

CAM Threatened species nomination summary

For nominations under the Common Assessment Method (CAM) where supporting information is available, but not in a format suitable for demonstrating compliance with the CAM, and assessment against the IUCN Red List threat status.

Cover Page


Species name (scientific and common name):	<i>Petrogale lateralis kimberleyensis</i> Wiliji, West Kimberley rock-wallaby [Listed as <i>Petrogale lateralis</i> West Kimberley race, Black-footed rock-wallaby (West Kimberley race)]
Nomination for (addition, deletion, change):	Change
Nominated conservation category and criteria:	Endangered B2ab(iii)
Scientific committee recommended category and criteria:	

Scientific committee assessment of eligibility against the criteria:		
This assessment is consistent with the standards set out in Schedule 1, item 2.7 (h) and 2.8 of the Common Assessment Method Memorandum of Understanding.		Yes <input type="checkbox"/> No <input type="checkbox"/>
A.	Population size reduction	•
B.	Geographic range	•
C.	Small population size and decline	•
D.	Very small or restricted population	•
E.	Quantitative analysis	•

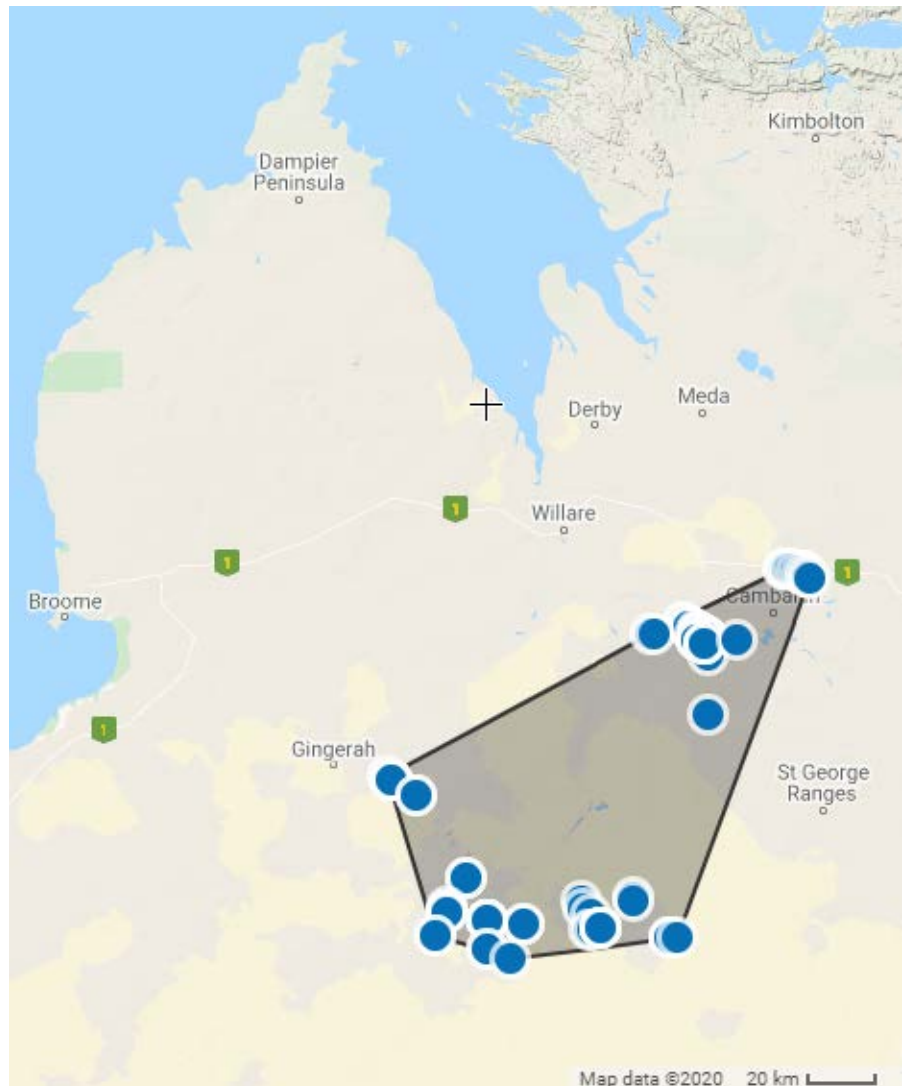
Outcome:			
<i>Scientific committee meeting date:</i>			
<i>Scientific committee comments:</i>			
<i>Recommendation:</i>			
<i>Ministerial approval:</i>		<i>Date of Gazettal/ Legislative effect:</i>	

