>Euastacus clarkae</i>) suffered a mass kill directly as a result of fire, perhaps due to water heated by fire (McCormack 2015). Similarly, <i>E. bispinosus</i> abundances declined after fire events, perhaps due to associated lessening 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).</p>



**Fig. 3:** *Euastacus jagara* distribution records overlaid with extent of 2019 – 2020 bushfires GIS layer (in red) (DAWE 2020). Flames = *E. jagara* sites confirmed fire impacted (McCormack 2021); Red pins = sites likely fire impacted; White pins = sites likely not impacted or unknown. Displayed in Google Earth Pro (version 7.3.2.5776).

A Federal Government report (Legge et al. 2020) on the impacts of the recent fires on wildlife across Australia found that many *Euastacus* species should be given management priority, because of their small distributions and particular biological traits (22 species with >10% fire-affected distributions). This includes *E. jagara*, which was listed as “provisionally high priority whilst more information is gathered”, largely due to its very highly restricted range, which has been confirmed by recent fieldwork (McCormack 2021). Level of current impact = moderate to high.

<p>Unauthorised collecting</p>	<p>See ‘Past threats’ section for other comments relevant to unauthorised collecting. Australian crayfish are for sale in Australia and overseas (legally and illegally, including online), although it is not known if <i>E. jagara</i> are among these (none were found offered for sale on the internet on 9 March, 2020). However, there are recent reports of poachers taking <i>E. sulcatus</i> illegally (ABC Gold Coast, 2019), which is found just south and east of <i>E. jagara</i>’s distribution.</p>
<p>Cane toads</p>	<p>See ‘Past threats’ section for other comments relevant to Cane toads. While there is no current evidence to show that cane toads are threatening <i>E. jagara</i>, Cane toads are reported from within their distribution. Although perhaps at the edge of the Cane toad’s potential distribution (Kearney et al. 2008), toads are found within the Main Range National Park, and have even been reported from precisely the same sites as <i>E. jagara</i> (WildNet; Queensland Department of Environment and Science 2020).</p>
<p>Feral pigs</p>	<p>See ‘Past threats’ section for other comments relevant to Feral pigs. Pigs are reported from various parts of the Main Range National Park, where they have caused a large amount of damage to understorey vegetation (Queensland Department of Environment and Science 2013). These areas are also prone to the establishment of invasive plant species after Feral pig disturbance. A survey for crayfish in the Park in 2017 found a great deal of evidence of Feral pig</p>

