

# Abel Ecology

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21 November 2022

Chris Buscall

Snow Hydro Ltd  
PO Box 332  
Cooma NSW 2630

Attention: Chris Buscall

Dear Chris,

**RE: Review of Lobs Hole Road fauna underpass remote camera monitoring for the period of 25 April 2022 to 22 September 2022.**

This letter presents the results of a review of remote camera photos of fauna detected using purpose-built road underpasses along Lobs Hole Ravine Road, Cabramurra NSW. Fauna underpasses along Lobs Hole Ravine Road were installed in response to potential direct impact on threatened small mammal populations through actions of vehicle strike in relation to Snowy Hydro 2.0 construction works, utilisation of the road. Monitoring of the fauna underpasses is guided by procedures outlined by Snowy 2.0 Main Works – Biodiversity Management Plan (BMP) (Revision I, dated 12 Oct 2020), Table 5-1 - BM02, BM03, and BM22, Appendix B and Appendix G.

There are six fauna underpasses along Lobs Hole Ravine Road, each with two (2) remote Reconyx cameras, one at each entrance to the underpass. This is a total of 12 cameras. There are three monitoring periods presented here and these periods are based on when the camera SD cards were retrieved and downloaded by Snowy Hydro Limited (SHL) staff.

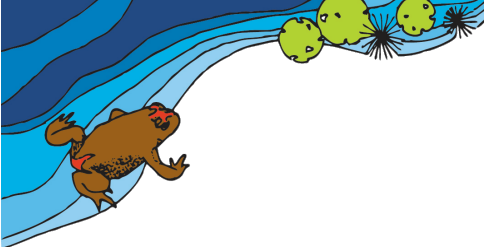
Monitoring periods:

- 25 April – 21 June 2022
- 16 July – 11 August 2022
- 11 August – 22 September 2022.

**BAE Ecology Pty Ltd (T/A Abel Ecology)**  
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ACN 626 221 467 – ABN 37 626 221 467

PO Box 495, Springwood, NSW, 2777  
Unit 2, 10-11 Ferguson Road,  
Springwood, NSW, 2777  
56 Sharp Street, Cooma, NSW, 2630

T (02) 4751 9487  
E [info@abelecolology.com.au](mailto:info@abelecolology.com.au)  
W [www.abelbushfire.com.au](http://www.abelbushfire.com.au)  
W [www.abelecolology.com.au](http://www.abelecolology.com.au)



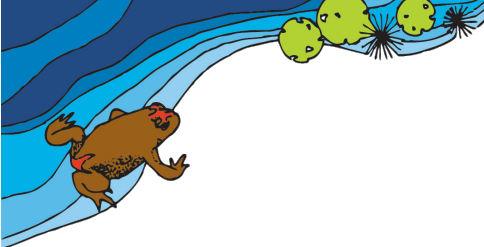
## 1.1 BioNet Atlas of NSW Wildlife website search

Because direct trapping of fauna is not scheduled to occur to identify animals in the hand through accurate morphometric measurement and also because views of lateral and ventral angles of animals is limited, records from the BioNet Atlas of NSW Wildlife website were accessed using the following search criteria to cross-reference local species records and locations:

Licensed Report of all Valid Records of Exotic listed or Native listed Mammals (Class: Mammalia) for a 20 x 22 km square centred on the site (selected area [North: -35.74 West: 148.32 East: 148.54 South: -35.94]). Records since 01 Jan 1990 until 12 October 2022 returned a total of 3,269 individual records from fifteen (15) exotic fauna and thirty-eight (38) native fauna species. Of these records, species unlikely to use the fauna underpasses or not of interest were eliminated from the results. The cleaned results are presented in Table 1.

Data from the BioNet Atlas website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1°; ^^ rounded to 0.01°). Copyright the State of NSW through the Office of Environment and Heritage.

The species in Table 1 have been considered in analysis of underpass photos.