Nomination summary

Current conservation status				
Scientific name:	<i>Petrogale lateralis kimberleyensis</i> Eldridge & Potter, 2020 [Listed as <i>Petrogale lateralis</i> West Kimberley race]			
Common name:	Wiliji, West Kimberley rock-wallaby [Listed as Black-footed rock-wallaby (West Kimberley race)]			
Family name:	Macropodinae	Fauna <input checked="" type="checkbox"/>	Flora <input type="checkbox"/>	
Nomination for:	Listing <input type="checkbox"/>	Change of status <input checked="" type="checkbox"/>	Delisting <input type="checkbox"/>	
1. Is the species currently on any conservation list, either in a State or Territory, Australia or Internationally? 2. Is it present in an Australian jurisdiction, but not listed?		Provide details of the occurrence and listing status for each jurisdiction in the following table		
Jurisdiction	State / Territory in which the species occurs	Date listed or assessed (or N/A)	Listing category i.e. critically endangered or 'none'	Listing criteria i.e. B1ab(iii)+2ab(iii)
International (IUCN Red List)		17/03/2014 (species level)	Vulnerable	B2ab(i,ii,iii,iv,v); C2a(i)
National (EPBC Act)		16/07/2000	Vulnerable	
State / Territory	1. Western Australia	3/11/2015	Endangered	B2ab(iii)
Consistent with Schedule 1, item 2.7 (h) and 2.8 of the Common Assessment Method Memorandum of Understanding, it is confirmed that:				
<ul style="list-style-type: none"> this assessment meets the standard of evidence required by the Common Assessment Method to document the eligibility of the species under the IUCN criteria; 			Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Comments:				
<ul style="list-style-type: none"> surveys of the species were adequate to inform the assessment; 			Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Comments:				
<ul style="list-style-type: none"> the conclusion of the assessment remains current and that any further information that may have become available since the assessment was completed supports or is consistent with the conclusion of the assessment. 			Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Comments:	<p>The WA threatened species nomination contains all available information and data up to 2014, and the status recommendation from <i>The Action Plan for Australian Mammals 2012</i> (MAP) (Woinarksi <i>et al.</i> 2014). That was the information used by the WA TSSC to assess the species conservation status in 2015 under WA State legislation.</p> <p>This summary form is the information since that time (2015 to 2020) to determined eligibility for a status upgrade under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act), in accordance with the Common Assessment Method (CAM).</p>			

Nominated national conservation status: category and criteria		
Presumed extinct (EX) <input type="checkbox"/> Critically endangered (CR) <input type="checkbox"/> Endangered (EN) <input checked="" type="checkbox"/> Vulnerable (VU) <input type="checkbox"/>		
None (least concern) <input type="checkbox"/> Data Deficient <input type="checkbox"/> Conservation Dependent <input type="checkbox"/>		
What IUCN Red List criteria support the recommended threatened category?	B2ab(iii)	
Eligibility against the IUCN Red List criteria (A, B, C, D and E)		
Provide justification for the nominated conservation status; is the species eligible or ineligible for listing against the five criteria. For delisting , provide details for why the species no longer meets the requirements of the current conservation status.		
A.	Population size reduction (evidence of decline)	<ul style="list-style-type: none"> There is limited information on the number and size of populations and on possible population trends. Any population size reduction would unlikely be approaching 30% in 15 years (3 generations). With the current information available, there insufficient information to quantify any evidence of decline. Insufficient information to assess.
B.	Geographic range (EOO and AOO, number of locations and evidence of decline)	<ul style="list-style-type: none"> Using all known occurrence records (168 records; 1901-2019): <ul style="list-style-type: none"> ➤ EOO = 9794.66 km² (<20 000 km²) ➤ AOO = 224 km² (<500 km²) 

- Using occurrence records in the last 18 years (three generations) (123 records; 2002-2017):
 - EOO = 8264.55 km² (<20 000 km²)
 - AOO = 160 km² (<500 km²)



- MAP calculated the EOO as 92.4 km² using records from 1993-2012 (20-year period). This was considered an underestimate due to lack of recent survey data. An EOO of c. 8000 km² (stable) used as the estimate for assessment against the IUCN criteria.
- MAP calculated the AOO as 16 km² using records from 1993-2012 (20-year period). This was considered this an underestimate due to lack of recent survey data. AOO estimated to be c. 70 km² (decreasing) based on availability of shelter habitat (caves, rock crevices).
- Subspecies known from three – four locations:
 - Erskine Range (including Dogspike Hill and Done Hill subpopulations)
 - Edgar Range (including Logues Spring and Mowla Bluff)
 - Grant Range
 - Mt Anderson
- Subspecies is severely fragmented as it is found in relatively small, isolated subpopulations - decreased likelihood of migration from other subpopulations and increased risk of local extinctions.

