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 Queensland *Nature Conservation Act 1992* (NC Act). Any subspecies, variety, race, hybrid, mutation or geographically separate population (hereafter 'species') can be nominated. The appropriate wildlife class will be selected during an expert assessment process and, following approval processes, reflected in the next suitable update of the NC Act Regulations.

A species may be nominated to an appropriate wildlife class from any other wildlife class. The nomination assessment process may result in a species being recommended to the wildlife 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 (excluding fish) native to Queensland are Protected wildlife under the NC Act and classified as Least Concern unless found eligible for a different wildlife class. Under the NC Act, a plant is defined as any member of the plant or fungus kingdom. Fish (which are managed under the Queensland *Fisheries Act 1994*) and invertebrate species are only protected under the NC Act if specifically named under a wildlife class. A species can be nominated for listing or reassignment from any wildlife class to:

A national class or category of threatened wildlife:

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

A Queensland class of non-threatened wildlife:

- 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 size and dynamics, geographic distribution, or threats.
- Least Concern (LC) if evidence is provided that no criteria for a higher class have been met, and the species will not 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.

To nominate a species with an Australian distribution that is not restricted to Queensland, use the Commonwealth nomination form and guidelines at and email the completed form to the Australian Government at EPBC.nominations@environment.gov.au.

Nomination to change the conservation class of a species in Queensland

Nominations to transfer a species from a threatened wildlife class to LC or NT under the NC Act may leave sections marked with an asterisk (*) blank.

TAXON DETAILS

Scientific name of species

Petrogale purpureicollis

Common name(s)

Purple-necked rock-wallaby

Taxonomy

Diprotodontia, Macropodidae

Le Souef, A.S. 1924. Notes on some rock wallabies, genus Petrogale, with descriptions of two new species. *Australian Zoologist* 3: 272-276.

The species has undergone taxonomic upheaval since the original description in 1924. They were historically classified as various species, including brush-tailed rock-wallaby (*Petrogale penicillata*), black-footed rock-wallaby (*Petrogale lateralis*), and unadorned rock-wallaby (*Petrogale inornata*). The classification of this species was confirmed by molecular data in 2001:

Eldridge, M. D. B., Wilson, A. C. C., Metcalfe, C. J., Dollin, A. E., Bell, J. N., Johnson, P. M., Johnston, P. G. & Close, R. L., 2001. Taxonomy of rock-wallabies, Petrogale (Marsupialia : Macropodidae). III. Molecular data confirms the species status of the purple-necked rock-wallaby (*Petrogale purpureicollis* Le Souef). *Australian Journal of Zoology,* 49**,** 323.

Synonyms: *Petrogale lateralis purpureicollis*

*Conventional acceptance of taxonomy

☒ Yes

☐ No

*Evidence of taxonomic distinctness (if answered 'No' above)

Type of evidence

☐ 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 with relevant expertise (i.e., someone who has worked with, or is a published author on, the group of species nominated) that the specimen is considered a new species.

Evidence

Not applicable

*Description

Full description: as in Le Souef (1924), "*Fur short, and very soft. General colour above pale grey (about light drab), irregularly marbled with black or brown, interspersed with flecking of a shade of buff; the colours tending to form short lines. Under surface a lighter buffy-grey. Hair on the back of the neck radiating laterally from the centre and washed with brownish vinaceous with grey tending to predominate on the nape, whereas the former colour predominates on the down, fading into a lighter wash on the cheeks and throat. A dark brown mark commences before and extends over the eye to the ear base. Nose, from tip to the front of eye, darker than the*

rest of the head. There is a paler patch under the eye, which does not form a cheek stripe. Ears parti-coloured behind; upper forepart of the outside dark mummy-brown; lower forepart and entire posterior half of outside of the ear lighter, brownish-buff. No lateral stripe is discernible, though, as usual, the sides are lighter. Edging the back of the shoulder and extending onto the side is a strongly defined irregular patch of the blackish-brown; the outer edge of this patch is dark tawny-brown, which colour extends down the back of the arm. Front of arm, cinnamon-buff, suffused with tawny-olive; paws, sayal brown, outer digits blackish-brown, which gives way to rich dark brown on the inner ones. A prominent blackish-brown streak commences a little below or on the knee and extends over the knee and up the side almost half-way to the wither. The outside of the hip is lighter, but there is no distinct stripe. Front of legs tinged with buffy-grey. The foot is light ochraceous-buff near the ankle, pencilled with brown, which Is darker along the centre of the foot, grading into blackish-brown on a level with the toes; the hairs are black on the longest toe. Tail short-haired to about the terminal fourth, upon which the hairs gradually lengthen, forming a slight tuft at the tip; general colour of proximal two-thirds tawny-olive, pencilled with grey, buff and brown, the terminal third gradually darkening from blackish-brown to black at the tip."

Short description: as in (Eldridge, 2012): "*This medium-sized rock-wallaby has a head and body length of 390–610 mm and a tail length of 445– 580 mm. It weighs 3– 7 kg, with males being larger than females. It is generally light grizzled brown (greyer in winter), with darker points and a paler underside and has distinct cheek and mid-dorsal head-stripes. It has characteristic purple pigmentation over the face, head, neck and shoulders that varies in intensity, from a faint pink wash to bright red/purple. The pigmentation also varies in coverage, from being confined to the head to extending well down the shoulders. The pigment is removable and water soluble*."

Distribution

Petrogale purpureicollis occurs along a series of ranges scattered from near Winton, north-west to Mount Isa, Cloncurry and beyond Boodjamulla National Park, almost to the NT border (Figure 1). They are common in the centre of their distribution (Mount Isa, Cloncurry and Dajarra) but rare to the north-west (Boodjamulla NP) and south-east (Winton region). They may occur further west, into the Northern Territory (Calvert River area) (Eldridge et al. 1993; Johnson et al. 2001; Eldridge 2003); however, to date survey effort in the Calvert River area has identified only *P. wilkinsi* (Jarrad Barnes, pers. comm., 2023).

The species occurs predominantly in, or near to, the Northwest Highlands bioregion**,** with some occurrences in Mitchell Grass Downs and Channel Country bioregions within the south-easterly part of their range (Figure 2). The species occurs on the lands of the Kalkadoon, Mitakoodi, Yalarrnga, Waanyi, Bularnu Waluwarra, Wangkayujuru, Koa and Indjalandji-Dhidhanu People, represented by the Kalkadoon Native Title, Yulluna Native Title, Waanyi Native Title, Bularnu Waluwarra Wangkayujuru, Guwa-Koa and Indjalandji-Dhidhanu Aboriginal Corporations.

Extent of Occurrence and Area of Occupancy

The species has an Extent of Occurrence (EOO) of 114,512km^2 (Figure 1) and Area of Occupancy (AOO) of 916km^2, calculated using a 2km x 2km grid cell (AOO) and a minimum convex polygon (EOO). Species' occurrence data presented in this document are a compilation of 370 expert verified occurrence records obtained from WildNet (2023), Queensland Museum (Atlas of Living Australia 2023) and the Biodiversity Assessment Team (2023). Occurrence records with poor precision (> 2 km) were omitted from analysis, as well as records with poor locality descriptions (when precision data was unavailable; Table 2). The species was first collected in 1924 and most recently collected in 2022. Of the points used to calculate EOO, phylogenetic analysis of specimens has confirmed the presence of this species at both the most eastern (Winton area) (Johnson et al., 2001) and north-western (Boodjamulla National Park) records (Eldridge et al., 1993), and the most southern occurrence record (single record of a colony) has been confirmed by photographs (Rod Fensham, pers..comm., 2023).

Subpopulations

Petrogale purpureicollis are considered in this assessment to occur within 11 (white polygons; figure 3) to 56 subpopulations (coloured clusters plus single records outside of clusters; figure 3). The subpopulations identified in this assessment were delineated according to the distance of separation between clusters of records, the likelihood of suitable habitat between the clusters, surrounding topography and the likely dispersal capacity of the species (see biology). White polygons encircle clusters of occurrence records that appear to be connected by potential habitat in which there has been unknown survey effort. It is likely that additional unrecorded sites occur between the currently known sites, although it is also plausible that many fragmented subpopulations exist, as with other *Petrogale* spp. (Potter et al., 2012a; Potter et al., 2012b).

Population size

The population size of the species has not been studied. However, past assessments have considered the population to comprise approximately 25 subpopulations with approximately 500 individuals per subpopulation; totalling 12,500 individuals (Burbidge and Woinarski, 2016; Woinarski et al., 2014). The Yalarrnga (Yulluna) People have observed declines in colony size and contractions in presence on their Country across three generations (L. Sullivan, pers. comm., 2023). Yalarrnga Country covers the southwestern part of the species range. Information on the species' abundance is held by the Yalarrnga People as the species is embedded in men's initiation and cultural practices (Papp, 2023). Given these observations on colony size across part of the species range, it is considered likely that the current population size has decreased since the last estimate, and that the current population size is below 10,000 mature individuals.

Declines are suspected in the north-west range of the species and are documented in the south-east (Burbidge and Woinarski, 2016; Woinarski et al., 2014) and southwest (L. Sullivan, pers. comm., 2023). Extirpation of the species is suspected at Manhole waterhole and Bladensburg National Park (near Winton) as there have been no records at these localities since 1975 (Johnson et al., 2001). This region is now possibly restricted to colonies on Mountain View Station that adjoins Bladensburg National Park (Johnson et al., 2001). There are several other subpopulations that have no occurrence record data from within the last 18 – 21 years (three-generations; table 1). However, further survey effort is required to determine if the species persists at these sites.

Land use and presence in conservation estate

Most of the distribution range of *P. purpureicollis* is classified as 'grazing native vegetation' (Figure 4); land on which domestic stock are grazed on pastures that have had no deliberate pasture modification, although some change in species composition may have occurred (<50% non-native pastures; ABARES, 2016). Protected areas only make up a small proportion of the distribution range of the species, and only 12% of occurrence records occur in conservation estates (Figure 4). Most of their distribution range is under active mineral exploration permits (Figure 5). Many records occur within active mining leases (27%; Figure 5) or in areas with granted mineral mining exploration permits (66%). Most of the distribution range of *P. purpureicollis* is land mapped as remnant, 'least concern' (95% of occurrence records; Figure 6).

To determine land use areas, occurrence records were overlaid on the QLD land use map (2019). Land use is classified according to the Australian Land Use and Management Classification (ABARES, 2016).

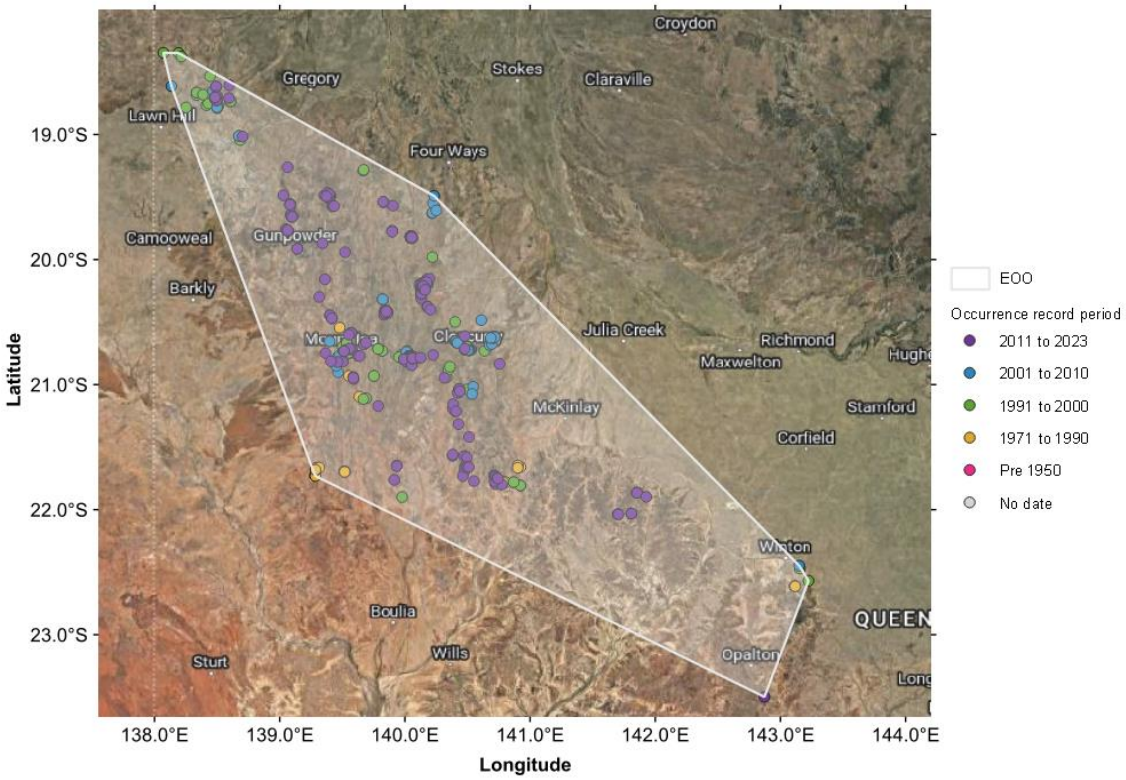

Figure 1. *Petrogale purpureicollis* populations occur along an interconnected series of ranges scattered from near Winton, north-west to Mount Isa, Cloncurry and beyond Boodjamulla National Park, almost to the NT border. The species has an Extent of Occurrence (EOO) of 114,512 km^2 , calculated using a minimum convex polygon (EOO).

