

Black Range Invasive Animal Impact Assessment/Prioritisation Table (April 2022);

References = Australian Government Threat Abatement Plans & various research project outcomes. This assessment based on the impact of invasive animals on biodiversity within the Eastern Black Range.

Invasive Animal Species	Priority Criteria	Relevant Justification Information	Ranking	Priority for Action
Rabbits <i>Oryctolagus cuniculus</i>	Current extent of the species on or near the site	4,200 hectares = rabbits are distributed across the entire area in and around the Black Range. There are very few areas in the Black Range where rabbit sign is not present. In 1997 in the Black Range = 4 rabbits per spotlight km or 1-3 active entrances per hectare were assessed using standard monitoring techniques. Impact of rabbit haemorrhagic disease (RHD) in 1997 reduced rabbit populations to historically low levels. However, populations have increased and rabbit population rebound is occurring with estimated 70-80 % population immunity to RHD (<i>McPhee, S. 2007. Monitoring the impact of rabbit haemorrhagic disease and conventional rabbit control in Victoria. Dept. of Primary Industries, Werribee</i>). A limited window of low impact on biodiversity within the range exists, before higher population levels severely impact Black Range biodiversity in the future.	H (3)	1
	Species invasiveness	Historically, rabbit populations in the Black Range have been sustained at very high levels over a long period of time. In 1987 levels of rabbit population were recorded at 33 rabbits per spotlight km. Earlier populations were observed to be much higher. Well drained light/easy digging granitic soils along with inaccessible steep areas with boulders and fallen timber provide ideal conditions for rabbits to breed and increase populations quickly. A pair of rabbits can turn into over 180 rabbits in just 18 months. Since the introduction of RHD and its initial knockdown effect, rabbit populations have increased and rabbit population rebound is gradually occurring with an estimated 70-80 % population immunity to RHD in 2007. Unless effective new biological control agents	H (3)	

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		are released in the future, rabbits have very high potential to increase and return to high impact levels in the Black Range.		
	Current and potential impact of the species	<p>There is robust scientific evidence that controlling rabbits to less than one active warren entrance per hectare, or less than three rabbits per spotlight kilometre, can increase the survival rate of small native tree seedlings in conservation areas with above 300mm annual rainfall. (<i>D.M.Forsyth, I.Stuart Sept 2014, Arthur Rylah Institute for Environmental Research – Dept. of Environment and Primary Industries</i>). ‘Overall, we consider the imbalance and problems of the Black Range are due primarily to the continuing presence of rabbits. If rabbits are not removed or considerably reduced in numbers the range will at best, remain in poor health or worse may continue to degrade to the point of no return.’ (<i>Miller.J, Woodhart.L, Report on a Trapping Programme for small mammals in the Stawell Black Range, January 1990, Conservation Forests and Lands Research permit RP-90-001</i>). ‘From David Cheal’s (<i>Cheal.D, Flora Survey Group, CF&L, Melbourne 1987</i>) comments on his assessment sheets (Vegetation Enclosures) it is obvious that grazing by rabbits, goats, sheep and kangaroos is having a very dramatic effect on the vegetation’ of the Black Range. (<i>McAlpine.I, Correspondence CF&L 1987 Horsham</i>). It takes less than one rabbit per hectare to prevent the successful regeneration of many native trees and shrubs, (<i>Williams.K, Parer I, Coman.B, Burley.J, and Braysher.M, 1995, Managing Vertebrate Pests:- Rabbits, Bureau of Resource Sciences and CSIRO Division of Wildlife and Ecology. Australian Government. Publishing Service Canberra</i>). In summary, the current estimate of 0.7 – 2.0 rabbits per hectare is close to, or over the threshold (<1</p>	H (3)	

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		<p>rabb/ha) where rabbit grazing and browsing can significantly impact the regeneration of vegetation in the Black Range. Previously in the Black Range, prolonged overgrazing by large rabbit populations has exposed large areas of granitic top soil to sheet erosion through accelerated water run-off. This not only has on site impacts such as reduced topsoil and flora ground cover, but also off site impacts such as sedimentation and nutrient inflows to streams further down the catchment. This can impact on water quality and aquatic life. The Black Range is also a re-charge area for localised sub-ground water tables. Any reduction in the interception of ground water in the hills by plants, increases saline ground water discharge further down the catchment which also impacts on stream water quality and plant survival.</p>		
	<p>Value of the habitat areas that the invasive species infests or may infest.</p>	<p>The Eastern Black Range is a unique open woodland of mainly Yellow Box and Long Leaf-Box overstorey with a rich diversity of shrubs and ground flora on granitic hills in the upper Wimmera river catchment. Its vegetation is rated in the category as:- Depleted, Endangered, Rare and Vulnerable in the Wimmera Catchment Management Authorities (WCMA) Catchment Management Strategy 2021-2027. The WCMA's objective is to prevent further decline and produce an overall gain in vegetation area and quality.</p> <p>The Black Range has supported a diversity of native fauna, but environmental pressures such as habitat depletion, prolonged drought, increased wildfire frequency/intensity, disease and predation from introduced predators has depleted and/or potentially removed some species from the range over recent decades, ie: Southern Brown Bandicoot (EPBC Listed Nationally Threatened) and Koala no longer found in the Black Range.</p>		