		<ul style="list-style-type: none"> • Suspected continuing decline in habitat due to introduced herbivores, inappropriate fire regimes and drought (climate change). The threats to rock-wallabies have been suggested to be synergistic, and therefore, the decline in habitat is likely to increase the detrimental impact of other threats, including the predation by foxes (<i>Vulpes vulpes</i>), feral cats (<i>Felis catus</i>) and possibly wild dogs/dingoes (<i>Canis lupus</i>). • Meets criteria Endangered B2ab(iii)
C.	<p>Small population size and decline</p> <p>(population size, distribution and evidence of decline)</p>	<ul style="list-style-type: none"> • There are no robust estimates of the number of mature individuals. • MAP has the following population information: <ul style="list-style-type: none"> ➢ Population inferred as < 2500 mature individuals, with no subpopulation containing more than 1000 mature individuals. ➢ Pearson (2012) estimated < 200 individuals in Edgar Range and 100 in the Erskine Range, but the number is likely to be higher (although probably less than 500). ➢ Numbers appear to be low in the Grant Range; a five-day survey in 2012 found small quantities of scats and flushed only one rock-wallaby. ➢ No population estimates for Mt Anderson. • Surveys in 2013 to 2019 in the southern Kimberley by the Nyikina Mangala Rangers and World Wide Fund for Nature Australia (WWF) found that the Grant Range subpopulation is small and may only contain 20 individuals. The Erskine Range subpopulation is estimated to have 211 individuals (\pm SD 51 and a density of 9.19 animals/km²). Fresh rock-wallaby scat was found at Mt Anderson in 2019. Edgar Range covers an extensive area. Previously only three small subpopulations were known from the Edgar Range, each thought to be less than 10 individuals. The recent surveys have recorded rock-wallabies and scats at many sites within the ranges. • Based on survey data from 2013 to 2019, population size could possibly be 500 individuals. • Survey across the species range is required to information population size. MAP states that there are several other areas of potentially suitable habitat that have not been surveyed. • Insufficient information to assess.
D.	<p>Very small or restricted population</p> <p>(population size)</p>	<ul style="list-style-type: none"> • (D1) Number of mature individuals inferred to be < 2500 (>1000), each subpopulation is estimated to contain < 1000 mature individuals. • (D2) Subspecies is restricted in AOO and number of locations (<5). AOO > 20km². If introduced predators (feral cats and foxes) become more established within the distribution of subspecies then this could have a detrimental impact on subpopulations, and subsequently the population. There is limited quantitative data to demonstrate that this threat would drive the taxon to critically endangered or extinct in a very short period. • Insufficient information to assess.
E.	<p>Quantitative analysis</p> <p>(statistical probability of extinction)</p>	<ul style="list-style-type: none"> • Insufficient information to assess.

Summary of assessment information							
EOO	All occurrences (1901-2019) EOO = 9794.66 km ² Occurrences from last 18 years (three generations; 2002-2017) EOO = 8264.55 km ² MAP: EOO = 8000 km ² (calculated as 92.4 km ² but considered an underestimate)		AOO	All occurrences (1901-2019) AOO = 224 km ² Occurrences from last 18 years (three generations; 2002-2017) AOO = 160 km ² MAP: AOO = 70 km ² (calculated as 16 km ² but considered an underestimate)		Generation length	MAP: 6 years
No. locations	3-4		Severely fragmented	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Unknown <input type="checkbox"/>			
No. subpopulations	4-6		No. mature individuals	MAP: < 2500. There is no robust estimate of the number of mature individuals. Surveys conducted in 2013 to 2019 suggest number of mature individuals could possibly be 500 individuals. Further survey required.			
Percentage global population within Australia				100			
Percentage population decline over 10 years or 3 generations				Unknown. MAP states decreasing trend in AOO and number of mature individuals.			
Threats (detail how the species is being impacted)							
Threat <i>(describe the threat and how it impacts on the species. Specify if the threat is past, current or potential)</i>	Extent <i>(give details of impact on whole species or specific subpopulations)</i>			Impact <i>(what is the level of threat to the conservation of the species)</i>			
Fox predation The species <i>Petrogale lateralis</i> is vulnerable to fox predation based on the impact of foxes on some subspecies. Threat is current in some subspecies and is a potential future threat for other subspecies where foxes are yet to be established. Predation by the European red fox is listed as a key threatening process under the EPBC Act.	MAP: "Minor (not yet established across majority of range). Foxes occasionally seen in the Edgar Ranges but usually absent; the subspecies would be vulnerable to foxes if they established within the rock-wallabies range." Regional knowledge suggests that foxes may always be present but in low densities. Depending on seasonal fluctuations there are probably times when they are not present. No foxes have been detected during surveys and predator monitoring conducted from 2013-2019 by the Nyikina Mangala Rangers and (WWF). Research of <i>Petrogale lateralis lateralis</i> black-flanked rock-wallaby subpopulations in the wheatbelt demonstrated the impact of foxes on that subspecies (Kinnear <i>et al.</i> , 1988, 1998, 2002, 2010). Individual or small groups of foxes can kill large numbers of rock-wallabies in short periods of time. This is a serious threat if subpopulations are already small. Fox predation is likely to be more severe on juveniles and smaller females, subsequently affecting recruitment to these subpopulations. The presence of foxes has been			MAP: Severe – catastrophic Regional knowledge: Moderate			