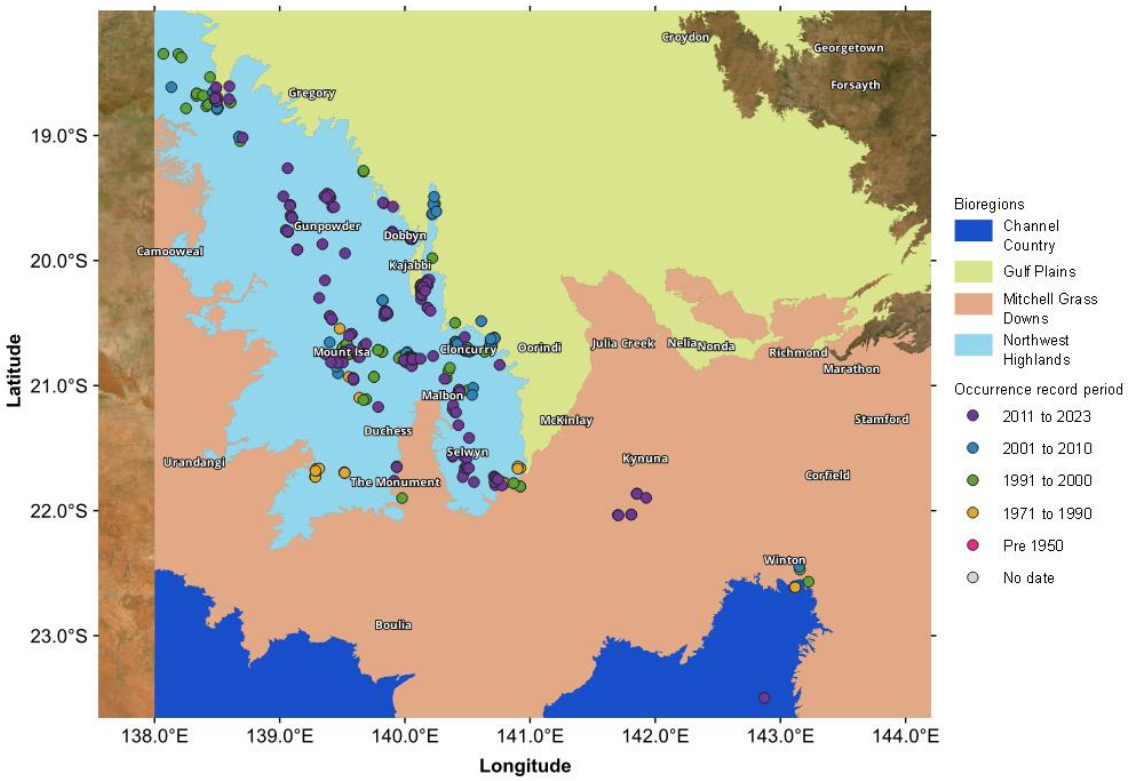

Figure 2. The species occurs predominantly in, or near to, the Northwest Highlands bioregion, with some occurrences in Mitchell Grass Downs and Channel Country bioregions within the south-easterly part of their range.

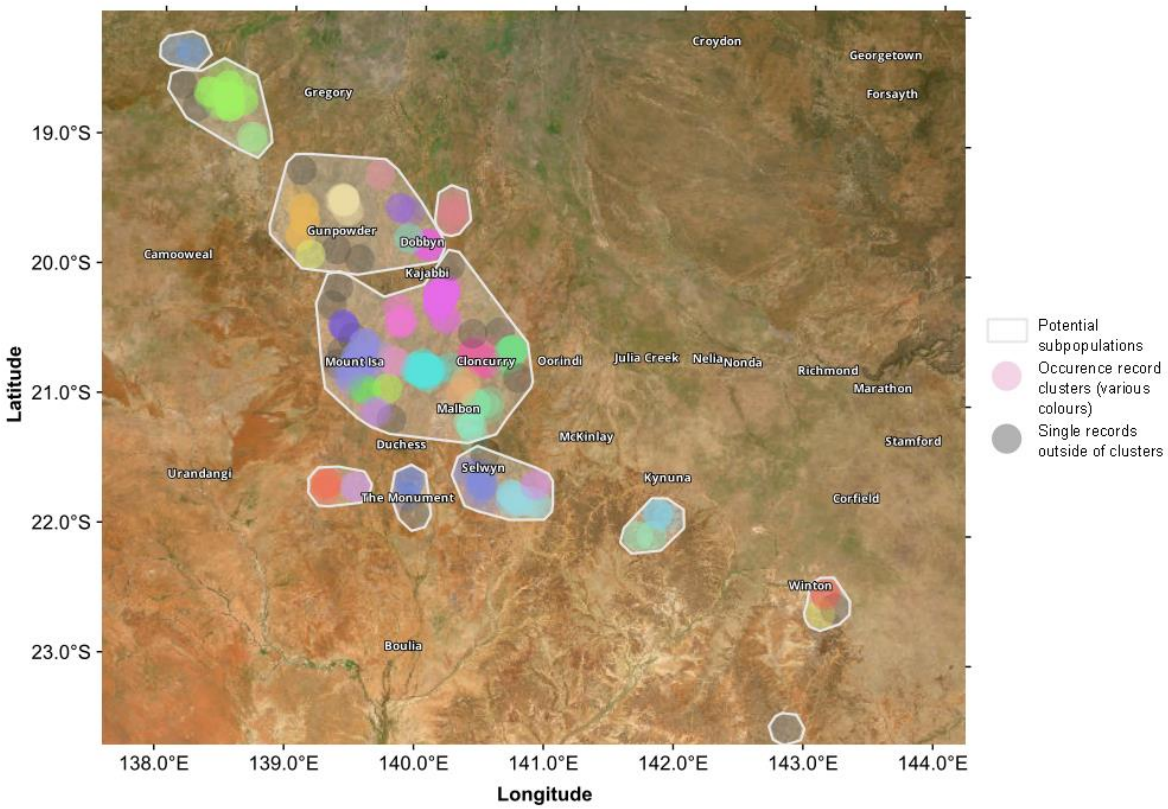

Figure 3. *Petrogale purpureicollis* are considered in this assessment to occur within 11 (white polygons) to 56 subpopulations (coloured clusters plus single records outside of clusters). The subpopulations identified in this assessment were delineated according to the distance of separation between clusters of records, the likelihood of suitable habitat between the clusters, surrounding topography and the likely dispersal capacity of the species (see biology). White polygons encircle clusters of occurrence records that appear to be connected by potential habitat in which there has been unknown survey effort.

Table 1. Summary of records by potential subpopulations (bold) and record clusters. Record clusters and potential subpopulations in which the species has not been recorded in the last three generations have been highlighted in orange (potential subpopulations 3 of 11, record clusters 12 of 56). Subpopulation and record clusters identifying names are based upon the most used location descriptor on the occurrence record.

Subpopulation	Record cluster	First record	Latest record	Number of records
Boodjamulla		**1991**	**2019**	**37**
	Boodjamulla	1991	2019	31
	Single record outside clusters	1991	2003	2
	Riversleigh	1994	2019	4
Boodjamulla - North		**1994**	**1994**	**3**
Chidna region		**1991**	**2022**	**56**
	Chidna	2010	2011	15
	Gidya Creek Spring	1991	1991	2
	Gleeson	2016	2016	3
	Lady Annie Mine	2012	2012	2
	Lady Loretta	2009	2022	12
	Lake Julius Rd	2018	2019	17
	Mount Watson	2003	2015	2
	Single record outside clusters	2012	2019	3
Dajarra		**1976**	**1986**	**10**
	Dajarra	1976	1985	7
	Dajarra East	1985	1986	3
Kynuna		**2020**	**2020**	**8**
	Kynuna N	2020	2020	4
	Kynuna S	2020	2020	4
Mount Dromedary		**1994**	**2008**	**6**
Mount Haystack		**2011**	**2011**	**1**
Mount Isa/Cloncurry		**1948**	**2022**	**208**
	Barkly HWY	1993	1999	4
	Black Mountain	1979	1994	3
	Brightlands Stn	1993	2018	4
	Cloncurry	1994	2013	21
	East Leichhardt River Range area	1994	1994	2
	Knapdale Ranges	2002	2019	36
	Monakoff project	1994	2008	12
	Mount Colin	1979	2019	48
	Mount Isa	1993	2022	37
	Mount Olive	2007	2014	10
	North Greenmount	1995	2011	8
	Single record outside clusters	1988	2019	10
	Rifle Creek Dam	1948	2019	4
	South Greenmount	2011	2019	5
	Xstrata Mine	2005	2019	4
Selwyn/Kirby Ranges		**1976**	**2019**	**31**
	Black Rock	1976	1976	3
	Single record outside clusters	2019	2019	1
	Selwyn Mine	2001	2019	11
	Squirrel Hills	1976	2011	16
Tick Hill		1990	2013	4
	Single record outside clusters	1996	1996	1

	Tick Hill	1990	2013	3
Winton		1974	2001	5
	Bladensburg NP	1974	1976	2
	Mountain View Stn	2000	2001	2
	Single record outside clusters	2000	2000	1

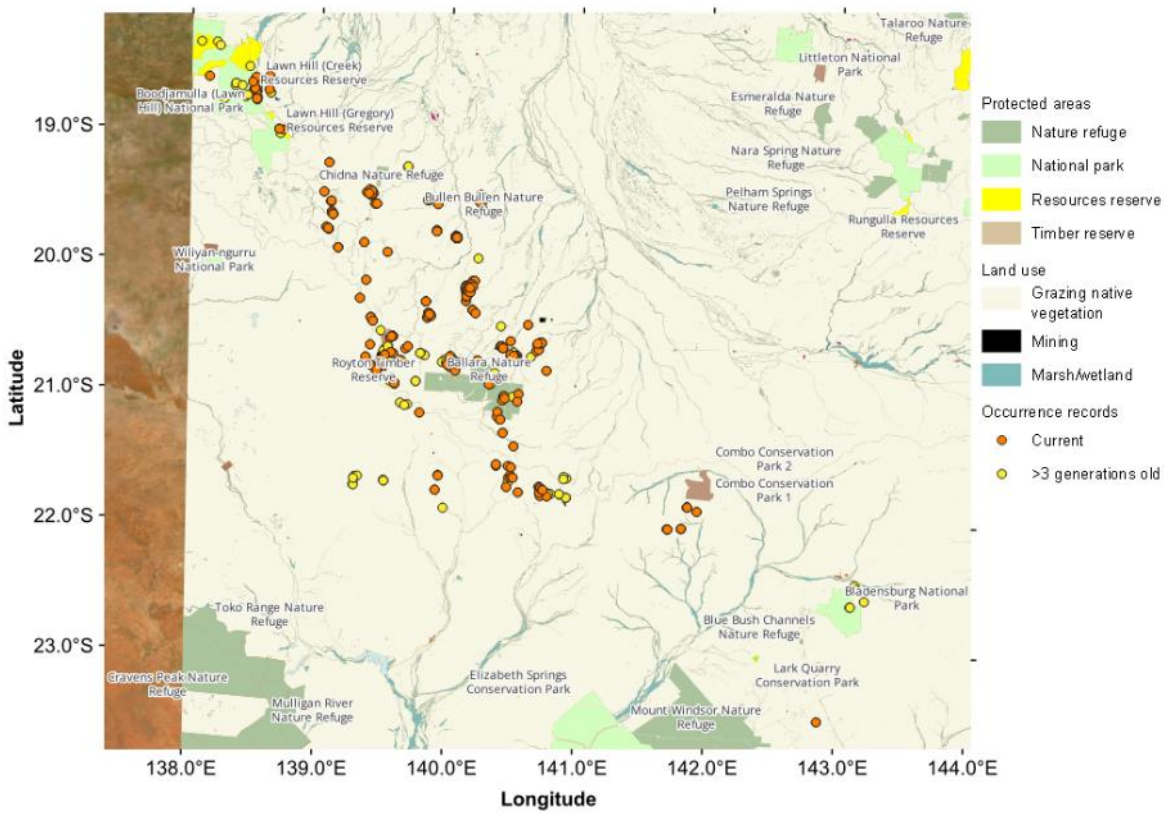

Figure 4. Most of the distribution range of *P. purpureicollis* is classified as 'grazing native vegetation', and most occurrence records fall within this land use type (79%). Protected areas only make up a small proportion of the distribution range of the species, and only 12% of records occur in conservation estates (Figure 4). Occurrence records have been classified as either current (within the last three generations, 18 – 21 years) or >3 generations old (older than 21 years).