	diggings close to crayfish sites, whereas none had been found the previous year (BAAM 2017). A 2021 surveys also found Feral pig activity near to crayfish sites (McCormack 2021). As <i>E. jagara</i> build their burrows in the stream bank, Feral pig activity could be very harmful to them and to the local water quality.
<b>Future threats – actual</b>	<b>Impact of threat</b>
Bushfire	The widespread nature of the recent fires has led to an inevitable discussion of the role of future climate change in increased fire risk. Climate projections for South East Queensland indicate the likelihood of harsher fire conditions, meaning that fires like those of 2019-2020 may not be unusual events in the near future (DEHP 2016). Because this species has such a small distribution (which will shrink further with climate change), and its entire distribution is very close to areas of proven fire risk, there is a real possibility of future extinction in the wild given more fires of similar and potentially even greater intensity, and at higher frequency. A drier climate will make rainforest habitat more likely to burn than previously. Level of future impact = high.
Feral pigs	Feral pigs will continue to provide a threat to <i>E. jagara</i> , both to individuals and to their general habitat quality.
<b>Future threats – potential</b>	<b>Impact of threat</b>
Climate change	<p>Climate change is a real threat to freshwater crayfish, which are very sensitive to changes in temperature and water availability, tend to be highly specialised, and often have limited distributions (Hossain et al. 2018). This combines to make them particularly vulnerable. Many <i>Euastacus</i> 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 (Ponniiah &amp; Hughes 2006).</p> <p>The Earth is warming rapidly. 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 the South East region of Queensland predicts significant, rapid future changes to climate (DEHP 2016). This includes higher temperatures, reduced rainfall, increasing drought, more extreme weather events, and harsher fire weather. All of this would be adverse for <i>E. jagara</i>, for the cool high-altitude rainforest to which it is restricted, and for the freshwater creeks in which it lives. The precise thermal tolerance of <i>E. jagara</i> is not known, but <i>E. sulcatus</i>, which lives nearby in similar habitat, becomes distressed at about 22°C, and is effectively incapacitated at 27°C (Bone et al. 2014). Thus, increased temperatures could severely impact <i>E. jagara</i>. Again, because of <i>E. jagara</i>’s highly restricted 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 event (fire, cyclone, flood, etc.) could potentially wipe out a population already reduced/weakened as a result of climate change. <i>E. jagara</i> may have already been adversely impacted by the drought that preceded the 2019-2020 bushfires, in particular at lower altitudes (McCormack 2021). Mass mortality has been recorded in <i>E. valentulus</i> about 80 kms to the east after a very intense rainstorm and flash flood which definitely killed hundreds, and probably thousands, of crayfish locally (Furse et al. 2012). Most of the individuals known to be killed in this event were about the same size as <i>E. jagara</i> (30-40 mm OCL). Level of future impact = high.</p>
Unauthorised collecting	The level of future unauthorised collecting is difficult to estimate. However, <i>E. jagara</i> ’s small distribution places it at a great risk of depletion of numbers from any level of exploitation or collection (legal or otherwise) and an accidental introduction of a pathogen during this collecting.

### \*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.

<b>Current threats</b>	<b>Abatement or recovery action underway</b>
Bushfire	To limit the risk of large bushfires, fuel-reduction burns and fuel monitoring are part of an active planned burning program undertaken by the managers of Main Range National Park. However, this work is currently limited by resources (S. Finlayson pers comm 2020).
Cane toads	Cane toad distribution in the Park is not being formally monitored (S. Finlayson pers comm 2020), but <i>ad hoc</i> occurrences are entered into WildNet.
Feral pigs	Incidental Feral pig trapping is undertaken by the National Park staff as time and resources allow (S. Finlayson pers comm 2020). There is evidence that the presence of dingoes may

	lessen the abundance of Feral pigs (Queensland Department of Environment and Science 2013). As there are also dog control programs, these may work at cross-purposes. Feral pig management activities may need to increase after bushfires, as even where <i>E. jagara</i> habitat does not burn, predation pressure from Feral pigs may increase as hungry pigs move out of adjacent burned areas.
	<b>Abatement or recovery action proposed</b>
Unauthorised collecting	Regular checks should be made of the internet to see if <i>E. jagara</i> are offered for sale, and if so the relevant parties prosecuted for illegal collecting. Obviously, anyone found collecting illegally should also be prosecuted, although no-one has been caught doing so in the Park to date (S. Finlayson pers comm 2020).
<b>Future threats – actual</b>	<b>Abatement or recovery action underway</b>
	<b>Abatement or recovery action proposed</b>
Bushfire	Detailed surveys should be made of any <i>E. jagara</i> sites should be made after bushfires. This would greatly improve our knowledge of how vulnerable this species is to both direct and indirect effects of fire (habitat degradation, water quality issues, predation pressure), and how well it can recover after bushfires in the future. There is a need to (a) understand the impact of fires on the species, (b) ensure that fire regimes in the area are appropriate for the species (e.g. not during breeding season when they are more active).
<b>Future threats – potential</b>	<b>Abatement or recovery action underway</b>
	<b>Abatement or recovery action proposed</b>
Climate change	Detailed monitoring of the health of both <i>E. jagara</i> populations (numbers, distribution, population dynamics, etc.) and its habitat (vegetation, water quality parameters such as temperature, etc.) should be undertaken to see if it is being adversely affected by the various factors associated with climate change. Species-specific thermal tolerance thresholds and environmental parameters (Richman et al 2015) are also important information for understanding <i>E. jagara</i> 's long-term extinction risk.

