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Koala surveys in Kosciuszko National Park

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Contents

CRICOS Provider #00120C

Summary

Kosciuszko National Park has not previously been formally surveyed for koalas (*Phascolarctos cinereus*), despite the presence of potentially suitable habitat and scattered sightings of koalas over the last 60 years. With koala numbers declining substantially across NSW in recent times, there is a need to better understand their distribution within the State, particularly in locations where data are currently scarce. The aim of the study reported here was to undertake preliminary surveys to determine whether koalas occur in Kosciuszko National Park and to inform future work to understand their habitat preferences and distribution.

Between November 2021 and February 2022, 92 passive acoustic and 26 spotlighting surveys were conducted in Kosciuszko National Park. From the acoustic recordings, male koala calls were identified at 14 sites, all of which were within the south-eastern portion of the Byadbo Wilderness Area. Although koalas were not observed during spotlighting surveys, seven other species of arboreal marsupials were recorded across the Park. These included two threatened species, the southern greater glider (*Petauroides volans*) and the yellow-bellied glider (*Petaurus australis*), for which there are limited previous records within Kosciuszko National Park.

SongMeter Mini passive acoustic recorders appeared to be more effective for detecting male koala bellows in Kosciuscko National Park than Audiomoth acoustic recorders. When koala bellows were detected at a site, the first bellow was recorded within one to 12 nights of recorder deployment, with almost 80 % of first detections occurring in the first four nights. During late December, January and February, when the surveys took place in Byadbo Wilderness, koalas bellows were recorded most commonly between 2100 h and 0500 h. The pattern and frequency of bellowing outside of the survey months is not known. This information would be valuable for determining optimal timing for ongoing monitoring of koalas in Kosciuszko National Park.

The study confirms that koalas are present in at least 300 km^2 within the south-eastern region of Kosciuszko National Park. The low rate of positive detections (26 % of recorders deployed in Byadbo and 15 % overall) suggests that koala densities are likely to be relatively low in the areas that were surveyed, but this requires further assessment to confirm. Due to time constraints, surveys were restricted to areas that 1) were accessible during the unseasonable wet weather, and 2) contained predicted medium to high quality habitat. Thus, koalas may also be present in other areas of Kosciuszko National Park that were not surveyed during the 2021-22 breeding season. These limitations could be addressed by expanding the study in future years.

CRICOS Provider #00120C

Background and objectives

Kosciuszko National Park (KNP) contains large tracts of eucalypt forest and woodland that are potentially suitable habitat for threatened arboreal marsupials, including koalas. More than 1,800 km^2 of KNP has been mapped as moderate to highly suitable koala habitat in the NSW State Government's koala habitat information base (State Government of NSW and Department of Planning Industry and Environment 2019a), and the Park contains a variety of eucalypt species known to be eaten by koalas. However, since 1940, only 16 koala sightings have been reported in NSW BioNet for KNP, along with a handful of camera detections that have not yet been entered into the database (personal communication from KNP staff). The small number of records probably reflects the lack of targeted koala surveys in KNP.

In the past, a limitation of surveying arboreal marsupial fauna across KNP has been the difficulty in efficiently searching large areas of remote and rugged terrain. Even in more accessible areas, traditional search methods, such as spotlighting and scat searches, often fail to detect koalas when population densities are low (Jiang et al. 2019, Wilmott et al. 2019). Recently, there have been a number of technological advances in wildlife survey methods that help to overcome some of the limitations of more traditional survey methods. For example, it is possible to detect vocal fauna species, such as male koalas and yellow-bellied gliders, using passive acoustic recording units (Hagens et al. 2018, Law et al. 2018, Whisson et al. 2021). These acoustic recorders can be deployed strategically across a large number of sites during koala breeding season (spring and summer), and the sound files can be analysed for characteristic vocalisations using machine learning protocols, substantially increasing the chance of detecting cryptic species (Law et al. 2018). Complementary spotlighting can also provide valuable additional data on the presence of other species of arboreal marsupials (Cripps et al. 2021).

The aim of this project was to: 1) identify and select potential survey sites for koalas, and 2) undertake preliminary surveys for koalas to better understand their occurrence and distribution in KNP. The work is a critical first step in identifying areas of conservation significance for koalas in KNP and will provide valuable baseline data within the NSW Koala Monitoring Framework (NSW Department of Planning, Industry and Environment 2021).