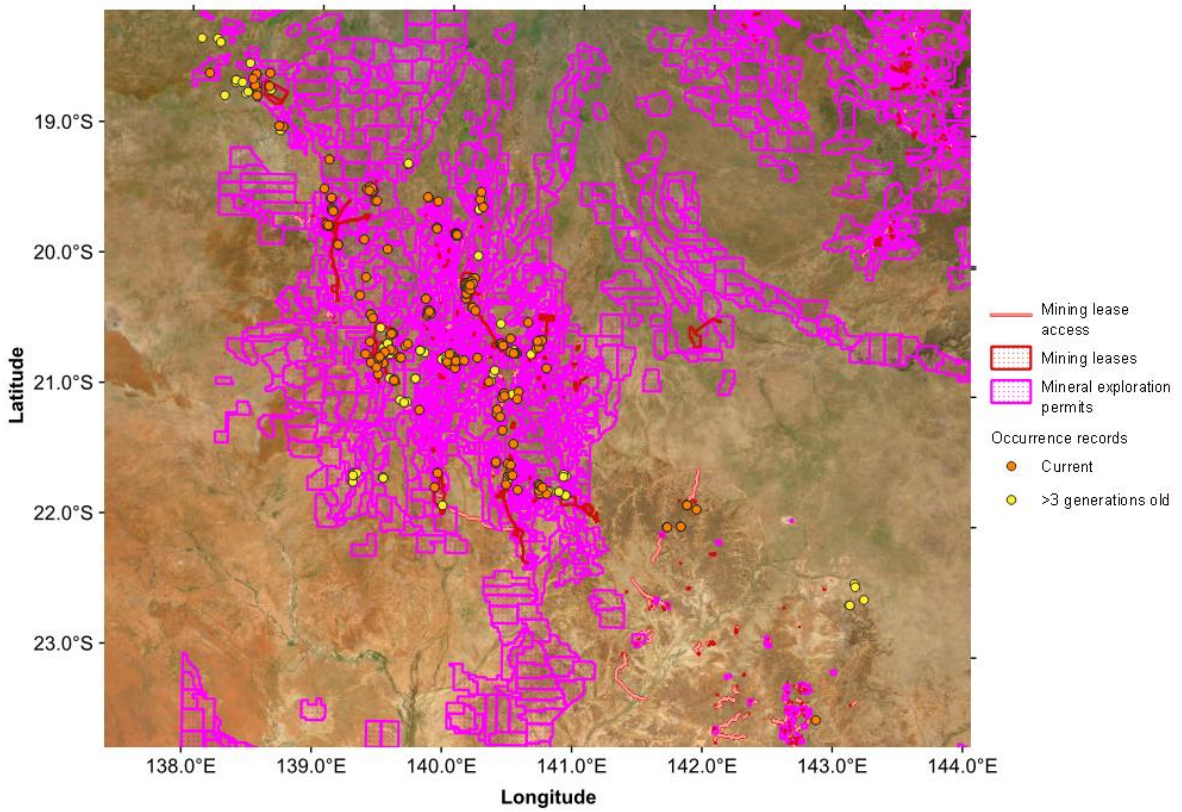

Figure 5. Most of the distribution range of *P. purpureicollis* is under active mineral exploration permits (pink polygons). Most occurrence records fall either within active mining leases (27%; red polygons) and/or areas with mineral mining exploration permits (66%; pink polygons).

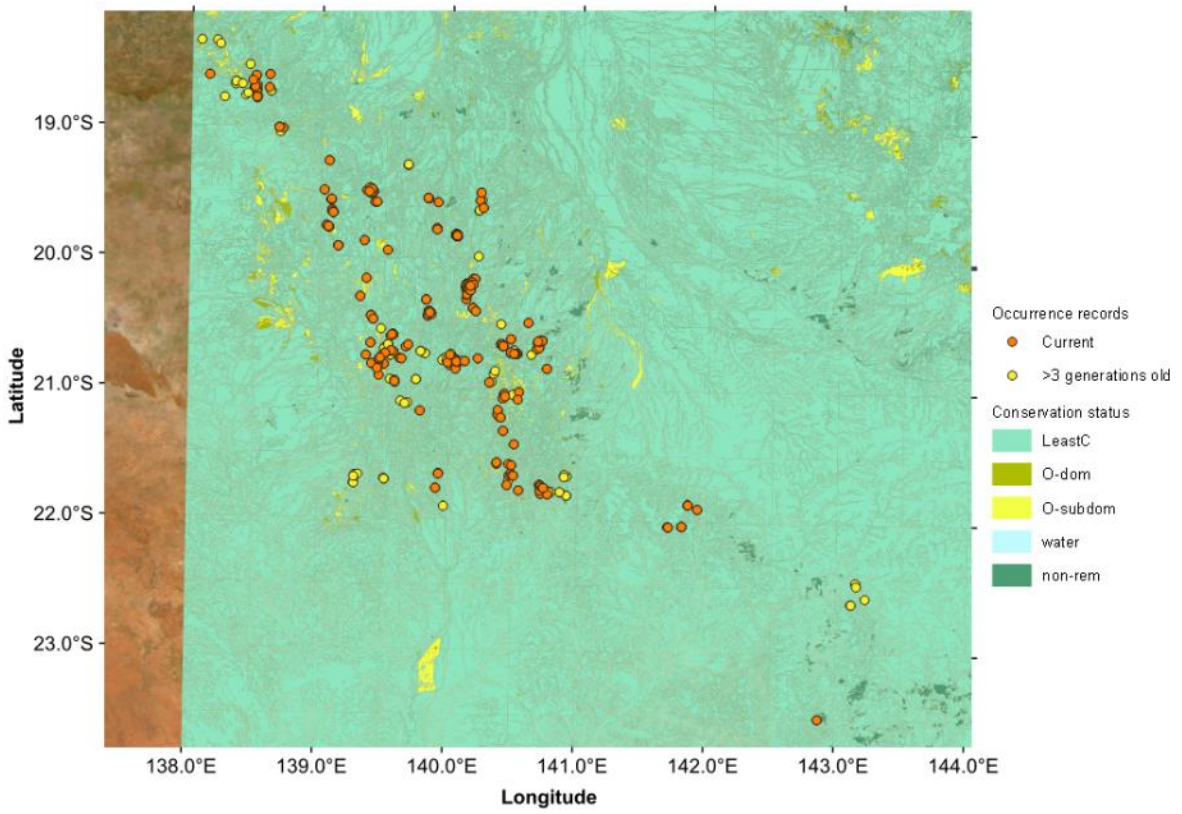

Figure 6. The majority of *P. purpureicollis* distribution range is mapped as remnant, 'least concern' habitat (95% of occurrence records).

Biology/ecology

Habitat

Petrogale purpureicollis occurs mostly on limestone, sandstone and quartzite outcrops, boulder piles, cliffs and gorges, as well as rocky slopes and gullies (Eldridge, 2012). The main restriction for presence is the location of suitable shelters; the species requires outcrops with internal crevasses or cave systems (I. Papp, pers. comm., 2023). Some colonies live across clustered contiguous outcrops, and others live on single outcrops that are relatively discrete (I. Papp, pers. comm., 2023). They do not use the larger exposed caves on the outside of outcrops as they are outcompeted for these refuge sites by Euros (*Osphranter robustus,* I. Papp, pers. comm., 2023). For large resilient colonies to persist they require shelters that can house multiple individuals.

The species occurs predominantly in broad vegetation groups composed of mostly *E. leucophylla* (Cloncurry box) and *Eucalyptus leucophiola* (snappy gum) with a *Triodia* spp. understory (Regional Ecosystems 19a [52% of occurrence records] and 19b [23% of records]); (Queensland Herbarium, 2021). Wildfire and planned fires occur throughout the range of *P. purpureicollis* at variable frequencies (Figure 8), with fire frequency being of the highest intensity across the north-western part of their range. Most occurrence records for *P. purpureicollis* are in habitat with low fire frequency (two or less fires since 2000); of occurrence records since 2000 (285 occurrence records), 36% occur in habitat that has had no fires since 2000, 32% one fire, 29% two fires, and, 3% three fires.

To determine broad vegetation groups, location records were overlaid on the Remnant 2019 Broad Vegetation Groups of Queensland map, v. 5.2 (State of Queensland, 2023). Broad Vegetation Groups (BVGs) are described further in the document 'Vegetation of Queensland' (Neldner et al., 2019).

Reproduction

*Petrogale purpureicollis y*oung are born after a 33–35 day gestation period, and remain in the pouch for 6 months, followed by 3–6 months at foot before being fully weaned (Eldridge, 2012). The species breed throughout the year (Eldridge, 2012) although Yalarrnga traditional knowledge indicate that young emerge from pouches at the start of the wet season (I. Papp, pers. comm., 2023).

Life cycle and generation length

Females of *P. purpureicollis* mature at 18 months and males at 22 months (Eldridge, 2012), with a median maturation age of 1.7 years. While there are no data on the longevity of *P. purpureicollis,* the estimated longevity of wild *Petrogale* spp. range from 10 to 12 years.

Age of first reproduction + (0.5 * length of reproductive period)
1.7 years + (0.5 * 8.3 – 10.3 years) = ~6-7 years generation length

The calculated three generation length for *P. coenensis* is ~18 - 21 years.

Feeding and movement

Petrogale purpureicollis are broadly herbivorous, feeding on a combination of grass, forbs and browse from a diversity of plant species, and occasionally insects (Eldridge, 2012; Papp, 2023). They eat all plant parts, from fruit, seeds, roots, shoots and leaves (Papp, 2023). There is a focus on fruiting species within their diets, including the fruit of Solanaceae species. Yalarrnga people hold records of *P. purpureicollis* digging for the root of 'jungulla' / 'native mint' (an aromatic native daisy, *Pterocaulon serrulatum*) and a range of other species (Papp, 2023). The species has also been found to eat a range of seeds, including *Acacia* seeds and pods e.g., *Acacia chisholmi* (Papp, 2023).