## 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.

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

## 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**?

- |                                     |  |  |  |
|-------------------------------------|--|--|--|
| <input type="checkbox"/> Extinct    | <input type="checkbox"/> Extinct in the Wild | <input type="checkbox"/> Critically Endangered | <input type="checkbox"/> Endangered            |
| <input type="checkbox"/> Vulnerable | <input type="checkbox"/> Near Threatened     | <input type="checkbox"/> Least Concern         | <input checked="" type="checkbox"/> Not listed |

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

- |                                     |   |  |  |
|-------------------------------------|---|--|--|
| <input type="checkbox"/> Extinct    | <input type="checkbox"/> Extinct in the Wild    | <input type="checkbox"/> Critically Endangered | <input type="checkbox"/> Endangered            |
| <input type="checkbox"/> Vulnerable | <input type="checkbox"/> Conservation Dependent |  | <input checked="" type="checkbox"/> Not listed |

## NOMINATED LISTING CLASS

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

- |                                     |  |   |                                     |
|-------------------------------------|--|---|-------------------------------------|
| <input type="checkbox"/> Extinct    | <input type="checkbox"/> Extinct in the Wild | <input checked="" type="checkbox"/> Critically Endangered | <input type="checkbox"/> Endangered |
| <input type="checkbox"/> Vulnerable | <input type="checkbox"/> Near Threatened     | <input type="checkbox"/> Least Concern                    | <input type="checkbox"/> 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?

- |   |   |                                   |  |
|---|---|-----------------------------------|--|
| <input type="checkbox"/> Genuine change of status   | <input checked="" type="checkbox"/> New knowledge | <input type="checkbox"/> Mistake  | <input type="checkbox"/> Other           |
| Taxonomic change - <input type="checkbox"/> 'split' | <input type="checkbox"/> newly described          | <input type="checkbox"/> 'lumped' | <input type="checkbox"/> 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 jagara* is being nominated as Critically Endangered because of its very small distribution (EOO = 24 km<sup>2</sup>) in a single location (upland rainforest of Mt. Range National Park), the entirety of which is increasingly threatened by bushfire, climate change and feral predators.

#### (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

Please complete as appropriate to the nomination

For this assessment it is 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%

<p>A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.</p> <p>A2 Population reduction observed, estimated, inferred or suspected in the past where the causes of the reduction may not have ceased OR may not be understood OR may not be reversible.</p> <p>A3 Population reduction, projected or suspected to be met in the future (up to a maximum of 100 years) [(a) cannot be used for A3]</p> <p>A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.</p>	<p><i>based on any of (a) to (e)</i></p>	<p>(a) direct observation [except A3]</p> <p>(b) an index of abundance appropriate to the taxon</p> <p>(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat</p> <p>(d) actual or potential levels of exploitation</p> <p>(e) the effects of introduced taxa, hybridisation, pathogens, pollutants, competitors or parasites</p>
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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.

Little data are available about the level or changes in population size of *E. jagara*, in the past, present, or projected into the future. There is anecdotal evidence of the possible impacts of drought preceding the 2019-2020 bushfires, that could have led to the local extinction of crayfish at two lower altitude (~750 m) sites that previously hosted the species, perhaps due to lower water levels impacting Rainforest Spinach (McCormack 2021). McCormack (2021) also reported a possible 10% contraction of the species distribution in Dalrymple Creek between 2009 and 2021. However, the local populations in the two fire impacted sites visited by McCormack (2021) appear healthy, so it is unclear on the overall impact of the fires across the whole species population.