	<p>demonstrated to alter the behaviour of rock-wallabies, resulting in a reduction in time spent foraging and confining foraging range to their rocky refuge habitats (Kinnear <i>et al.</i>, 2010). In areas where surrounding habitat has been degraded, and little food resources are available in rocky refuges, simply the presence of foxes could be detrimental to subpopulations.</p> <p>It is suggested by Kinnear <i>et al.</i> (2010) that small rock-wallaby populations (20-30 animals) are dependent on absolute fox control. As the rock-wallaby population increases, a finite (density-dependent) level of fox predation becomes tolerable. This highlights the importance to accurately determining population numbers of <i>P. l. kimberleyensis</i> to fully understand the impact foxes may have on this subspecies.</p> <p>The importance of fox control has been demonstrated in other rock-wallaby subspecies. <i>P. l. lateralis</i> numbers fell to very low levels after the 1080 baiting program was suspended at the Kokerbin Rock Nature Reserve (wheatbelt) due to the presence of a camp site (WA DPaW 2016). following the cessation of 1080 baiting programs at Querekin Rock (wheatbelt) in 2013, numbers of <i>P. l. lateralis</i> dropped and the remaining animals were removed and translocated in 2014. Sixteen previously micro-chipped animals, were not captured or detected on camera images, suggesting up to a 43% subpopulation decline with the cessation of baiting (WA DPaW 2016).</p> <p>The decline and local extinction of several <i>Petrogale lateralis centralis</i> colonies from northern South Australia are thought to be a result of fox predation (Read <i>et al.</i> 2019) and the <i>P. l. lateralis</i> subpopulation on Depuch Island was extirpated as a result of fox incursion (Kinnear <i>et al.</i>, 1984).</p> <p>Foxes are occasionally sighted in Edgar Range and it is fair to assume that the West Kimberley rock-wallaby subpopulation would be vulnerable to foxes if they were to become permanently established.</p> <p>There is little information directly relating to the impact of foxes on the West Kimberley rock-wallaby subspecies. Studies conducted on other rock-wallaby subspecies (including <i>P. l. lateralis</i> and <i>P. l. centralis</i>) have demonstrated the potentially devastating impact foxes could have on <i>P. l. kimberleyensis</i>.</p>	
<p>Wild dog / dingo predation</p> <p>Plausible, but no information. Possible past, current and future threat.</p> <p>Cats, dingoes and wildfire are thought by the Rock-wallaby Recovery Team to be the major threat to the species.</p>	<p>MAP: "Entire. Plausible. The addition of artificial watering points in the Kimberley region increases the likelihood of dog predation."</p> <p>Predation of West Kimberley rock-wallabies by wild dogs and dingoes is a plausible threat. There is no information to determine the full impact this may have on the subspecies, <i>P. l. kimberleyensis</i>.</p> <p>Nyikina Mangala Rangers and WWF in 2013-2019, observed cats and dingoes infrequently at monitoring site up on the rocky outcrops at Grant Range, Mt Anderson and Erskine Range. Cats are more likely to have more interactions with</p>	<p>MAP: Unknown</p> <p>Regional knowledge: Severe - catastrophic</p>

	<p>rock-wallabies as they have been observed as being more prevalent on the rocky outcrops. Dingoes are more prevalent on the flats.</p> <p>Dingos are known to predate on wallaby species (Allen <i>et al.</i>, 2012; Thomson, 1992; Whitehouse, 1977). Dingoes are also known by Western Desert Aborigines to be predators of rock-wallabies (Pearson, 1992; Pearson and Ngaanyatjarra Council 1997).</p> <p><i>P. l. centralis</i> populations in the Little Sandy Desert and Warburton Region of WA have declined and persist only in the most optimal habitat as a result of large numbers of exotic predators (foxes, cats and wild dogs/dingos) and the lack of predator control for over 40 years (Pearson & Kinnear, 1997).</p> <p>There is considerable debate about the status and role of dingoes in the Australian landscape. This has the potential to influence effective predator control, as it is not currently possible to deliver widespread fox control using 1080 baits without also killing dingoes (Pearson, 2012).</p>	
<p>Feral cat predation</p> <p>The full impact of feral cats on rock-wallaby populations is yet to be fully understood. However, they have been recorded to kill juvenile and sub-adult rock-wallabies, and thereby reduce recruitment. There are also records of predation on adults of smaller rock-wallaby species.</p> <p>Feral cats are listed as a key threatening process under the EPBC Act.</p> <p>Cats, dingoes and wildfire are thought by the Rock-wallaby Recovery Team to be the major threat to this taxon.</p>	<p>MAP: “Entire. Feral cats have been established in the range of the West Kimberley rock-wallaby since c. 1890s (Abbott 2002, 2008). Impact appears low, but cats seem to be impacting other subspecies (<i>P. l. lateralis</i>).”</p> <p>Regional knowledge suggests that the impact of cat predation should be rated higher than dingoes and foxes. Cats are likely to impact juvenile recruitment. The density of cats around human communities is very high. Cat predation is likely to be having a higher impact at Grant Range due to the proximity of communities.</p> <p>Nyikina Mangala rangers and WWF in 2013-2019 observed cats and dingoes infrequently at monitoring sites up on rocky outcrops at Grant Range, Mt Anderson and Erskine Range. The impact of cat predation on <i>P. l. kimberleyensis</i> requires research and monitoring.</p> <p>Spencer (1991) observed feral cats eating young <i>Petrogale assimilis</i> (up to 4kg in weight as adults) in tropical Queensland and showed that a single cat killed eight <i>P. assimilis</i> over a nine-month period. This cat was a significant predator of young rock-wallabies, killing 5 of 11 young at foot present in the colony. Therefore, Spencer (1991) believed that feral cat predation can play a role in limiting recruitment.</p> <p>In Anangu Pitjantjatjara Yankunytjatjara Lands, South Australia, where foxes are rare, feral cats are believed to be the cause of low juvenile survival (51%) and an estimated 88% range contraction of <i>P. l. centralis</i> (Ward <i>et al.</i> 2011; Read <i>et al.</i> 2019).</p> <p>Feral cats have been recorded to prey on other <i>P. lateralis</i> subspecies, including <i>P. l. lateralis</i> and <i>P. l. centralis</i> (Read <i>et al.</i> 2019). Predation by feral cats is thought to have contributed to the decline of black-flanked rock-wallaby subpopulations in the Wheatbelt, at Nangeen Hill and Mt</p>	<p>MAP: Unknown</p> <p>Regional knowledge: Severe - catastrophic</p>