Petrogale purpureicollis shelter in cool rocky refuges during the day, emerging around dusk or later to feed in the surrounding woodland on outcrops and adjacent flats (Papp, 2023). In cool weather, they sunbathe in the morning and late afternoon (Eldridge, 2012). Being social, they can be found in colonies of over 20 individuals (Eldridge, 2012). However, colonies are frequently only 5-6 adults, and large colonies of over 20 individuals are likely restricted to outcrops with many suitable refuge caves (I. Papp, pers. comm., 2023). There are no studies on the movement ecology of *Petrogale purpureicollis.* However, among other *Petrogale* spp. males of *P. lateralis* are documented to have dispersed 12 km between two study populations (West et al., 2018) and low genetic differentiation was present between populations of *P. brachyotis* separated by 67 km of largely continuous habitat (Potter et al., 2012b). We have used 12 km radius around record clusters to represent the dispersal capacity of *P. purpureicollis* (Figure 3).

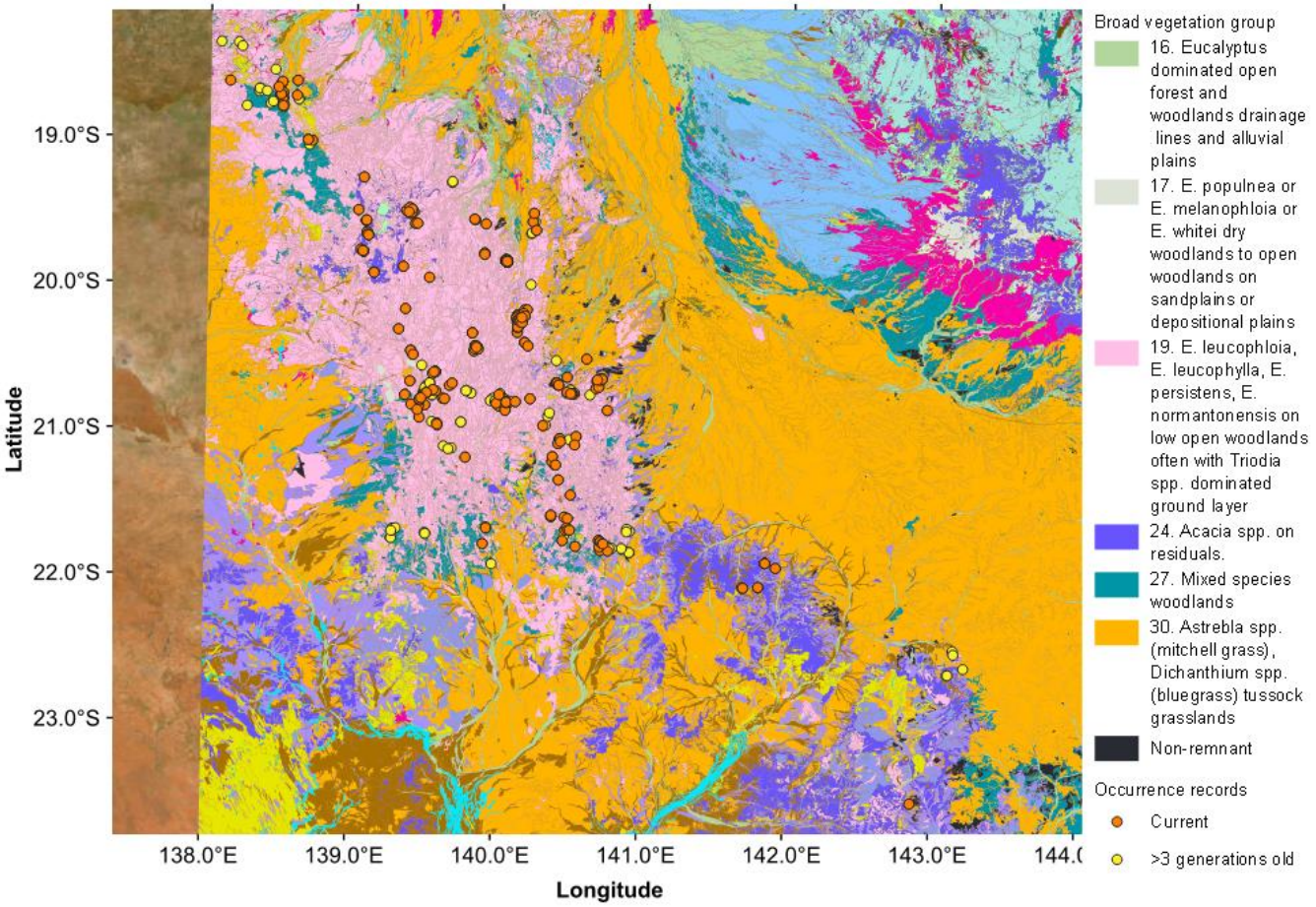

Figure 7. Occurrence records for *P. purpureicollis* most frequently occur in vegetation composed of mostly *E. leucophylla* (Cloncurry box) and *Eucalyptus leucophloia* (snappy gum) with a *Triodia* spp. understory (Regional Ecosystems 19a [52% of occurrence records] and 19b [23% of records]); (Queensland Herbarium, 2021).

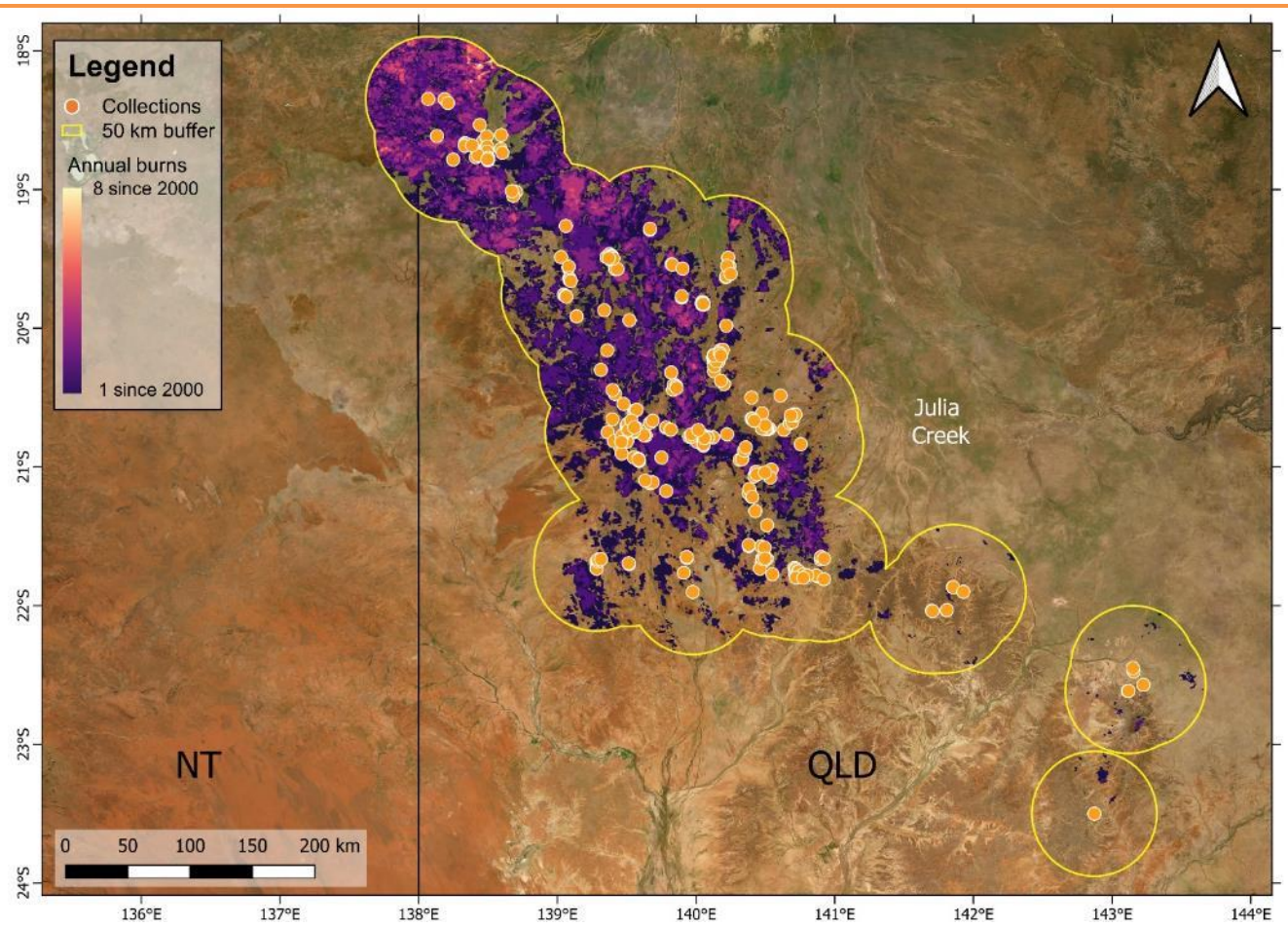

Figure 8. Annual burned areas since 2000 via MODIS MCD64A1 across the distribution of *P. purpureicollis*. Most occurrence records for *P. purpureicollis* are in habitat with low fire frequency (two or less fires since 2000); of occurrence records since 2000 (285 occurrence records), 36% occur in habitat that has had no fires since 2000, 32% one fire, 29% two fires, and, 3% three fires.

THREATS

Identification of known threats and impact of the threats

[a]Threat status definitions
Mechanism: identifies whether the threat is direct or indirect
Timing: identifies the temporal nature of the threat (past, current and/or future)
[b]Confidence: identifies the nature of the evidence (observed, estimated, projected, inferred, or suspected)
[c]Likelihood: identifies the likelihood of the threat impacting on the whole population or extent of the species or a part thereof
[d]Consequence: identifies the severity of the threat
Trend: identifies the extent to which it will continue to operate on the species (decreasing, static, increasing, unknown)
Extent: identifies its spatial context in terms of the range of the species (entire range, part of range, unknown)

[b]Parameters for Confidence are defined as follows:
Observed: based on census data (i.e., all individuals in population counted)
Estimated: based on statistical assumptions (i.e., sample of population)
Projected: based on statistical assumptions and projected into time or space
Inferred: estimated from indirect evidence on variables of same type
Suspected: estimated from indirect evidence on variables of different type

[c]Parameters for Likelihood are defined as follows:
Almost certain: expected to occur every year
Likely: expected to occur at least once every five years
Possible: might occur at some time
Unlikely: known to have occurred only a few times
Unknown: currently unknown how often the threat will occur

[d]Parameters for Consequence are defined as follows:

Not significant: no long-term effect on individuals or populations
Minor: individuals are adversely affected but no effect at population level
Moderate: population is stable or beginning to decline
Major: population decline is ongoing
Catastrophic: population trajectory close to extinction

Add or delete additional table rows as required.

Threat	[a]Status	Evidence
IUCN Threat 3. Energy production & mining *3.2 Mining & quarrying*	Mechanism: direct and indirect Timing: past, current, future Confidence: inferred Likelihood: almost certain Consequence: major Trend: unknown Extent: part of range Risk: very high	Mining and quarrying can cause extensive ecological damage through habitat clearing and degradation through the creation and maintenance of infrastructure. Beyond the direct impact of the mine footprint, potential secondary impacts should be considered, such as the movement of weeds (Threat 8.1.2 Weeds), elevated populations of exotic predators (Threat 8.1.2 Cats), increased road traffic and extraction and/or contamination of water. The development of tracks during mining exploration activities also facilitates the spread of weeds (Threat 8.1.2 Weeds). In addition to the direct impact, mining activity may also decrease the dispersal capacity of this species by creating barriers to migration and increase inbreeding in isolated subpopulations (Threat 8; loss of genetic diversity). The Yalarrnga People have documented declines in colony size at mine sites on their Country in the southern part of the species range, e.g., Monument, Squirrel Hills, Duchess, Castle Rock and Amythest hills mine sites (L. Sullivan, pers. comm., 2023). Mining actively occurs within the range of *P. purpureicollis* (Figure 5; red polygons) and much of the species range is under mineral exploration permits (Figure 5; pink polygons). As such, the associated impacts of any current or future mining and exploration activities affect nearly the entire range of the species.
IUCN Threat 2. Agriculture and aquaculture 2.3 Livestock farming and ranching 2.3.2 Small-holder grazing, ranching or farming (*Habitat degradation by production animals*)	Mechanism: indirect Timing: past, current, future Confidence: inferred Likelihood: likely Consequence: major Trend: unknown Extent: entire range Risk: very high	Livestock production industries are responsible for habitat degradation. The impact ranges from the direct impacts of land clearing for conversion to exotic pastures, overgrazing and trampling, to indirect impacts such as the introduction of weeds (Threat 8. Weeds), changes to fire regimes (Threat 7.1), changes to floristic structure, altered hydrological flows and impacts on soil stability. Overgrazing by domestic livestock is one of the most serious threats to rocky outcrop vegetation, especially by goats and sheep (Michael and Lindenmayer, 2018). Browsing stock simplify floristic diversity, which may negatively impact forage availability for *P. purpureicollis,* as they are known to have floristically diverse diets (Papp, 2023). Yalarrnga people have observed the decline of fruiting species at traditional camps on stations (L. Sullivan, pers. comm., 2023). Adding to this, excessive grazing by production animals may increase predation threats for rock-wallabies (Threat 8, predation by cats) as they forage further from their rocky refuges to meet their dietary requirements (Hayward et al., 2011; NESP Threatened Species Recovery Hub, 2021).