**Table 1. Bionet records search results of relevant small mammals likely to use fauna underpasses in the locality.**

Scientific Name	Common Name	Bionet records for locality since 1 Jan 1990	NSW status	CommWlth. status
<i>Pseudomys fumeus</i>	Smoky Mouse	33	CE	E
<i>Mastacomys fuscus</i>	Broad-toothed Rat	83	V	V
<i>Cercartetus nanus</i>	Eastern Pygmy-Possum	61	V, P	-
<i>Rattus fuscipes</i>	Bush Rat	154	P	P
<i>Antechinus mimetes</i>	Mainland Dusky Antechinus	29	P	P
<i>Antechinus agilis</i>	Agile Antechinus	198	P	P
<i>Antechinus stuartii</i>	Brown Antechinus	1	P	P
<i>Perameles nasuta</i>	Long-nosed Bandicoot	6	P	-
<i>Mus musculus</i> *	House Mouse	45	I	I
<i>Rattus rattus</i> *	Black Rat	11	I	I
<i>Oryctolagus cuniculus</i> *	Rabbit	422	I	I
<i>Vulpes vulpes</i> *	Red Fox	124	I	I
<i>Felis catus</i> *	Feral Cat	49	I	I

### Key

P = Protected

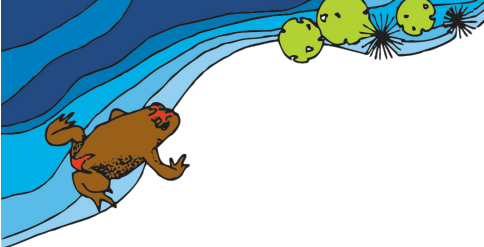
V = Vulnerable

E = Endangered

E1 = Endangered Species

CE = Critically Endangered

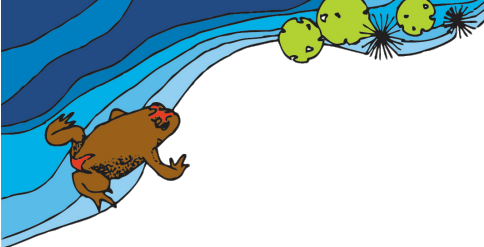
I = Introduced\*



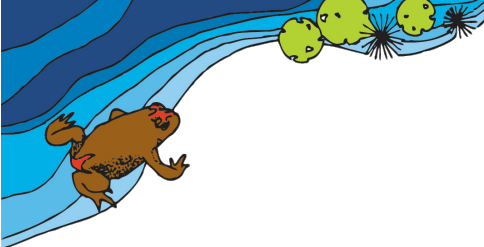
The presence / absence results of the 25 April – 21 June 2022 monitoring period are present in **Table 2**.

**Table 2. Results from reporting period 25 April – 21 June 2022.**

Underpass Location	Species detected	East	West
<b>1</b>	Smoky Mouse	-	-
	Broad-toothed Rat	-	-
	House mouse	●	●
	Feral Cat	●	●
	Bush Rat	-	●
<b>2</b>	Smoky Mouse	-	-
	Broad-toothed Rat	-	-
	House mouse	●	●
	Bush Rat	-	●
<b>3</b>	Smoky Mouse	-	-
	Broad-toothed Rat	-	-
	House mouse	●	●
	Bush Rat	●	●
<b>4</b>	Smoky Mouse	-	-
	Broad-toothed Rat	-	-
	House mouse	●	●
	Red Fox	●	●



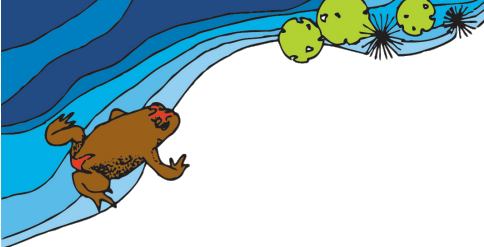
	Feral Cat	●	●
<b>5</b>	Smoky Mouse	-	-
	Broad-toothed Rat	-	-
	Bush Rat	●	●
	House mouse	●	●
	Red Fox	●	●
<b>6</b>	Smoky Mouse	-	-
	Broad-toothed Rat	-	-
	Bush Rat	●	●
	House mouse	●	●
	Red Fox	●	-
	Feral Cat	●	●
	Brown Antechinus	●	-



The presence / absence results of the 16 July – 11 August 2022 monitoring period are present in Table 3.