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		<p>The Black Range is an important headwater for the Wimmera river waterway system. Without active mitigation measures, the Black Range can contribute reduced water quality in the system via:- sedimentation of streams, saline ground water flow into streams and depletion of riparian zones.</p> <p>Concongella Creek Reach 49 which rises in the Black Range is a high priority reach for protection.</p> <p>With the increasing rate of a changing climate, native species will require areas of refuge as a buffer to change or as areas of migration to a more suitable habitat. The Black Range is identified as a Priority Functional Zone in the Grampians to Pyrenees Biolink. A healthy and resilient Black Range ecosystem is an important link for the consolidation of strategic regional vegetation/wildlife corridors.</p> <p>Cultural Values:- The aboriginal art site known as Bunjil's Shelter is considered the most significant rock art site in Victoria. The areas around the shelter are accorded the highest archaeological significance. The Black Range was significant to several local aboriginal clans (Clark 1990: 256). There a multiple recorded cultural heritage sites across the Black Range, and potentially further sites which have not been identified and/or recorded. Feral Goats and rabbits heavily utilise and impact on general rock shelters around the Black Range. These shelters are not confirmed cultural heritage sites. But any unrecorded sites are potentially being damaged by Feral Goat and rabbit activity. Feral Goat sign has been observed at other aboriginal cultural heritage sites in the Black Range. Damage to these sites by feral goats is a risk.</p>	H (3)	
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Invasive Animal Species	Priority Criteria	Relevant Justification Information	Ranking	Priority for Action
	Comments			
Feral Goat <i>Capra hircus</i>	Current extent of the species on or near the site	Feral Goats have been observed to be present in the Black Range over a long period. Anecdotal observations of feral goats, feral goat sign and damage has appeared to have increased over the las two decades, and seems apparent over most of the Black Range landscape. It is speculated that goats may have escaped nearby farming operations into the Black Range sometime during this period. The nearby Grampians (Gariewerd) National Park has an established population of feral goats. Concerted efforts to monitor the abundance of the feral goat population in the Black Range is required to get a more reliable understanding of abundance and distribution.	H* (3)	2
	Species invasiveness	With two breeding seasons a year, and twins and triplets common, goat populations can increase by up to 50 percent a year under favourable conditions. (<i>Mahood 1985, Maas and Choquenot 1995, Parkes et al. 1996, Fleming 2004</i>). Feral goats are intelligent animals and adapt to a range of conditions as well as travel long distances to find food or water or to escape hunting pressure. (<i>Agriculture Victoria, Integrated Feral Goat Management Information Note 2022</i>)	M (2)	