Fire impact analyses by a team from the NESP TSR Hub (Legge et al. 2021), using remote sensing data (Commonwealth of Australia 2020), estimated that 47% of the range of *E. jagara* was affected by the 2019-2020 fires (19% percent was burnt in high to very high severity fire). A structured expert elicitation process was used to estimate the proportional population change for this species from pre-fire levels out to three generations after the fire, when exposed to fires of varying severity. These results, combined with the spatial analyses of fire overlap, suggest that three generations after the fire, the best estimate for the overall population decline relative to the pre-fire population is predicted to be 21%, but potentially as much as 53% (bound of 80 percent confidence limit). For comparison, experts also estimated the population change over time in the absence of fire; by three generations, the overall population after the fire was estimated to be 10% lower than it would have been had the 2019-2020 bushfires not occurred (Legge et al. 2021). The estimate of a

21% decline is marginally above the cut-off for the Near Threatened Category ( $\geq 20\%$ ). However, the estimated decline is sensitive to small differences in mapping for species with small distributions, and so could be an over or underestimate.

The data currently available are not strong enough to determine eligibility for this species for this criterion. However, it is likely that the population size will decline further in the face of climate change (especially with hotter weather and lower rainfall) since this species is a cool mountain specialist. 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 intense bushfires and Feral pig impacts. Given the current small size of this species' distribution, any further reductions will make it more susceptible to a single stochastic event which 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 km <sup>2</sup>	< 5,000 km <sup>2</sup>	< 20,000 km <sup>2</sup>	< 40,000 km <sup>2</sup>
B2. Area of occupancy (AOO)	< 10 km <sup>2</sup>	< 500 km <sup>2</sup>	< 2,000 km <sup>2</sup>	< 4,000 km <sup>2</sup>
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 jagara* meets Criterion B1 for **Critically Endangered (CR)** based on:

1) B1: EOO of 24 km<sup>2</sup> (actually 19.77 km<sup>2</sup>, but as the AOO is 24km<sup>2</sup>, EOO defaults to the AOO value as AOO is defined as an area within EOO). All calculated in GeoCat (Bachman et al. 2011). As this species is restricted to a linear-like stream and near-stream habitats, the actual area of habitation will be significantly smaller.

a: Known from single location (Fig. 1), namely the dense upland rainforest community of Main Range National Park. This is considered as a single location because the most serious plausible threats (bushfire, climate change) could impact the entire species population simultaneously. The fires of 2019-2020 covered a much larger area locally than the entire distribution of the species and covered all parts of the park, and engulfed or came near every known *E. jagara* site (DAWE 2020; Threatened Species Operations 2020). Similarly, climate change will affect the whole population equally, will reduce the area of occupancy, and will increase the chances and impact of future bushfires. The species presence in rainforest is also not considered protection from fire and climate change, given the burning of some rainforest areas witnessed in the 2019-20 bushfire season.

b(iii): Projected decline in area, extent and/or quality of habitat due to bushfires, climate change and Feral pigs. This decline could be slow (via climate change) or very rapid (via future severe bushfires).

2) B2: AOO of 24 km<sup>2</sup> which meets the Endangered (EN) category.

*Euastacus jagara* was previously assessed under IUCN criteria (Coughran & Furse 2010) as *Critically Endangered B1ab(iii)+B2ab(iii)*. Because new local sites have been discovered since this listing, its AOO is no longer less than 10 km<sup>2</sup> (now = 24 km<sup>2</sup>), so it no longer qualifies under B2 as Critically Endangered.

Subcriteria a and b(iii) apply. The threats previously listed of climate change and invasive species are still very concerning (perhaps even more so now), and the correlated threat of bushfire is now considered much more serious given the fire events of 2019-2020.

## 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
(a) OR				
(a) (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 determine a robust estimate of the number of mature individuals. The species is not eligible for listing under this criterion.

## 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 km <sup>2</sup> or number of locations ≤ 5	D2. Typically: AOO < 40 km <sup>2</sup> 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.

*Euastacus jagara* meets Criterion D2 for **Near Threatened (NT)**.