Threat	[a]Status	Evidence
		Most of the range of *P. purpureicollis* is land classified as 'grazing native vegetation' (Figure 4; ABARES 2016), and sheep and cattle are farmed on un-improved pastures in much of the region. The extent of livestock grazing and impact on *P. purpureicollis* and their habitat has not been documented.
IUCN Threat 8. Invasive and other problematic species, genes and diseases 8.1 Invasive non-native/alien species/diseases 8.1.2. Goats (*Capra hircus*) 8.1.2. Camels (*Camelus dromedarius*) 8.1.2 Horses (*Equus caballus*) 8.1.2. Cattle (*Bos taurus/indicus*) *(Competition with and habitat degradation by feral herbivores)*	Mechanism: direct and indirect Timing: past, current, future Confidence: observed Likelihood: likely Consequence: major Trend: unknown Extent: part of range Risk: very high	Feral herbivores, such as feral goats, camels, cattle and horses, degrade habitats and alter native plant communities through soil damage and overgrazing (DEWHA, 2008a). Overgrazing may modify floristic structure and increase unpalatable forage (DCCEEW, 2016) or decrease the availability of fruiting species that are utilised by *P. purpureicollis* (L. Sullivan, pers. comm., 2023). Alongside this, they may degrade water quality (Csurhes et al., 2016) and/or decrease the persistence of water points (NRM Ministerial Council, 2010). Interaction with other threats, such as fire (threat 7.1.1), weed incursions (threat 8.1.2) and production animals (threat 2.3.2), may exacerbate these effects. Goats (*Capra hircus*) have been listed as a Key Threatening Process under the EPBC Act (DEWHA, 2008a). Goats are documented to compete with *Petrogale* spp. for both forage and refuge in rocky outcrops (Hayward et al., 2011; Johnson et al., 2001; DCCEEW, 2016). Excessive grazing by introduced herbivores may also increase predation threats for rock-wallabies (Threat 8, predation by cats and foxes) as they forage further from their rocky refuges to meet their dietary requirements (Hayward et al., 2011; NESP Threatened Species Recovery Hub, 2021). Goats, both managed and unmanaged, occur throughout the south-easterly range of *P. purpureicollis* (Centre for Invasive Species Solutions, 2023a). Overgrazing by goats has been documented as the cause of extirpation of *P. purpureicollis* from "Man hole" waterhole and Bladensburg National Park in the Winton district (Johnson et al., 2001). As such, the impact of goats in *P. purpureicollis* habitat is a major threat to the species. Other invasive herbivores, including horses (*Equus caballus*), cattle (*Bos taurus/indicus*) and camels (*Camelus dromedarius*) occur commonly across most of the range of *P. purpureicollis* (NRM Ministerial Council, 2010; Csurhes et al., 2016). However, their impact on the species has not been directly documented.
IUCN Threat 7. Natural system modifications 7.1 Fire and fire suppression 7.1.1 Increase in fire frequency 7.1.2 Suppression in fire frequency	Mechanism: direct and indirect Timing: past, current, future Confidence: inferred Likelihood: almost certain Consequence: moderate Trend: increasing Extent: entire range Risk: very high	Fires can cause mortality of medium-sized marsupials, including wallabies, directly or via starvation and predation, linked to loss of suitable habitat, and increased predator abundance and activity (McGregor et al., 2015; Leahy et al., 2016). Fires often follow periods of drought (Threat 11.2), exacerbating any declines in small- and medium-sized marsupials already caused by drought conditions (Crowther et al., 2018). Fire frequency and intensity also impacts on the floristic structure of a habitat, and too frequent or intense fires may reduce floristic diversity, especially of obligate seeders (e.g., many fruiting species), and thus reduce forage availability for the species. Alternatively, too

Threat	[a]Status	Evidence
(*Altered fire regimes*)		infrequent fire may allow the thickening of vegetation and lead to poor recruitment of a diversity of plant species. There have been no studies on the most appropriate fire intensity and/or frequency for the persistence of *P. purpureicollis.* The species occurs predominantly in vegetation composed mostly of *Eucalyptus* spp. overstory with *Triodia* spp. understory (Figure 7; Regional Ecosystems 19a [52% of occurrence records] and 19b [23% of records]). For these habitat systems, early dry season (EDS) mosaic burns are recommended every 4 – 10 years of less than 20% of habitat, with consideration for variable fuel load after wet years (Queensland Herbarium, 2021). All current occurrence records for *P. purpureicollis* occur in areas that have experienced three or less fires since 2000 (Figure 8). The habitat surrounding the Boodjamulla subpopulation has high frequency fires (Figure 8), which may threaten this subpopulation. There are current fire management plans in place for Boodjamulla National Park and Buckley River Key Biodiversity Area that aim to reduce wildfire frequency through increased controlled EDS burning (Ezzy, 2022; Plant and Crowley, 2018). However, the impact of these management actions on *P. purpureicollis* populations has not been assessed.
IUCN Threat 8. Invasive and other problematic species, genes and diseases *(Loss of genetic diversity)*	Mechanism: direct Timing: past, current, future Confidence: inferred Likelihood: almost certain Consequence: moderate Trend: increasing Extent: part of range Risk: very high	In general, higher levels of fragmentation and loss of subpopulations result in reduced genetic variation, especially in the longer term through attrition of unique individuals and gene combinations. Loss of genetic diversity and gene flow leaves isolated subpopulations vulnerable to threats such as inbreeding depression (Frankham et al., 2017). It also erodes the populations' fitness and adaptive capacity of the species to future environmental change (Frankham et al., 2017), e.g., climate change (Threat 11). While there have been no genetic studies on the inbreeding of *P. purpureicollis*, population declines attributed to inbreeding have been documented in other *Petrogale* spp., e.g., *P. penicillata* (Eldridge et al., 2004), and *P. lateralis* (Eldridge et al., 1999). As with these other *Petrogale* spp., *P. purpureicollis* occur across a disjunct range, with multiple isolated populations that may be further isolated by mining activities (Threat 3) or other habitat degradation.
IUCN Threat 8. Invasive and other problematic species, genes and diseases 8.1 Invasive non-native/alien species/diseases *8.1.2 Weeds*	Mechanism: indirect Timing: past, current, future Confidence: suspected Likelihood: likely Consequence: moderate Trend: increasing Extent: entire range Risk: high	Invasive weeds, especially high biomass perennial grasses can cause declines in susceptible species by increasing competition and altering fuel loads and thus fire ecology of habitats (Chambers et al., 2019). Invasive weeds may also alter the availability of palatable food for *P. purpureicollis* by outcompeting native forage plants. There is no available literature on the interactions between *P. purpureicollis* and invasive weeds, although a woody weed (*Lantana camara*) has been implicated in the degradation of habitat for *P. penicillata* (DCCEEW, 2021). *Lantana camara* does not occur within the range of *P. purpureicollis* (Weeds Australia, 2020). However,

Threat	[a]Status	Evidence
		prickly acacia (*Vachellia nilotica*) is a woody weed of concern in the region that reduces grass cover and may decrease habitat suitability. Parthenium (*Parthenium hysterophorus*) is another weed of concern within the species range that may affect habitat suitability, as it is toxic and alters the availability of palatable forage (Weeds Australia, 2007). Additionally, buffel grass (*Cenchrus ciliaris*) that is sown by pastoralists in the region, may lead to increased fire intensity and spread (Butler and Fairfax, 2003; Threat 7.1.1) or out compete native grasses after disturbance events (e.g., over grazing [Threat 2.3.2] or fire [Threat 7.1.1]). Mining activities and exploration in the region (Threat 3.2) may facilitate the spread of invasive weeds.
IUCN Threat 11. Climate change and severe weather 11.1 Habitat shifting and alteration 11.3 Temperature extremes *(Climate change)*	Mechanism: direct and indirect Timing: past, current, future Confidence: suspected Likelihood: likely Consequence: moderate Trend: increasing Extent: entire range Risk: high	Climate change is well understood to have negative consequences, such as increased stochastic events (prolonged drought, severe and extensive wildfires and flooding) and it has led to changes in the biodiversity of some native ecosystems within Australia (Hoffmann et al., 2019). Climate change modelling within the distribution of the species (Monsoonal North Cluster) project very little change in fire frequency (*medium confidence*), although fire is predicted to be more extreme (*high confidence*) (Moise et al., 2015). A substantial increase in temperature is predicted (*very high confidence*), with a substantial increase in the frequency, temperature and duration of hot days (*very high confidence*). Meteorological drought will continue to be a regular feature in this region, and an increase in heavy rainfall events are predicted (*high confidence*). A reduction in the frequency of cyclones is predicted (*medium certainty)*, but with an increase in the proportion of the most intense storms. As *P. purpureicollis* occurs across multiple isolated subpopulations, the impact of stochastic environmental events, such as extreme fire, are more likely to extirpate a subpopulation from an area that cannot be recolonised through natural dispersal. Additionally, many of these subpopulations are likely effectively closed populations that may suffer from reduced genetic variability (Threat 8; loss of genetic diversity). These populations may suffer from limited adaption capacity to respond to changing environmental conditions and habitat as a result of climate change.
IUCN Threat 8. Invasive and other problematic species, genes and diseases 8.1 Invasive non-native/alien species/diseases 8.1.2 Cats (*Felis catus*) *(Predation by cats)*	Mechanism: direct Timing: past, current, future Confidence: inferred Likelihood: possible Consequence: moderate Trend: unknown Extent: entire range Risk: high	Predation by feral cats (*Felis catus*) is listed as a Key Threatening Process under the EPBC Act (DEWHA, 2015) and is implicated in the decline and extinction of many terrestrial mammal species (Legge et al., 2020). While there are no available data on the impact of cats on *P. purpureicollis, Petrogale* spp. are susceptible to predation by feral cats, particularly juveniles (Doherty et al., 2015). Single large cats can be particularly destructive to isolated subpopulations of *Petrogale* species; a single feral cat was implicated in the death of five (46%) juveniles, one (14%) sub-adult and at least two (5%) adults, in a population of *P. assimilis* in tropical north Queensland (Spencer, 1991).