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	<p>Current and potential impact of the species</p>	<p>Competition and land degradation by feral goats is listed as a key threatening process under the Environment Protection Biodiversity Conservation Act. Feral goats can affect native flora and fauna by grazing/browsing on native vegetation, thereby preventing regeneration (<i>Harrington 1997, Harrington 1986, Green et al. 1998</i>); by overgrazing, which causes soil erosion (<i>Bayne et al. 2004</i>); by introducing weeds through seeds carried in their dung; and by fouling waterholes. Goats also compound landscape degradation caused by rabbits, but rabbits may have the most profound impacts when both species occur together, (<i>Henzell 1991, Dept. Of the Environment, Water, Heritage and the Arts, Commonwealth of Australia 2008</i>).</p> <p>'From David Cheal's (<i>Cheal.D, Flora Survey Group, CF&L, Melbourne 1987</i>) comments on his assessment sheets (of Vegetation Exclosures) it is obvious that grazing by rabbits, goats, sheep and kangaroos is having a very dramatic effect on the vegetation' of the Black Range.' (<i>McAlpine.I, Correspondence CF&L 1987 Horsham</i>).</p> <p>There a multiple recorded cultural heritage sites across the Black Range, and potentially further sites which have not been identified and/or recorded. Feral Goats and rabbits heavily utilise and impact on general rock shelters around the Black Range. These shelters are not confirmed cultural heritage sites. But any unrecorded sites are potentially being damaged by Feral Goat and rabbit activity. Feral Goat sign has been observed at other aboriginal cultural heritage sites in the Black Range. Damage to these sites by feral goats is a risk. It is suspected that due to their browsing habit feral goats may be spreading boneseed across the Black Range.</p>	<p>M* (2)</p>	
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	<p>Value of the habitat areas that species infests/may infest</p>	<p>The Eastern Black Range is a unique open woodland of mainly Yellow Box and Long Leaf-Box overstorey with a rich diversity of shrubs and ground flora on granitic hills in the upper Wimmera river catchment. Its vegetation is rated in the category as:- Depleted, Endangered, Rare and Vulnerable in the Wimmera Catchment Management Authorities (WCMA) Catchment Management Strategy 2021-2027. The WCMA's objective is to prevent further decline and produce an overall gain in vegetation area and quality.</p> <p>The Black Range has supported a diversity of native fauna, but environmental pressures such as habitat depletion, prolonged drought, increased wildfire frequency/intensity, disease and predation from introduced predators has depleted and/or potentially removed some species from the range over recent decades, ie: Southern Brown Bandicoot (EPBC Listed Nationally Threatened) and Koala no longer found in the Black Range.</p> <p>The Black Range is an important headwater for the Wimmera river waterway system. Without active mitigation measures, the Black Range can contribute reduced water quality in the system via:- sedimentation of streams, saline ground water flow into streams and depletion of riparian zones.</p> <p>Concongella Creek Reach 49 which rises in the Black Range is a high priority reach for protection.</p> <p>With the increasing rate of a changing climate, native species will require areas of refuge as a buffer to change or as areas of migration to a more suitable habitat. The Black Range is identified as a Priority Functional Zone in the Grampians to Pyrenees Biolink. A healthy and resilient Black Range ecosystem is an important link for the consolidation of strategic regional vegetation/wildlife corridors.</p>	<p>H (3)</p>	
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		Cultural Values:- The aboriginal art site known as Bunjil's Shelter is considered the most significant rock art site in Victoria. The areas around the shelter are accorded the highest archaeological significance. The Black Range was significant to several local aboriginal clans (Clark 1990: 256). There a multiple recorded cultural heritage sites across the Black Range, and potentially further sites which have not been identified and/or recorded.		
	Comments	*To accurately quantify the distribution and abundance of feral goats, and then in-turn their current and potential impact on biodiversity in the Black Range. It is necessary to undertake a monitoring program using a reliable monitoring technique.		
Invasive Animal Species	Priority Criteria	Relevant Justification Information	Ranking	Priority for Action
Fallow Deer	Current extent of the species on or near the site	Fallow Deer have been observed to be present in the Black Range only over the last two decades. Anecdotal observations of Fallow Deer, Fallow Deer sign and damage has appeared to have increased over the last two decades, and seems apparent over most of the Black Range landscape. It is speculated that Fallow Deer may have escaped nearby farming operations into the Black Range sometime during this period. Fallow Deer and Sambar Deer populations are distributed across the Pyrenees Ranges and Red and Fallow Deer populations are distributed across the greater Grampians National Park, (Victorian Deer Control Strategy, DELWP 2020, www.delwp.vic.gov.au).	MH* (2.5)	3

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		In Tasmania (Statham and Statham 1996) found that fallow deer had home ranges of 870ha for males and 590ha for females.		
	Species invasiveness	Females usually produce one fawn a year after an 8 month gestation period, giving birth in December/January.	LM (1.5)	
	Current and potential impact of the species	Deer populations can significantly reduce the health of natural ecosystems. Deer contribute to shrub and ground layer disturbance, plant and habitat destruction through grazing. Localised soil compaction and erosion, degradation of waterways and the spread of weeds into new areas. Deer compete with native wildlife for food sources and as deer densities increase in an area, the abundance and diversity of plant species is reduced. Extensive current damage to native flora is evident to trees, shrubs and seedlings. The combined grazing/browsing impact of Fallow Deer, rabbits, feral goats and macropods is potentially a high threat to Black Range biodiversity.	M* (2)	
	Value of the habitat areas that the species infests/may infest	As above.	H (3)	
	Comments	*To accurately quantify the distribution and abundance of fallow deer, and then in-turn their current and potential impact on biodiversity in the Black Range. It is necessary to undertake a monitoring program using a reliable monitoring technique.		
Invasive Animal Species	Priority Criteria	Relevant Justification Information	Ranking	Priority for Action
European Fox <i>Vulpes vulpes</i>	Current extent of the species on or near the site.	It is estimated that there are 7.2 million foxes in Australia based on a density of two foxes per square kilometre. (McLeod 2004). Current density in the Black Range is unknown. Evidence shows that fox predation is a major	MH* (2.5)	4