	<p>Caroline. The long-term baiting for cats (which also results in control of foxes and dingoes) at the Calvert Range (Kaalpi) has resulted in a steady increase in the rock-wallaby subpopulation (P. Kendrick pers. comm., cited in WA DPaW 2016).</p> <p>The Northern Territory Government's Department of Environment and Natural Resources recorded images of a cat killing an adult short-eared rock wallaby (<i>P. brachyotis</i>, mean adult body mass 4 kg) (Dahlstrom 2019).</p> <p>Read <i>et al.</i> (2019) suggests that feral cats were more likely to prey upon rock-wallaby individuals in time of food stress, rather than scavenge opportunistically on carcasses.</p>	
<p>Habitat degradation and resource depletion due to livestock and introduced species</p> <p>All mainland unfenced subpopulations of rock-wallabies co-occur with introduced herbivores in or adjacent to their habitats. Some locations are heavily grazed. These herbivores reduce available forage and cause habitat degradation.</p> <p>Invasive weeds also decrease food resources and habitat quality. Weeds also impact fire regimes and the severity of wildfires.</p>	<p>MAP: "Entire. Some locations are heavily grazed by cattle [<i>Bos taurus</i>] and feral donkeys [<i>Equus asinus</i>] (and possibly feral camels [<i>Camelus dromedarius</i>])."</p> <p>Habitat degradation due to livestock (cattle) is probable at all sites. Erskine Range, Grant Range and Mt Anderson are all on active pastoral lease tenure. The majority of the Edgar Range is on pastoral lease, and some of the area is Karajarri Indigenous Protected Area (IPA) and/or Unallocated Crown Land (UCL). All sites are heavily grazed. The steep landscape does deter cattle but does not stop them completely. Camels are known to be present in the Edgar Range.</p> <p>Domestic livestock (cattle), feral donkeys and feral camels degrade vegetation around rock outcrops used by many subpopulations of rock-wallabies. These introduced animals may impact rock-wallaby subpopulations by confining the rock-wallabies foraging activities to close to refuges or causing them to travel further to forage (Pearson, 2012). Usually these potential competitors are unable or unwilling to penetrate most of the habitat used by rock-wallabies.</p> <p>Food supplies have been identified as the second-most important limiting factor for rock-wallabies, after foxes (Kinnear et al. 2010). Resource depletion is exacerbated by clearing around rocky sites, depriving subpopulations of their originally food supply.</p> <p>Drought combined with grazing impacts has reduced native grass cover and carrying capacity of rocky habitat for rock-wallabies. This has also led to weed invasion.</p> <p>Little is known about the impact of weeds on rock-wallaby habitats and long-term effects on rock-wallabies. Concern has been raised about the spread of Buffel grass (<i>Cenchrus ciliaris</i>) into rock-wallaby habitat (Pearson, 2012). Buffel grass tends to form monocultures and outcompetes native grasses, dries off quickly in dry periods and provides continuous, abundant fuel for fires. It is eaten by rock-wallabies, although its palatability and nutritional status is low as it dries off (Pearson, 2012).</p>	<p>MAP: Moderate</p> <p>Regional knowledge: High possibly Severe – catastrophic</p>
<p>Habitat destruction from clearing, mining and quarrying</p>	<p>All occurrences of <i>P. l. kimberleyensis</i> in the Erskine Range, Grant Range and Mt Anderson, and most in the Edgar Range are on petroleum titles (exploration permits).</p>	<p>Unknown</p>