**Table 3. Results from monitoring period 16 July – 11 August 2022.**

Underpass Location	Species detected	East	West
1	Smoky Mouse	-	-
	Broad-toothed Rat	-	-
	Brown Antechinus	-	●
	Bush Rat	-	●
2	Smoky Mouse	-	-
	Broad-toothed Rat	-	-
	Brown Antechinus	-	●
	Bush Rat	-	●
3	Smoky Mouse	-	-
	Broad-toothed Rat	-	-
	Bush Rat	●	●
4	Smoky Mouse	-	-
	Broad-toothed Rat	-	-
	Bush Rat	●	●
5	Smoky Mouse	-	-
	Broad-toothed Rat	-	-

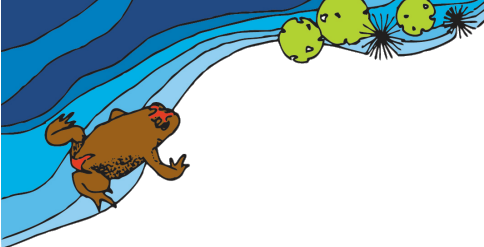


	No records for this period for underpass 5		
6	Smoky Mouse	-	-
	Broad-toothed Rat	-	-
	Bush Rat	-	●
	Brown Antechinus	●	-

The presence / absence results of the 11 August – 22 September 2022 monitoring period are present in Table 4.

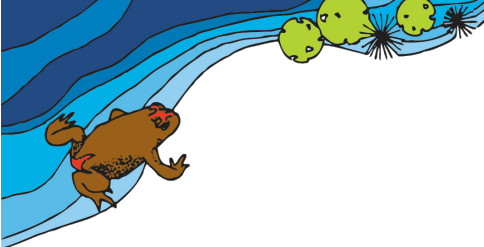
**Table 4. Results from monitoring period 11 August – 22 September 2022.**

Underpass Location	Species detected	East	West
1	Smoky Mouse	-	-
	Broad-toothed Rat	-	-
	Bush Rat	-	●
	White-browed Scrubwren ( <i>Sericornis frontalis</i> )	-	●
2	Smoky Mouse	-	-
	Broad-toothed Rat	-	-
	House mouse	●	●
	Bush Rat	●	●
	Brown Antechinus	●	-
3	Smoky Mouse	-	-



	Broad-toothed Rat	-	-
	Bush Rat	●	●
	Grey Fantail ( <i>Rhipidura albiscapa</i> )		●
4	Smoky Mouse	-	-
	Broad-toothed Rat	-	-
	Bush Rat	●	●
5	Smoky Mouse	-	-
	Broad-toothed Rat	-	-
	Bush Rat	●	●
6	Smoky Mouse	-	-
	Broad-toothed Rat	-	-
	Bush Rat	●	●
	Rabbit	●	●
	Brown Antechinus		●
	Bird sp.		●





## 2 Discussion

With a reasonable level of confidence, no presences of Smoky Mouse or Broad-toothed Rat were recorded using the underpasses during the 25 April 2022 to 22 September 2022 reporting period. Species recorded that are similar in size and shape were House Mouse and Bush Rat. All mouse sized individuals recorded were brown to light-brown in colour, no image recorded provided the diagnostic features to confirm the present of Smoky Mouse. Similarly, the Bush Rats caught on camera were quite dark brown as opposed to descriptions of lighter coloured individuals from reference text. No image recorded provided the diagnostic features to confirm the present of Broad-toothed Rat. This conclusion also reflects the spatial distribution of public species records for Broad-toothed Rat and Bush Rat within the Snowy Hydro 2.0 project area. Broad-toothed Rat has not previously been recorded along Lobs Holes Ravine Road (EMM 2020; BMP 2020).

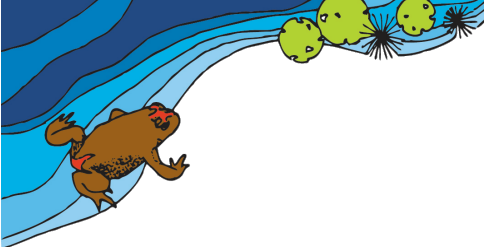
The level of fauna activity within the underpasses was highest during the 25 April – 21 June 2022 monitoring period, where a significant amount of camera triggers was due to the presence of House Mouse. The period also coincided with the greatest reporting of feral predators (red fox and cats) ‘within’ the underpass entrances. It is unclear if introduced predators were able to move freely through the underpasses and or were successfully predated within the underpasses, however we did record three House Mice on three different occasions with injured tails during this period. House Mouse was not detected at all during the 16 July – 11 August 2022 monitoring period (height of recorded snow fall), and only recorded at Underpass 2 during the 11 August – 22 September 2022 monitoring period. The presence of foxes and cats appears to be linked to the presence of House Mouse, as no foxes or cats were recorded in the underpasses after 21 June 2022. The design of the underpasses was to have obstructive habitat within the underpasses to facilitate threatened fauna movement through the underpasses and to exclude feral predators. This design feature is currently being real-world tested by onsite feral predators. We recommend a site inspection is made to determine if improvements can be made to deny predator entry into the underpasses past the camera positions.