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		threat to the survival of native Australian fauna. (<i>Saunders et al. in press</i>) Terrestrial mammals at the greatest risk are those that weigh between 35 and 5,500 grams (sometimes referred to as critical weight-range species) and ground nesting birds.		
	Species invasiveness	Vixens give birth to one litter per year of between three to five cubs.	M (2)	
	Current and potential impacts of the species	Current and potential impacts on critical weight range species in the Black Range is somewhat unknown.	M* (2)	
	Value of the species that the species predate or may predate.	There are currently no known occurrences of nationally/state threatened species at threat from fox predation in the Black Range. (www.wcma.vic.gov.au <i>Threatened Fauna List in the Wimmera</i>) Further native fauna research programs in the Black Range would be required in order to provide a reliable assessment of the value of native fauna species at risk. At the time of writing this plan, there is no evidence of the nationally endangered Southern Brown Bandicoot being present in the Black Range.	M* (2)	
	Comments	Further local research of local native fauna species at risk from fox predation is required in order to make a more reliable assessment of predation risks. Due to the abundance and distribution of the fox population across the broader landscape, it is unrealistic to control fox populations and their spread. Therefore management programs should focus on protection of specific high value assets where management can be realistically sustained.		
Invasive Animal Species	Priority Criteria	Relevant Justification Information	Ranking	Priority for Action
Feral Cat <i>Felis actus</i>	Current extent of the species on or near the site.	Feral cats are a serious vertebrate pest in Australia and have severe to catastrophic effects on native fauna, (<i>Woinarski et al. 2014, Threat abatement plan for predation by feral cats,</i>		

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		<i>Australian Govt. Dept. of Environment 2015</i>). Anecdotal reported observations of feral cats in the Black Range appear to be few and only occasional. It is difficult to accurately assess their current distribution and abundance.	LM* (1.5)	5
	Species invasiveness	Female feral cats can have two litters per year with an average of 4.4 kittens per litter. <i>Coman (1992)</i> noted low recruitment rates to feral cat populations in rural Victoria despite high reproductive potential. Feral cat density varies greatly depending on available food supply and appropriate habitat, ie: 0.03 – 4.7 cats /km ² in relatively unmodified and pastoral habitats, (<i>Review of cat ecology and management strategies in Australia, Institute of Wildlife Research School of Biological Sciences, University of Sydney Feb. 2010</i>).	LM (1.5)	
	Current and potential impacts of the species	Feral cats predate on native and non-native fauna up to 2kg, but more frequently below 220 grams. (<i>Review of cat ecology and management strategies in Australia, Institute of Wildlife Research School of Biological Sciences, University of Sydney Feb. 2010</i>).	LM* (1.5)	
	Value of the habitat area/species that the species infests/predates or may infest/predate.	There are currently no known occurrences of nationally/state threatened species at threat from fox predation in the Black Range. (www.wcma.vic.gov.au <i>Threatened Fauna List in the Wimmera</i>) Further native fauna research programs in the Black Range would be required in order to provide a reliable assessment of the value of native fauna species at risk. At the time of writing this plan, there is no evidence of the nationally endangered Southern Brown Bandicoot being present in the Black Range.	M* (2)	
	Comments	Further local research of local native fauna species at risk from feral cat predation is required in order to make a more reliable assessment of predation risks.		

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Value of the habitat areas/species that species infests/predates, may infest/predate	H (3)	H (3)	H (3)	M* (2)	M* (2)
Comments	Can justify rabbits as highest priority as there is robust scientific research both local and state/federal to validate decision.	*More information needed. Feral goats potentially using rock shelters, & impacting cultural sites	*More information needed.	*More information needed. No known "at risk" critical weight range mammals present	*More information needed. Especially limited info. on feral cat distribution and abundance
TOTALS	12	10	9.0	8.5	6.5
PRIORITY @ May 2022	1	2	3	4	5

*Need more information/research.

Value

Rankings = H (3)

= M (2)

= L (1)