<p>Areas of habitat destroyed by these operations may be limited, indirect impacts resulting from these activities (increased traffic, greater risk of fire and elevated populations of exotic predators) are likely to affect rock-wallabies over larger areas than just the immediate footprint.</p>	<p>No occurrences overlap with mining tenements. There are numerous mining tenements within 20-50km of West Kimberley rock-wallaby subpopulations.</p> <p>The indirect impact of nearby active mining tenements on this subspecies is unknown.</p> <p>Some small areas of habitat for other rock-wallaby species/subspecies are currently under threat from clearing or from extractive industries such as mining or quarrying (Pearson 2012).</p>	
<p>Changes to fire regimes</p> <p>Fires are frequent and extensive in this area; large or frequent fire likely to impact subspecies.</p> <p>Cats, dingoes and wildfire are thought by the Rock-wallaby Recovery Team to be the major threat to this taxon.</p>	<p><i>MAP: "Entire. Fires are frequent and extensive in the Kimberley Region and large or frequent fire is likely to impact the West Kimberley rock-wallaby."</i></p> <p>Knowledge on the short-term and long-term impact of fire on rock-wallaby subpopulations is limited. Frequent fires will likely reduce food availability and diversity of plant species. Food resources are a limiting factor for the subspecies</p> <p>Regional knowledge indicates that, if unmanaged, the fire frequency can be 1-2 years on the foot slopes and plains surrounding the rock-wallaby habitat within the range of <i>P. l. kimberleyensis</i>, possibly longer on the outcrops themselves.</p> <p>Late dry season wildfires can extend beyond the plains and over the slopes to reach the plateaus of the outcrops. Nyikina Mangala rangers observed this type of wildfire in 2019 on the Erskine Range and report that food availability was impacted and plant recovery was very slow post-fire. Wiliji scat densities in previously frequently used caves and shelters also reduced, with very few fresh scats evident in March 2020. This anecdotal evidence suggests <i>P. l. kimberleyensis</i> may be able to respond to fire impacts by using sub-optimal (but unburnt) habitat where forage resources may still be available. However, if extensive fires remove forage resources completely, populations may need to disperse to other outcrops, which increases vulnerability to predation.</p> <p>There is increasing evidence across northern Australia that current fire regimes are resulting in, or have a synergistic impact on, the decline of a range of mammal species (e.g. Fitzsimons <i>et al.</i> 2010).</p> <p>There are anecdotal accounts for rock-wallabies vacating burnt areas for short periods (Pearson, 2012).</p>	<p><i>MAP: Unknown</i></p> <p>Regional knowledge: High, possibly Severe – catastrophic</p>

<p>Climate change leading to a decline in rainfall and higher summer temperatures.</p> <p>Climate change that leads to declines in rainfall, higher summer temperatures and more variable weather patterns are likely to impact on the body condition, survivorship, and reproduction of rock-wallabies.</p>	<p>There have been no specific studies on the likely effects of climate change on the rock-wallaby species.</p> <p>Fragmented populations and reduced genetic variability may limit evolutionary responses to climate change, such as in situ adaptation of subpopulations and dispersal to other areas of habitat or habitat types.</p> <p>Climate change is predicted to alter vegetation communities and food resources.</p>	<p>Moderate</p>
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A note on the impacts of ongoing small population size and population fragmentation, in addition to threats that are likely to maintain or decrease population size, and how this may increase vulnerability to loss of adaptive potential and increased risk to loss of genetic diversity: Small population sizes increase the likelihood of inbreeding and reduced genetic diversity. This in turn, reduces taxon's adaptive potential and can result in deleterious genes becoming fixed in the population. Some rock-wallaby species/subspecies have shown to retain relatively high levels of genetic diversity despite their fragmented habitat and generally small colony size (Hazlitt *et al.*, 2006; Spencer *et al.*, 1997; Ruykys & Lancaster 2015). The *Petrogale* genus has substantially lower genetic diversity than other macropods (Eldridge *et al.*, 2010).

Rock-wallaby subpopulations that have a large effective population size are resistant to loss of genetic diversity through genetic drift and inbreeding. It is hypothesised that effective population sizes of ~1000 individuals maintain quantitative variation to the same extent as an infinite large population (Lynch & Lande, 1998). As subpopulations of *P. l. kimberleyensis* are estimated to be <1000, this subspecies may be vulnerable to rapid erosion of genetic diversity. The genetic viability of the West Kimberley rock-wallaby subpopulations has not been researched.

Fragmentation and small population size can also result in increased risk of local extinctions due to stochastic events (i.e. drought).