There are insufficient data to determine a robust estimate of the number of mature individuals, and so it cannot be assessed under Criterion D1. However, *Euastacus jagara* does qualify under Criterion D2 as Near Threatened. This is because its AOO is < 40 km<sup>2</sup> (24 km<sup>2</sup>) and locations ≤ 10 (1), and the combined threats of enhanced climate change, feral predators and bushfires 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.

No quantitative analysis has been done to estimate the probability of extinction. The species is not eligible for listing under this criterion.

## 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
- B1 (specify at least two of the following)  a)  b)  c); **AND/OR**
- Critically Endangered  B2 (specify at least two of the following, other than NT)  a)  b)  c)
- Criterion C
- estimated number of mature individuals **AND**
- C1 **OR**
- C2  a (i) **OR**  a (ii) **OR**

C2 b)

Criterion D

D1 **OR**  D2

Near Threatened

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.

This species has no known cultural significance to Indigenous groups. The species was named in Morgan (1988) for the Aboriginal language, Jagara (also known as Yuggera). The Main Range is at the western edge of this language area (Horton 1996).

### 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.).

As there is little background information on this species, research should focus on population assessment and monitoring, biology, life history, habitat requirements, distribution, taxonomy and resilience to invasive species (Coughran & Furse 2010; McCormack 2021). Further surveys should be undertaken to see how this species fared in the sites that were impacted by the 2019-2020 bushfires to assess its recovery and vulnerability to future events, in particular at lower altitude sites that may have already been impacted by drought (McCormack 2021). Because this species is entirely found within one national park (Main Range), which was heavily affected by the recent fires, resources are scarce due to the large amount of recovery work currently needed and being conducted there. Given this park also hosts a number of other fire-affected threatened species (mammals, birds, lizards; Threatened Species Operations 2020), it would be wise to allocate considerable resources to its recovery and the monitoring of the recovery of its biota, for example in weed and Feral pig control (McCormack 2021).

### 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. 4:** *Euastacus jagara* on the bank of Blackfellow Creek on 20 March 2017 (BAAM 2017).  
Authorised for use by Penn Lloyd (Director, BAAM) as long as BAAM acknowledged as owner of the image.

## 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 (originally submitted 10/3/2020) was formally peer-reviewed by Dr. James Furse, and was read and approved by Dr. Jason Coughran and Robert McCormack (all contact details below). The minor revision (submitted 3/6/2021) has also been peer-reviewed and approved for submission by Dr. James Furse.

A number of experts were consulted in preparing this nomination, all of whom kindly provided information, advice and guidance. These include Rob McCormack (Australian Aquatic Biological), Jason Coughran (Sheridan College), James Furse (Griffith University), Jon Marshall (Water Planning Ecology), Steve Finlayson (Ranger in Charge, Main Range Base), Ben Cook (frc environmental), Penn Lloyd (BAAM Ecology), Sarah Legge (Australian National University), Nick Whiterod (Aquasave), Ofalia Ho (Department of Environment and Science), Courtney Duncan (Queensland Herbarium), Peta Maidens (Queensland Parks and Wildlife Service), Jodi Mehrtens (Queensland Parks and Wildlife Service), John Neldner (Queensland Herbarium), and Adrian Borsboom (Queensland Herbarium).

This nomination was prepared using Borsboom (2019) as a guide.

- Dr. James M. Furse  
Griffith Centre for Coastal Management
- Robert B. McCormack  
Australian Aquatic Biological P/L
- Dr. Jason Coughran  
Sheridan College

## 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)

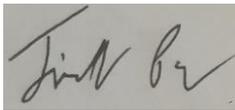
Griffith University

### 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:



Date: 10/03/2020 (original submission)

03/06/2021 (minor revision)

*\* If submitting by email, please attach an electronic signature*

## Lodging your nomination

Completed nominations may be lodged either:

1. by email in Microsoft Word format to: [SpeciesTechnical.Committee@des.qld.gov.au](mailto: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.**

Suggested citation:

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