Threat	[a]Status	Evidence
		As with other *Petrogale* species, *P. purpureicollis* rely on specific refuge sites (Eldridge, 2012), which may make the species susceptible to predators, such as feral cats, that learn the location and pathway to those sites (Moseby et al., 2021; Moseby et al., 2015). Loss of habitat complexity through overgrazing by both production animals (2.3.2) and feral herbivores (Threat 8.1.2) and competition with goats for refuges (Threat 8.1.2) may also contribute to increase the feral cat predation risk for this species. Cats may also hunt more successfully in post-fire landscapes (Threat 7.1.1). Due to the adult weight of *P. purpureicollis* (average ♀ 3.6 kg to ♂ 5.4 kg; Johnson and Eldridge, 2008), the impact of predation by feral cats is thought to be less significant than predation by European red foxes (Radford et al., 2018), however, cat predation on adults of the similarly sized *Petrogale lateralis* has been documented (Read et al., 2019), and it is likely *P. coenensis* continue to be predated by cats as adults. Feral cats are known to occur across the entire range of *P. purpureicollis*, and as such, it is likely that cats are a significant threat to *P. purpureicollis,* particularly for the persistence of small, isolated subpopulations, that are more susceptible to the population level effects of predation, and less able or unable to recolonise.
IUCN Threat 8. Invasive and other problematic species, genes and diseases 8.1 Invasive non-native/alien species/diseases 8.1.2 Fox (*Vulpes vulpes*) *(Predation by foxes)*	Mechanism: direct Timing: past, current, future Confidence: inferred Likelihood: possible Consequence: moderate Trend: unknown Extent: part of range Risk: high	Predation by the European red fox (*Vulpes vulpes*) is listed as a Key Threatening Process under the EPBC Act (DEWHA, 2008b) and has been implicated in the decline and extinction of many terrestrial, non-volant, mammal species (Radford et al., 2018). While there is no available literature on the impact of foxes on *P. purpureicollis, Petrogale* spp. are highly susceptible to predation by red foxes (Centre for Invasive Species Solutions, 2023b; Radford et al., 2018). Furthermore, the foraging areas utilised by *P. purpureicollis* may be reduced due to predation risks (Tuft et al., 2011). Red foxes have been documented near to the south-easterly subpopulations (Centre for Invasive Species Solutions, 2023b; Atlas of living Australia, 2023) and on Yalarrnga Country. The threat posed by red fox would be greatest in years where climatic factors favour the abundance and expansion of red fox distribution, e.g., rodent plagues (Pavey et al., 2008).
8. Invasive and other problematic species, genes and diseases 8.1 Invasive non-native/alien species/diseases 8.1.2 *Echinococcus granulosus*	Mechanism: direct Timing: past, current, future Confidence: inferred Likelihood: likely Consequence: minor to moderate Trend: unknown Extent: entire range Risk: moderate to high	*Echinococcus granulosus* (hydatid worm) may cause cystic echinococcosis and is spread by canids (definitive host) and a variety of intermediate hosts (e.g., sheep, pigs, macropods). Cystic echinococcosis can cause pulmonary impairment and death, as documented in *P. penicillata* (Barnes et al. 2008). Cystic echinococcus has also been documented in other *Petrogale* spp., including *P. godmani* and *P. persephone* (Begg et al., 1995; Beveridge et al., 1989). The prevalence of the parasite and disease outcomes in *P. purpureicollis* are unknown.
IUCN Threat 11. Climate change and severe weather 11.2 *Droughts*	Mechanism: indirect Timing: future Confidence: suspected Likelihood: unlikely Consequence: moderate	Rainfall in the Monsoonal North Cluster is under the influence of El Niño-Southern Oscillation (ENSO), and there is some indication that ENSO events will intensify under global warming, resulting in an intensification of El-Niño driven drying in this cluster

Threat	[a]Status	Evidence
	Trend: unknown Extent: entire range Risk: moderate	(Power et al., 2013). However, climate change modelling projections within the distribution of the species (Monsoonal North Cluster) have shown no clear indications to drought conditions in the cluster and there is low confidence in projections on the frequency and duration of extreme drought (Moise et al., 2015). Under a high emission scenario, extreme drought duration could increase in some models with not much change to their frequency, but others show change of duration in the opposite direction (Moise et al., 2015). Prolonged drought degrades habitat quality, particularly in the presence of fire (Threat 7.1.1) and overgrazing (Threat 2.3.2). There are limited perennial water points across much of the species' range and longer than normal periods of drought may reduce the availability of suitable habitat. Water availability may also be impacted by other threatening processes that impact the hydrological landscape (e.g., mining and quarrying [Threat 3.2] and agricultural practices). Prolonged periods of drought may also further isolate populations, impacting the species genetic diversity (Threat 8. Loss of genetic diversity).
8. Invasive and other problematic species, genes and diseases 8.1 Invasive non-native/alien species/diseases 8.1.2 *Toxoplasma gondii*	Mechanism: direct Timing: past, current, future Confidence: suspected Likelihood: unknown Consequence: minor Trend: unknown Extent: entire range Risk: low to moderate	Toxoplasmosis is an infectious disease caused by the protozoan parasite, *Toxoplasma gondii,* and is spread by cats (the only definitive host). *Toxoplasma gondii* infection can cause disease and mortality in Australian marsupials (Hollings et al., 2013). *Toxoplasma gondii* has been reported in *P. penicillata* (Barnes et al., 2010) and *P. persephone* (Johnson et al., 2003). Factors that determine the impact of *T. gondii* infection on a population (e.g., prevalence of the pathogen, incidence of disease, and disease outcomes) have not been studied in *P. purpureicollis,* and as such, the threat of *T. gondii* is speculative (Hillman et al., 2016).

Risk matrix for each threat listed in the Threats table

Risk rating for each threat according to the Likelihood and Consequence of the threat as identified in the Threats table. Note that threats in the Threats table should be presented according to the risk rating identified in the Risk matrix (highest to lowest).

Likelihood	Consequence				
	Not significant	**Minor**	**Moderate**	**Major**	**Catastrophic**
Almost certain			7.1 Altered fire regimes 8. Loss of genetic diversity	3.2 Mining & quarrying	
Likely		8.1.2 *Echinococcus granulosus*	8.1.2 Weeds 11.1 Climate change	2.3.2 Habitat degradation by production animals 8.1.2 Competition with and habitat degradation by feral herbivores	
Possible		8.1.2 *Toxoplasma gondii*	8.1.2 Predation by cats 8.1.2 Predation by foxes		
Unlikely			11.2 Drought		
Unknown					
Risk matrix legend/ risk rating:					
LOW RISK	**MODERATE RISK**		**HIGH RISK**	**VERY HIGH RISK**	

*Conservation advice: threat abatement and recovery actions

Add or delete additional table rows as required.

Threat	Abatement or recovery action underway
IUCN Threat 3. Energy production & mining *3.2 Mining & quarrying*	No recovery actions currently address this threat.
IUCN Threat 2. Agriculture and aquaculture 2.3 Livestock farming and ranching 2.3.2 Small-holder grazing, ranching or farming (*Habitat degradation by production animals*)	No recovery actions currently address this threat.
IUCN Threat 8. Invasive and other problematic species, genes and diseases 8.1 Invasive non-native/alien species/diseases 8.1.2. Goats (*Capra hircus*) 8.1.2. Camels (*Camelus dromedarius*) 8.1.2 Horses (*Equus caballus*) 8.1.2. Cattle (*Bos taurus/indicus*)	No recovery actions currently address the threat of feral horses and cattle. Unmanaged goats are currently managed under the federal 'Threat abatement plan for competition and land degradation by unmanaged goats' (DEWHA,

Threat	Abatement or recovery action underway
(Competition with and habitat degradation by feral herbivores)	2008a). However, these plans do not provide specific recovery advice for *P. purpureicollis.* A national strategy for the management of feral camels in Australia exists (NRM Ministerial Council, 2010). However, the plan does not provide specific recovery advice for *P. purpureicollis.* Pest animal management is supported by Southern Gulf NRM across much of the range of *P. purpureicollis*, although the plan does not identify goats, camels, cattle or horses as significant pest species (Southern Gulf NRM, 2016).
IUCN Threat 7. Natural system modifications 7.1 Fire and fire suppression 7.1.1 Increase in fire frequency 7.1.2 Suppression in fire frequency (*Altered fire regimes*)	No recovery actions currently address this threat. Fire management is supported by Southern Gulf NRM across much of the range of *P. purpureicollis* (Southern Gulf NRM, 2016), particularly to manage the habitat of Carpentarian grasswren (*Amytornis dorotheae*) (Plant and Crowley, 2018).
IUCN Threat 8. Invasive and other problematic species, genes and diseases *(Loss of genetic diversity)*	No recovery actions currently address this threat.
IUCN Threat 8. Invasive and other problematic species, genes and diseases 8.1 Invasive non-native/alien species/diseases *8.1.2 Weeds*	No recovery actions currently address this threat. There are weed management guidelines managed by the Qld Government (DAF, 2022). However, these do not have specific provisions for the conservation of *P. purepureicollis.* Prickly acacia management is supported by Southern Gulf NRM via the Australian Government's North Queensland flood recovery effort through the Department of Agriculture, Water and the Environment (Southern Gulf NRM, 2016). Other weed management is supported by Southern Gulf NRM across much of the range of *P. purpureicollis* (Southern Gulf NRM, 2016).
IUCN Threat 11. Climate change and severe weather 11.1 Habitat shifting and alteration 11.3 Temperature extremes	No recovery actions currently address this threat. Climate projections (modelling) have been undertaken for the Monsoonal North Cluster (Moise et al., 2015).
IUCN Threat 8. Invasive and other problematic species, genes and diseases 8.1 Invasive non-native/alien species/diseases 8.1.2 Cats (*Felis catus*) *(Predation by cats)*	Feral cats are currently managed under the federal 'Threat abatement plan for predation by feral cats' (DEWHA, 2015). However, these plans do not provide specific recovery advice for *P. purpureicollis.* Pest animal management is supported by Southern Gulf NRM across much of the range of *P. purpureicollis.* Southern Gulf NRM identifies the management of cats to mitigate the risk of predation on vulnerable wildlife as part of their action plan (Southern Gulf NRM, 2016).
IUCN Threat 8. Invasive and other problematic species, genes and diseases 8.1 Invasive non-native/alien species/diseases 8.1.2 Fox (*Vulpes vulpes*) *(Predation by foxes)*	No recovery actions currently address this threat. Foxes are currently managed under the federal 'Threat abatement plan for predation by the European red fox' (DEWHA, 2008b). However, these plans do not provide specific recovery advice for *P. purpureicollis.*

Threat	Abatement or recovery action underway
	Pest animal management is supported by Southern Gulf NRM across much of the range of *P. purpureicollis*. Southern Gulf NRM identifies the management of foxes as a low priority in their action plan (Southern Gulf NRM, 2016).
8. Invasive and other problematic species, genes and diseases 8.1 Invasive non-native/alien species/diseases 8.1.2 *Echinococcus granulosus*	No recovery actions currently address this threat.
IUCN Threat 11. Climate change and severe weather 11.2 *Droughts*	No recovery actions currently address this threat. Climate projections (modelling) have been undertaken for the Monsoonal North Cluster (Moise et al., 2015).
8. Invasive and other problematic species, genes and diseases 8.1 Invasive non-native/alien species/diseases 8.1.2 *Toxoplasma gondii*	No recovery actions currently address this threat.