Management and Recovery	
Is there a Recovery Plan (RP) or Conservation Management Plan operational for the species?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
<p>List all relevant recovery or management plans (including draft, in-preparation, out-of-date, national and State/Territory recovery plans, recovery plans for other species or ecological communities, or other management plans that may benefit or be relevant to the nominated species).</p> <ul style="list-style-type: none"> Pearson, D.J. (2013). <i>Recovery plan for five species of rock wallabies: Black-footed rock wallaby (Petrogale lateralis), Rothschild rock wallaby (Petrogale rothschildi), Short-eared rock wallaby (Petrogale brachyotis), Monjon (Petrogale burbidgei) and Nabarlek (Petrogale concinna) 2012-2022.</i> Department of Parks and Wildlife, Perth, WA. Available from: http://www.environment.gov.au/resource/recovery-plan-five-species-rock-wallabies. 	
<p>List other documents that may be relevant to the management of the species or the lands on which it occurs (i.e. area management plans, conservation advices, referral guidelines).</p> <ul style="list-style-type: none"> Department of the Environment, Water, Heritage and the Arts (DEWHA) (2008). <i>Threat abatement plan for predation by the European red fox.</i> DEWHA, Canberra. Available from: http://www.environment.gov.au/biodiversity/threatened/publications/tap/predation-european-red-fox 	

- Department of the Environment (2015). *Threat abatement plan for predation by feral cats*. Canberra, ACT: Commonwealth of Australia. Available from: <http://www.environment.gov.au/biodiversity/threatened/publications/tap/threat-abatement-plan-feral-cats>.
- Department of the Environment and Energy (2016). *Threat abatement plan for competition and land degradation by rabbits*. Canberra, ACT: Commonwealth of Australia. Available from: <http://www.environment.gov.au/biodiversity/threatened/publications/tap/competition-and-land-degradation-rabbits-2016>.
- Department of Agriculture, Water and the Environment (DAWE) (2015). Draft threat abatement plan for competition and land degradation by rabbits. Canberra, ACT: Commonwealth of Australia. Available from: <https://www.environment.gov.au/biodiversity/threatened/threat-abatement-plans/rabbits-2015>
- Department of the Environment, Water, Heritage and the Arts (DEWHA) (2008). Threat abatement plan for competition and land degradation by unmanaged goats. DEWHA, Canberra. Available from: <https://www.environment.gov.au/biodiversity/threatened/publications/tap/competition-and-land-degradation-unmanaged-goats>
- Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) (2012). Threat abatement plan to reduce the impacts on northern Australia's biodiversity by the five listed grasses. Canberra, ACT: Commonwealth of Australia. Available from: <https://www.environment.gov.au/biodiversity/threatened/publications/threat-abatement-plan-reduce-impacts-northern-australias-biodiversity-five-listed-grasses>

List current management or research actions, if any, that are being undertaken that benefit the conservation of the species.

- Walalakoo Healthy Country Plan.

Through the Nyikina Mangala Rangers, Walalakoo Aboriginal Corporation have worked in partnership with WWF-Australia since 2011 to better understand the ecology of *P. l. kimberleyensis*. This work is ongoing and includes investigating key threatening processes and implementing management activities to reverse the decline of subpopulations. In particular, they are working together to:

- Establish a permanent monitoring program in key locations to give robust estimates of trends in population abundance and density;
- Trial different techniques and methods for population monitoring, e.g. scat counts, camera trapping, live trapping, thermal scanners;
- Assess likely threats (including fire, predation by foxes, feral cats, wild dogs and dingoes, cattle grazing);
- Undertake threat management activities to protect *P. l. kimberleyensis* subpopulations, e.g. protection of core habitat from large wildfires on the Grant, Edgar and Erskine Ranges; and
- Investigate the diet and preferred food resources of *P. l. kimberleyensis* using eDNA techniques and use this information to enhance key food resources through fire management, fencing from feral herbivores, and revegetation.

List further recommended management or research actions, if any, that would benefit the conservation of the species.

- Targeted assessment of predator densities at/near *P. l. kimberleyensis* subpopulations.
- Feral cat and dingo diet studies; scat and/or stomach sample analysis.

The Recovery Plan outlines the recovery actions required to ensure the survival of populations and improve the conservation status of the species. Recommended actions for *Petrogale lateralis kimberleyensis* (referred to *Petrogale lateralis subsp.* (West Kimberley) in Recovery Plan) include:

- Conduct feral predator control, manage feral herbivores, and manage habitat, and monitor management actions to determine effectiveness.
- Survey and monitor populations

- Undertake research to improve understanding of biology, management, and monitoring techniques
- Work with land-holders to implement a patch burn strategy to reduced likelihood of large fires in the Edgar and Erskine Range
- Communication and community education

The Action Plan for Australian Mammals 2012 (Woinaski *et al.*, 2014) outlines the following management actions required:

- Active mitigation of threats – including control of foxes where present, manage fire in and near habitat, protect habitat via creation of protected areas, and where appropriate and effective, implement mechanisms to reduce cat numbers at significant subpopulations.
- Monitor all known locations
- Community engagement – involve Aboriginal communities and rangers, and local NGOs in monitoring, fox control and fire management.