The detection of two native species (Brown Antechinus and Bush Rat) using the underpasses is a positive outcome, and this is an event that SHL should strive to maintain and improve.

Incidental records of Grey Fantail and White-browed Scrubwren within the underpass entrances were interesting and unexpected. Small birds are not expected to forage or to go beyond the entrance to pass through the underpass.

Rabbit/s were recorded from one underpass (#6) during the 11 August – 22 September 2022 monitoring period. The underpass would offer temporary shelter to rabbits.

It was / is essential that the area of the underpass within the photo frame of the cameras be cleared of debris (e.g. habitat rocks) so the animals are ‘in-focus’ when the photo/s are taken. The presence of habitat rocks generated many out-of-focus images of fauna, however the obstacles did encourage individuals into different postures to get better views of undersides, faces, and feet to aid identification. It is essential that cover (e.g. habitat rocks) are maintained or increased to strongly inhibit predator movement through the underpasses and provide habitat connectivity for native fauna.



To improve the success of the fauna underpass monitoring program the installation of timber or metal rulers (30cm) is recommended within the photo frame of the cameras. This is to ensure we capture a reliable scale of the animals using the underpasses. A marking (paint or tag) to indicate the direction of the underpass entrance within the photo frame of the remote cameras is recommended. Additionally, a marking (paint or tag) within the photo frame of the cameras to indicate which underpass camera the photo was taken at is also recommended.

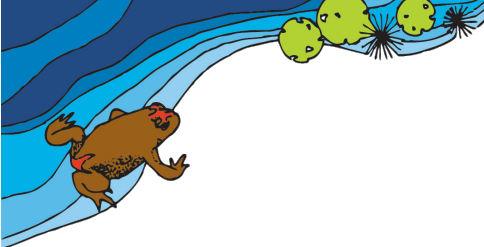
A successful movement will be determined through an animal being detected on both cameras at around the same time period. The success of this performance criteria has not been analysed or reported here.

### 3 Conclusion

The six fauna underpasses are functioning as a corridor for small mammal movement. The target species - Smoky Mouse and Broad-toothed Rat have not yet been recorded utilising the underpasses. Eastern-Pygmy Possum *Cercartetus nanus* was not recorded during this reporting period.

The detection of two native species (Brown Antechinus and Bush Rat) using the underpasses is a positive outcome, and this is an event that SHL should strive to maintain and improve.

Of concern is the significant presence through the early period of reporting of feral predators, which appear to be focusing on the underpasses during periods of a high or dispersing House Mouse population.



## 4 Recommendations

For the continued monitoring of six fauna underpasses along Lobs Hole Ravine Road, Cabramurra NSW, the following recommendations are made in accordance with the Snowy Hydro Limited document Snowy 2.0 Main Works – Biodiversity Management Plan (BMP), Biodiversity Monitoring Program and Fauna Strike Mitigation Strategy:

1. Presence and pressure from feral predators has been detected at underpasses #1, #4, #5, and #6. To take reasonable 'in focus' photos, subject animals must be on the floor of the underpass, therefore we support the removal of obstructive habitat within the photo frame of the cameras. However, it has been demonstrated that feral predators are entering the underpasses at least as far as the camera positions. We recommend a site inspection is made to determine if improvements can be made to deny predator entry into the underpasses past the camera positions.
2. The installation of timber or metal rulers (30cm) is recommended within the photo frame of the remote cameras. This is to ensure we capture a reliable scale of the animals using the underpasses. We recommend two (2) rulers running parallel to the underpass, one on either side of the photo frame. Rulers and glue were provided to SHL (Emily Martin) by Abel Ecology for installation 1 July 2022.
3. A marking (paint stencil or tag) to indicate the direction of the underpass entrance within the photo frame of the remote cameras. Additionally a marking (paint stencil or tag) within the photo frame of the remote cameras to indicate which underpass camera the photo was taken at.
4. Continue small terrestrial mammal presence/absence monitoring as per Table 5-2 of site BMP (2020) in the vicinity of the fauna underpasses.
5. Continue feral animal presence/absence monitoring as per Table 8-1 of site BMP (2020).
6. Implement Smoky Mouse and Broad-toothed Rat pest animal mitigation strategies as per Table 5-3 of site BMP (2020).

Yours faithfully,

Mark Mackinnon

Abel Ecology