Threat	Abatement of recovery action proposed
IUCN Threat 3. Energy production & mining *3.2 Mining & quarrying*	Avoid or minimise further loss and fragmentation of *P. purpureicollis* habitat from mining. Undertake activities to rehabilitate mine sites to a condition that is suitable for *P. purpureicollis* based on their habitat and refuge requirements (see “Biology”). Undertake further surveys to identify additional occurrences of the species in poorly surveyed areas/potentially extirpated regions to determine if/how mining activities may fragment the population.
IUCN Threat 2. Agriculture and aquaculture 2.3 Livestock farming and ranching 2.3.2 Small-holder grazing, ranching or farming (*Habitat degradation by production animals*)	Undertake research to identify the significance of habitat degradation by production animals on the persistence of *P. purpureicollis.* Avoid or minimise further loss and fragmentation of *P. purpureicollis* habitat through habitat degradation by production animals through partnerships with landholders to improve stocking practices. Inform landholders of habitat requirements for *P. purpureicollis,* particularly their association with fruiting browse.
IUCN Threat 8. Invasive and other problematic species, genes and diseases 8.1 Invasive non-native/alien species/diseases 8.1.2. Goats (*Capra hircus*) 8.1.2. Camels (*Camelus dromedarius*) 8.1.2 Horses (*Equus caballus*) 8.1.2. Cattle (*Bos taurus/indicus*) *(Competition with and habitat degradation by feral herbivores)*	Undertake research to determine the significance of habitat degradation by goats and other feral herbivores, and potential refuge competition. Undertake research to identify the distribution of feral herbivores throughout the range of the species. Implement a goat management strategy in the habitat of *P. purpureicollis* where goats occur, with particular focus on isolated subpopulations. Partner with or support the Traditional Custodians to lead the recovery actions for this species (a culturally significant species) to address the threat of feral herbivores.
IUCN Threat 7. Natural system modifications 7.1 Fire and fire suppression 7.1.1 Increase in fire frequency 7.1.2 Suppression in fire frequency	Undertake research to better understand how the species utilises habitat, forage and refuge areas after fire, and in areas with differing fire regimes. Partner with or support the Traditional Custodians to lead the recovery actions for this species (a culturally significant species) to address the threat of inappropriate fire

Threat	Abatement of recovery action proposed
(*Altered fire regimes*)	regimes. Engage with the relevant Traditional Custodians to undertake threat management planning and management. Develop and implement and monitor a fire management strategy that optimises the persistence of *P. purpureicollis.*
IUCN Threat 8. Invasive and other problematic species, genes and diseases *(Loss of genetic diversity)*	Undertake research to determine genetic diversity across, and within, subpopulations and analyse data to identify barriers to migration for the species. Consider implementing strategies to improve genetic diversity, e.g., genetic rescue translocations, especially for the Winton region subpopulations that are likely genetically isolated and at greater risk of inbreeding depression. Establish *ex situ* populations at appropriate institutions for conservation and research, ensuring a maximum range of genetic diversity possible is represented.
IUCN Threat 8. Invasive and other problematic species, genes and diseases 8.1 Invasive non-native/alien species/diseases *8.1.2 Weeds*	Undertake research to identify if weeds have significant impact on the floristics and structure of priority *P. purpureicollis* habitat, and how this threat interacts with fire. Partner with or support the Traditional Custodians to lead the recovery actions for this species (a culturally significant entity) by addressing the threat of weed incursions through cultural burning practices. Implement a management strategy for invasive weeds following best-practice guidelines (DAF, 2022).
IUCN Threat 11. Climate change and severe weather 11.1 Habitat shifting and alteration 11.3 Temperature extremes	Undertake research to better understand how the species will respond to climate change scenarios based on its specific life history and biology. Undertake research to gain knowledge on the true current distribution of the species, particularly to the north of their described range, and to confirm their persistence in the Winton region. Undertake time-series monitoring to quantify the population demographics of the species (number of mature individuals at each subpopulation) and trends over time. Partner with or support the Traditional Custodians to lead the recovery actions for this species (a culturally significant entity) to address the threat of climate change.
IUCN Threat 8. Invasive and other problematic species, genes and diseases 8.1 Invasive non-native/alien species/diseases 8.1.2 Cats (*Felis catus*) *(Predation by cats)*	Undertake research to identify the significance of the predation threat from cats, and potential predator avoidance behaviour by *P. purpureicollis* in the presence of cats Implement feral cat management strategy in the habitat of *P. purpureicollis,* with particular focus on isolated subpopulations. Partner with or support the Traditional Custodians to lead the recovery actions for this species (a culturally significant species) to address the threat of predation by cats.
IUCN Threat 8. Invasive and other problematic species, genes and diseases 8.1 Invasive non-native/alien species/diseases 8.1.2 Fox (*Vulpes vulpes*) *(Predation by foxes)*	Undertake research to identify the significance of the predation threat from foxes, and potential predator avoidance behaviour by *P. purpureicollis* in the presence of foxes. Implement a fox management strategy in the habitat of *P. purpureicollis* where foxes occur, with particular focus on isolated subpopulations. Partner with or support the Traditional Custodians to lead the recovery actions for this species (a culturally significant species) to address the threat of predation by foxes.
8. Invasive and other problematic species, genes and diseases 8.1 Invasive non-native/alien species/diseases 8.1.2 *Echinococcus granulosus*	Undertake research to determine susceptibility of *P. purpureicollis* to *E. granulosus* and monitor wild populations for cystic echinococcus. Investigate strategies to reduce prevalence of *E. granulosus* in vulnerable subpopulations, e.g., control of definitive hosts (foxes and dogs).

Threat	Abatement of recovery action proposed
IUCN Threat 11. Climate change and severe weather 11.2 *Droughts*	Undertake research to better understand how the species will respond to climate change scenarios based on its specific life history, biology and distributional range. Undertake time-series monitoring to quantify the population demographics of the species (number of mature individuals in each subpopulation) and trends over time. Partner with or support the Traditional Custodians to lead the recovery actions for this species (a culturally significant entity) to address the threat of climate change.
8. Invasive and other problematic species, genes and diseases 8.1 Invasive non-native/alien species/diseases 8.1.2 *Toxoplasma gondii*	Undertake research to determine susceptibility of *P. purpureicollis* to toxoplasmosis and outcomes of infection. Investigate strategies to reduce prevalence of *T. gondii* in vulnerable subpopulations, e.g., control of definitive hosts (cats).

LISTING CLASS/CATEGORY

Current listing class under the NC Act

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

Details of current NC Act listing

Listing Advice for this species is not available.

Current listing category under the EPBC Act

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

Details of current EPBC Act listing

Nominated listing class

☐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

Genuine change

☐Genuine change (recent) ☐Genuine change (since first assessment)

Nongenuine change

☐Criteria revision ☐New information ☐Criteria misinterpretation ☐Incorrect data ☐Other

☐Taxonomy (split) ☐Taxonomy (lump) ☐Taxonomy (newly described) ☐Taxonomy (no longer valid)

No change

☐Same category and criteria ☐Same category but change in criteria/subcriteria ☒Details unavailable

Genuine and nongenuine reasons for nomination to transfer to another class

The assessment for *P. purpureicollis* has been updated to reflect the Common Assessment Methodology. As the reasons for the initial listing are unavailable, it is not possible to determine whether this represents a change in subcriteria/criteria, or if the criteria remain the same.

Impact of transferring a threatened species to Near Threatened or Least Concern

Add or delete additional table rows as required.

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

SUMMARY OF KEY ASSESSMENT PARAMETERS

Metric	Estimate used in assessment	Minimum plausible value	Maximum plausible value	Justification
Number of mature individuals	6,800 – 10,000	6,800	12,500	There are no precise population parameters for the species. Records for this species are sparse and there is considerable uncertainty about the presence of the species between the surveyed sites. Previous threat assessments have used estimated number of subpopulations (25) multiplied by estimated number of individuals per subpopulation (500) to calculate an approximate population estimate of 12,500 individuals (Burbidge and Woinarski, 2016; Woinarski et al., 2014). However, there is low confidence in this estimate, and there have been documented declines in colony size in the south-western part of the species range (L. Sullivan, pers. comm., 2023). Alternatively, if each uniquely located occurrence record (338 records) is considered a colony (approximately 20 individuals; Eldridge 2012, although colonies of 5-6 adults are more frequently observed; I. Papp, pers. comm., 2023) the population could be approximately 6,760 mature individuals (20 x 338). It is very likely that there are undetected colonies and that some records come from the same colony, and as such there is also low confidence in this value. Given the observed reduction in colony size across part of the species range, it is considered likely that the current population size is below 10,000 mature individuals.
Trend	Decreasing (inferred)			Although there are known threats impacting the species, the extent that these threats are impacting the number of mature individuals across most of the species' range are broadly unknown. Data on population trends are limited to records from the Winton region (Johnson et al., 2001) and Yalarrnga Country (L. Sullivan, pers. comm., 2023). These data both indicate that abundance is decreasing in due to competition with goats (Johnson et al., 2001) or mining activities (L. Sullivan, pers. comm., 2023). Mining permits exist across most of the species' range (Figure 5). Competition with goats is of unknown significance across most of the species' range.
Generation length (years)	6-7	6	7	Generation length calculations were estimated using the IUCN generation length calculator, which estimates the mean age that a cohort reproduces (IUCN 2022). The formula is calculated as follows, age at first reproduction + (0.5*reproductive length). Females of *P. purpureicollis* mature at 18 months and males at 22 months (Eldridge, 2012). While there are no data on the longevity of *P. purpureicollis,* the longevity of *Petrogale* spp. range from 10 - 12. Therefore, the estimate used within the assessment is 6 – 7 years, with a three-generation period of approximately 18 - 21 years.

Metric	Estimate used in assessment	Minimum plausible value	Maximum plausible value	Justification
Extent of occurrence (km^2)	**80,000 – 120,000**	76,250	306,899	The species has a calculated Extent of Occurrence (EOO) of 114,512km^2. The EOO was estimated using 370 expert verified occurrence records from 1924-2022 and a minimum convex polygon (IUCN 2022). The species is suspected to be extant at all these sites. However, there have been no records since 2000 in the Winton and Dajarra regions. The minimum plausible EOO has been calculated excluding records greater than 22 years old (three generations); an EOO of 76,250 km^2 was calculated using 277 occurrence records. However, it is more likely that the EOO is more extensive given the surrounding areas of similar habitat across this species distribution that require further surveys (including into the Northern Territory). Potential habitat modelling (Laidlaw and Butler, 2021) was used to estimate the maximum plausible EOO for the species by calculating the area of a minimum convex polygon around the viable area of this species' modelled potential habitat. Viable potential habitat was determined by the equal training sensitivity and specificity Logistic threshold. The maximum EOO value was estimated as 306,899 km^2. This is likely to be a significant overestimate as it assumes the species is distributed across this entire area of modelled potential habitat, whereas it is known to occupy only small areas within suitable habitat. Thus, the EOO estimate used in this assessment is 80,000 – 120,000 km^2.
Trend	Unknown			There have been relatively recent discoveries of populations that have expanded the known EOO of the species; (a) Boodjamulla National Park, northwest of the previously known range (Eldridge et al., 1993), and, (b) Haystack Hill, south of the previously known range (discovered 2011). It is considered unlikely that these populations represent a true increase in EOO. Alongside this, the Winton region and Dajarra region populations have not been recorded in greater than 3 generations (Table 1), representing a potential decrease in EOO. Further surveys of these regions and other potential habitat are required to confirm this.

Metric	Estimate used in assessment	Minimum plausible value	Maximum plausible value	Justification
Area of occupancy (km^2)	900 – 1,800	916	119,584	The AOO was estimated as 916 km^2 using 2 x 2 km grid cells and using 370 expert verified occurrence records from 1924-2022. The species is suspected to be extant at all these sites. However, there have been no records in the last three generations at some sites. The minimum plausible AOO has been calculated using all occurrence records, potentially meeting the criteria for VU under Criterion B2. However, it is considered more likely that the AOO is more extensive given the areas of similar habitat across this species distribution that remain unsurveyed. Potential habitat modelling (Laidlaw and Butler 2021) was used to estimate the maximum plausible AOO for the species by calculating the sum of the area of 2 km grid cells that intersect with modelled potential habitat for this species. Viable potential habitat was determined by the equal training sensitivity and specificity Logistic threshold. The maximum AOO value is 119,584 km^2. This is likely to be a significant overestimate as it assumes the species is distributed across this entire area of modelled potential habitat, whereas it is known to occupy only small areas within suitable habitat. Thus, the AOO estimate used in this assessment is 900 – 1,800 km^2, which allows for occupancy in unsurveyed areas.
Trend	Decreasing (inferred)			Although there are known threats impacting the species, the extent that these threats are impacting the species AOO is relatively unknown. Based on current information, the AOO is suspected to be decreasing due to known subpopulation range reductions in the Winton region subpopulation (Johnson et al., 2001). Further surveys of the Winton region subpopulation are required to confirm the species persistence in the most south-easterly part of their range.
Number of subpopulations	19	11	56	*Petrogale purpureicollis* are considered in this assessment to occur within 11 (white polygons; figure 3) to 56 subpopulations (coloured clusters and outlier records; figure 3), although IUCN assessment data indicate that there are 25 subpopulations (Burbidge and Woinarski, 2016; Woinarski et al., 2014). It is plausible that additional unrecorded sites occur between the currently known sites, although it is also plausible that many fragmented subpopulations exist, as with other *Petrogale* spp. (Potter et al., 2012a; Potter et al., 2012b).
Trend	Decreasing (suspected)			Based on current information, the number of subpopulations are suspected to be decreasing due to possible extirpation of subpopulations in the Winton region s (Johnson et al., 2001) and Dajarra region. However, further surveys of these regions are required to confirm this.
Number of locations	>10	>10	>10	Land management practices vary across the range of this species, and as such, the most serious plausible threat (habitat degradation due to mining and quarrying activities, inappropriate fire regimes, weed incursions, grazing by production animals and climate change) is unlikely to impact large parts of the species range rapidly. Resultantly, the number of locations is considered to exceed 10 for this nomination.