The Action Plan for Australian Mammals 2012 (Woinaski *et al.*, 2014) outlines the following as gaps in knowledge:

- Survey to better define distribution – additional surveys required to determine current distribution and estimate total sizes of subpopulations
- Assess impacts of threats on species, including assessing: impacts of foxes, cats, wild dogs and dingoes; impacts of a range of fire regimes and identify optimal fire regime; and impacts of feral herbivore disturbance (including cattle, donkeys and camels).
- Establish or enhance monitoring program – develop monitoring protocols and implement at all known locations
- Assess effectiveness of threat mitigation options – if foxes present, assess impact of fox control
- Assess diet, life history – investigate diet and their factors that may affect conservation status
- Undertake research to develop new or enhance existing management mechanisms – develop broad-scale, targeted feral cat eradication technology

Nomination prepared by:

Species and Communities Program, Biodiversity and Conservation Science, Department of Biodiversity, Conservation and Attractions, Western Australia.

Contact details:

Date submitted:

2020

If the nomination has been refereed or reviewed by experts, please provide their names and contact details:

Summary of subpopulation information (detailed information to be provided in the relevant sections of the form)						
Location or subpopulation	Land tenure	Survey information: Date of survey and No. mature individuals	AOO	Site / habitat Condition	Threats (note if past, present or future)	Specific management actions
Grant Range	Pastoral lease Petroleum title (exploration permit)	Occurrence records from surveys in 2012 and 2019. Surveys by the Nyikina Mangala Rangers and WWF recorded the subspecies (cameras and scats) in 2015, 2016 and 2019.	44km ² (using all records (2012-2019))	Unknown	Predation by feral cats and dingoes. Wildfire / inappropriate fire regimes. Habitat degradation and resource depletion by introduced species. Reduced genetic diversity.	Fire management activities were undertaken in 2018 around the Grant Range by the Nyikina Mangala Rangers to protect the West Kimberley rock-wallaby. WWF is currently supporting Walalakoo fire management through a Lotterywest grant (2020-2023). In June 2020, fire management was undertaken along the base of the Grant Range.
Erskine Range (including Dogspike Hill and Drone Hill)	Pastoral lease Petroleum title (exploration permit)	Occurrence records from specimen collection, opportunistic sightings and surveys from 1992, 1995 and 1996. Surveys by the Nyikina Mangala Rangers and WWF recorded the subspecies (cameras and scats) in 2013, 2015, 2016 and 2017.	44 km ² (using all records 1992-2017)	Unknown	Predation by feral cats and dingoes. Wildfire / inappropriate fire regimes. Habitat degradation and resource depletion by introduced species. Reduced genetic diversity.	The Walalakoo Aboriginal Corporation secured a Community Action Grant in 2016 to conduct prescribed burning around the Erskine Range which will benefit the taxon. Some patchy burns have already been undertaken. WWF is currently supporting Walalakoo fire management through a Lotterywest grant (2020-2023). In 2018 WWF finalised a monitoring methodology and established ten monitoring sites on the Erskine Range. The adaptation of survey design

						<p>proposes to provide robust estimates of population density and establish permanent monitoring sites on the Erskine and Grant Ranges over the next three years. Thirty-seven sensors cameras have been positioned across the Erskine range to look at distribution and abundance of feral cats and foxes. WWF also initiated a project with Charles Darwin University researchers to assess whether thermal imaging devices placed on drones can be used to efficiently monitor populations of rock-wallabies.</p> <p>Fire management activities were not undertaken in 2018 around the Erskine range and half of the range was subsequently heavily impacted by bush fire.</p> <p>In 2018 Nyikina Mangala Rangers and WWF conducted a camera survey to estimate predator occupancy the Erskine Range.</p>
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Edgar Range (including Logues Spring and Mowla Bluff)	Karajarri IPA UCL Pastoral lease Petroleum title (exploration permit)	Occurrences from specimen collection, opportunistic sightings and surveys from 1911, 1961, 1976, 1977, 2002, 2015, 2017. Surveys by the Nyikina Mangala Rangers and WWF recorded the subspecies (cameras and scats) in 2013, 2015, 2016 and 2017.	116 km ² (using all records 1911-2017)	Unknown	Predation by foxes, feral cats and dingoes. Wildfire / inappropriate fire regimes. Habitat degradation and resource depletion by introduced species. Reduced genetic diversity	Unknown
Mount Anderson	Pastoral lease Petroleum title (exploration permit)	Single historical occurrence from Mount Anderson – date unknown. Nyikina Mangala rangers and WWF conducted a once-off scat and camera trap survey in 2019 and found fresh scat at two sites.	8km ²	Unknown	Unknown. Assumed to be same as Grant Range due to proximity.	Unknown
Mount Wynne	Pastoral lease	Single historical occurrence from 1901. Subspecies appears to have disappeared from the small outcrop at Mt Wynne (MAP)	Subpopulation expatriated	Unknown	Unknown	Unknown

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