Metric	Estimate used in assessment	Minimum plausible value	Maximum plausible value	Justification
Trend	Decreasing (suspected)			Based on current information, the number of locations are suspected to be decreasing due to possible extirpation of populations in the Winton region (Johnson et al., 2001) and Dajarra region. However, further surveys of these regions are required to confirm this.
Severe fragmentation	While the species population is fragmented across at least 11 subpopulations that are separated by distances larger than the inferred dispersal capacity for the species, these subpopulations are suspected to be viable subpopulations, excepting the Winton region subpopulation (AOO 20 km^2). As these subpopulations only amount to ~ 2% of the total AOO, this species is not severely fragmented.			
Extreme fluctuations	There is no evidence of extreme fluctuations in the number of mature individuals that represent a tenfold increase or decrease in the total population for this species (IUCN SPC, 2022).			

STANDARD OF SCIENTIFIC EVIDENCE AND ADEQUACY OF SURVEY

The survey effort is considered adequate and there is sufficient scientific evidence to support the assessment.

ELIGIBILITY AGAINST THE CRITERIA

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

***Petrogale purpureicollis* is assessed as Data Deficient under Criterion A.**

Generation length
A generation length of 6 – 7 years is used in this assessment, equating to a three-generation period of approximately 18 – 21 years.

Population reduction
Although there are known threats impacting the species, the extent that these threats are impacting the number of mature individuals is broadly unknown. Data on population trends are limited to records from the Winton region that indicate that extent of range and abundance is decreasing in this region due to competition with goats (Johnson et al., 2001). Competition with goats is of unknown significance across most of the species' range. Additional monitoring data is required to determine the population trends within a given time for the species.

Conclusion
While a population reduction is suspected (where the causes have not ceased and may not be reversible, A2), the magnitude of this population reduction cannot be determined. Therefore, there are insufficient data to determine a population reduction relative to generation length for this species, and further research is required on this species to confirm a trend in population size over time.

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**

***Petrogale purpureicollis* meets the thresholds for listing as Near Threatened under Criterion B2(b)(ii,iii,v).**

EOO and AOO
The species has an Extent of Occurrence (EOO) of 80,000 to 120,000 km² (Figure 1) and Area of Occupancy (AOO) of 900 – 1,800 km². Therefore, the species is within the AOO thresholds for VU under B2, and while it is expected that the AOO would increase with further survey efforts, it is unlikely to exceed the threshold for VU.

Severely fragmented
While the species population is fragmented across at least 11 subpopulations that are separated by distances larger than the inferred dispersal capacity for the species, these subpopulations are suspected to be viable subpopulations, excepting the Winton region subpopulation (AOO 20 km²). As these subpopulations only amount to ~ 2% of the total AOO, this species is not severely fragmented for this assessment. However, further research is required to confirm.

Number of locations
The species occurs across a broad area and land management practices vary across the range of this species, and as such, a single plausible threat (habitat degradation due to mining and quarrying activities, inappropriate fire regimes, weed incursions or grazing by production animals) is unlikely to impact large parts of the species range rapidly. Resultantly, the number of locations is considered to exceed 10 for this nomination.

Continuing decline
A continuing decline has been inferred for the species based on the threat of competition with goats and mining activity. Records from the Winton region indicate that extent of range and abundance is decreasing in this region due to competition with goats (Johnson et al., 2001). Goats are documented to compete with *Petrogale* spp. for both forage and refuge in rocky outcrops (Hayward et al., 2011; Johnson et al., 2001; DCCEEW, 2016). Competition with goats is of unknown significance across most of the species' range. The Yalarrnga People have documented declines in colony size at mine sites on their Country in the southern part of the species range (L. Sullivan, pers. comm., 2023). Most of the species' range is under active mining lease or mineral exploration permits (Figure 5). As such, the associated impacts of any current or future mining and exploration activities affect nearly the entire range of the species.

These threats are inferred to cause a continuing decline in AOO, habitat quality and the number of mature individuals, thereby meeting subcriterion (b)(ii, iii, v). It is considered likely that these threatening processes, alongside other processes, will lead to a > 10% population decline by three generations (18 – 21 years).

Extreme fluctuations
Petrogale purpureicollis do not experience extreme fluctuations in total population, AOO or number of subpopulations.

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**

Petrogale purpureicollis **meets the requirements for listing as <u>Vulnerable</u> under Criterion C2a(i).**

Number of mature individuals
The number of mature individuals for *P. purpureicollis* is estimated at 6,800 to 10,000, although further research is required to improve confidence in the population estimate. The population estimate falls within the eligibility threshold for VU.

Continuing decline
A continuing decline has been inferred for the species based on the threat of competition with goats and mining activity (see Criterion B). It is considered likely that these threatening processes, alongside other processes, will lead to a >10% population decline by three generations (18 – 21 years). However, further research on the species is required to estimate the rate of decline, and as such the species is not eligible under Criterion C1.

Number/ percentage of mature individuals in each subpopulation
The number and proportion of mature individuals in each subpopulation is unknown. However, it is believed that the largest subpopulations of *P. purpureicollis* are approximately 500 individuals (Burbidge and Woinarski, 2016; Woinarski et al., 2014). As such, this species is falls well within the threshold for VU under subcriterion a(i).

Extreme fluctuations in the number of mature individuals
Petrogale purpureicollis do not experience extreme fluctuations in total population, AOO or number of subpopulations.

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 (for VU), or EN or VU in a very short time (for NT).	**Not applicable**	**Not applicable**	**D2. Typically: AOO < 20 km² or number of locations ≤ 5**	**D2. Typically: AOO < 40 km² or number of locations ≤ 10**

***Petrogale purpureicollis* is assessed as <u>Not eligible</u> under Criterion D.**

Number of mature individuals
The number of mature individuals for *P. purpureicollis* is estimated at 6,800 to 10,000, although further research is required to improve confidence in the population estimate. The species is not eligible for criterion D1.

Restricted area of occupancy or number of locations
The species has an AOO of 900 – 1,800 km^2 and occurs at greater than 10 locations. The species is not eligible for criterion D2.

There are no plausible threats that could drive the species to CR or EX in a very short time.

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**

***Petrogale purpureicollis* is assessed as <u>Data Deficient</u> under Criterion E.**

Population viability analysis has not been undertaken for *P. purpureicollis*. Therefore, there is insufficient information to determine the eligibility of the species for listing in any category under this criterion.

Summary of criteria under which the species is eligible for listing as EX/EW/CR/EN/VU/NT

☐Criterion A **Data Deficient**	☐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 **Near threatened**	☐B1 (specify at least two of the following) ☐a) ☐b) ☐c); **AND/OR** ☒B2 (specify at least two of the following, other than NT) ☐a) ☒b) ☐c)
☒Criterion C **Vulnerable**	☐estimated number of mature individuals **AND** ☐C1 **OR** ☒C2 ☒a (i) **OR** ☐a (ii) **OR** ☐C2 ☐b)
☐Criterion D **Not eligible**	☐D1 **OR** ☐ D2
☐Criterion E **Data Deficient**	
☐EX	
☐EW	
☐LC	Species nominated to change from a higher wildlife class to Least Concern: No above boxes apply.

OTHER CONSIDERATIONS

*Indigenous cultural significance

The cultural, customary and spiritual significance of species and the ecological communities they form are diverse and varied for Indigenous Australians and their stewardship of Country. This section describes some examples of this significance but is not intended to be comprehensive or applicable to, or speak for, Indigenous Australians. Such knowledge may be held by Indigenous Australians who are the custodians of this knowledge and have the rights to decide how this knowledge is shared and used.

For the Yalarrnga People, Ngarlingarli Kurri (*Petrogale purpureicollis*) are a highly culturally significant species as the species is embedded in men's initiation and cultural practices. As such, the Yalarrnga People hold much knowledge on the species presence and abundance and they are committed to leading conservation actions.

The distribution of *Petrogale purpureicollis* overlaps with many Peoples' Country. The cultural and customary significance of the species is not publicly available for the other People's Country. Further consultation with the Traditional Owners of these lands will benefit the conservation of the species by providing awareness of traditional knowledge and management practices on Country.

This statement of significance is not intended to be comprehensive, applicable to, or speak for, all Indigenous Australians. It is acknowledged that Indigenous Australians who are the custodians of this knowledge have the rights to decide how it is shared and used.

Further studies

Additional comments/information

Table 2. Occurrence records of *P. purpureicollis* omitted from EOO and AOO calculations.

Year	Locality	Latitude	Longitude	Precision	Reason omitted
1924		-21.833	139.250		No precision/locality data
1924		-21.7	139.516		No precision/locality data
1928	Mine in ranges SW of Kajabbi	-20.2483	139.868	9000	Poor precision

1934	MT ISA 12 MILES SOUTHWEST OF	-20.8568	139.376	2600	Poor precision
1934		-20.816	139.416		No precision/locality data
1938	Quamby area	-20.365	140.284	3600	Poor precision
1974	Mount Isa	-20.7264	139.493	20	Unlikely location (city centre)
1974	Dajarra [cited as Duaringa]	-21.6942	139.514	3600	Poor precision
1979	Winton area	-22.3818	143.034	7200	Poor precision
1981	Mount Isa area	-20.7167	139.483	20	Unlikely location (city centre)
1981	Mt Isa	-20.7269	139.480	1000	Unlikely location (centre of active mine)
1984	LOUIE CREEK SHELTER, LAWN HILL GORGE;	-18.8152	138.468	7000	Poor precision
1986	DAJARRA, S OF MT ISA;	-21.6943	139.514	1800	Unlikely location (suburban)
1988	Dajarra area	-21.6942	139.514	3600	Poor precision
1991	Ridgepole Waterhole, Highland Plains	-18.6667	138.333		No precision/locality data
1993		-20.7355	139.513	10000	Poor precision, no locality data
1994	Mt Isa	-20.7256	139.497	20	Unlikely location (city centre)
1996	24 KM W OF LAKE CORELLA	-20.75	139.850	2000	Poor locality description, uncertain of precision value
1997	Cloncurry, Slazey Creek	-20.7	140.500	20	Unlikely location (suburban)
2001	Winton	-22.3833	143.033	2000	Unlikely location (suburban)
2003	Selwyn Range nr Mt Isa	-21.515	139.501	11000	Poor precision
2004	50 MLS N W OF DAJARRA	-21.2152	139.018	2600	Uncertain of location precision
2009	Near Mt Isa	-19.716	138.945	3000	Poor precision
2010	Lagoon Creek	-17.5251	138.063	100	Outlier; confirmed with EcoSmart that this could be a spurious record (J. Barnes pers comm. 2023)
2012	50km west of Cloncurry - located in north-west of Mt Colin tenement	-20.785	140.052	2500	Poor precision
2013	50km west of Cloncurry - located in north-west of Mt Colin tenement - riparian areas RE 1.3.7	-20.7802	140.049	5000	Poor precision
2013	Approx. 85 kilometres (km) north-east of Mt Isa and 65 km north-west of Cloncurry	-20.2553	140.137	10000	Poor precision
2014	15km to the north west of Kajabbi and 100km north west to Cloncurry.	-19.9842	139.949	15000	Poor precision
2015	15km to the north west of Kajabbi and 100km north west to Cloncurry.	-19.9842	139.949	15000	Poor precision
2016	Mt Dromedary, ~50 km south of Four Ways, NW Queensland	-19.6141	140.221	3000	Poor precision
ND	Cloncurry, 87km W	-20.6986	139.751	1000	Uncertain of location precision
ND	87 KM W OF CLONCURRY	-20.7167	139.733	2000	Uncertain of location precision
ND	Ardmore Station 20mls SW of Dajarra	-21.6485	139.185	2600	Poor precision
ND	20 MLS S W OF DAJARRA	-21.8735	139.268	2600	Poor precision
ND	Queensland, Ardmore Station 25 miles south west of Dajarra	-21.65	139.183		No precision data

Images of the species

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