Methods

Site selection

Geospatial data were obtained for:

1) Predicted koala habitat suitability (State Government of NSW and Department of Planning Industry and Environment 2019a)
2) Likelihood of the presence of tree species known to be used by koalas (State Government of NSW and Department of Planning Industry and Environment 2019b)
3) Vegetation class and plant community type (NSW Department of Planning Industry and Environment 2020)
4) 2019-2020 fire extent and severity (State Government of NSW and Department of Planning Industry and Environment 2020)
5) Topography and elevation (NSW Department of Planning Industry and Environment 2019)
6) Recent (< 5 years) and historical (5 - 60 years) koala sightings from local rangers and NSW BioNet online resource

The study design specifically considered habitat suitability and previous koala sightings in the first instance because these parameters are most likely to lead to the selection of sites with the highest probability of locating koalas if they occur in KNP. To facilitate site selection, Kosciuszko National Park was divided into 3 km x 3 km grid squares in ArcGIS Desktop 10.8.1 (Esri Inc.). A single survey site was selected within each grid

CRICOS Provider #00120C

cell through which a road or track passed if either: a) at least one third of the cell contained moderate to high suitability habitat based on the NSW koala habitat suitability model, or b) the cell contained a previous koala sighting, even if koala habitat was of low predicted suitability. A further condition was that each survey site had to be at least 1 km away from any sites in adjacent cells to ensure that a single bellow was detected on only one acoustic recorder (approx. 150 - 300 m detection range; Hagens et al. 2018, Law et al. 2018). At a spacing of 1 km, the home range of a single koala may encompass more than one acoustic recorder. However, because little is known about habitat use and koala densities in KNP, it is appropriate to use multiple acoustic recorders within a relatively small area to increase detection probability. Selected survey sites were always close to roads to reduce deployment time, and thus maximise the number of sites that could be surveyed in the short time frame of the project, which began part way through the 2021-2022 koala breeding season. This resulted in the initial selection of 134 potential sites (Figure A 1).

Spring and summer 2021-2022 were exceptionally wet, making road access to some of the selected sites difficult or impossible, especially in the Pilot Wilderness in south-west KNP. However, during field work, we also encountered accessible areas with potentially suitable koala habitat that had not been identified during computer-based site selection. Some of these areas were subsequently incorporated into our surveys. Koala surveys were therefore conducted at 118 sites using a combination of spotlighting and passive acoustics. Scat searches were not conducted, although any incidental sightings of probable koala scat were recorded. The surveyed sites encompassed 25 different plant community types from 10 vegetation classes across a range of elevations (< 600 m to > 1,000 m ASL) and fire severities (unburnt to extreme burn severity). These are summarised in the tables and figures in the appendix.

Spotlighting surveys

Spotlighting surveys were undertaken at 26 sites using the double observer method (Cripps et al. 2021). Specifically, we walked along a road or track for 300 m at a pace of 100 m per 10 minutes, while using a handheld spotlight to search for arboreal marsupials within 50 m of both sides of the transect. Two observers searched the transect independently, with the second observer at least 10 minutes behind the first. Spotlighting surveys are likely to be less efficient than acoustic surveys for detecting koalas in low-density populations (Law et al. 2018), and detectability is also affected by factors such as forest height and canopy complexity. However, despite these limitations, spotlighting surveys can assist with determining the presence of other nocturnal arboreal marsupials that cannot be detected with acoustic recorders, such as the greater glider (*Petauroides volans*).

Acoustic surveys

Audiomoth (Open Acoustic Devices, England) or SongMeter Mini (Wildlife Acoustics, USA) passive acoustic recording devices were placed at 92 sites throughout KNP. Recorders were attached to small trees (< 10 cm diameter at breast height) at a height of 1.5 m, and were set to record continuously from 2000 h to 0600 h daily for 12-19 days per site. The length of deployment was adjusted according to weather, because koala calls are less likely to be detected during rain or strong winds (Law et al. 2020). It has been estimated that, in the absence of wind or rain, ten days is sufficient to detect koalas in low density populations in Victoria (Hagens et al. 2018).

Acoustic recordings were processed by the Forest Science Unit at NSW DPI using an automated koala call recogniser to identify potential male koala bellows (Law et al. 2018). Any potential calls identified by the software were then checked manually to remove false positives.

Vegetation assessment

Rapid vegetation assessments were undertaken to determine the eucalypt species composition within 50 m of each acoustic recorder, or at the centre of each spotlighting transect. Specifically, we identified the dominant, co-dominant and sub-dominant eucalypt species, and estimated their proportional contribution to above ground biomass.

Results

No koalas were observed during the 26 spotlighting surveys (Table A 7), but seven other arboreal marsupial species were recorded (Table 1; Figure 1, Figure 2).

Table 1. Summary of arboreal marsupials observed by spotlighting.

Animal	**Scientific name**	**Number observed**
Common brushtail possum	*Trichosurus vulpecula*	20 (+ 4 dependent young)
Mountain brushtail possum	*Trichosurus cuninghamii*	5
Common ringtail possum	*Pseudocheirus peregrinus*	2
Southern greater glider	*Petauroides volans*	1
Krefft's glider	*Petaurus notatus*	4
Squirrel glider	*Petaurus norfolcensis*	1
Yellow-bellied glider	*Petaurus australis*	4

Figure 1. A mountain brushtail possum seen during a spotlighting survey at site KNP151 (see Table A 7 for site details) on Blue Creek Trail on 16 December 2021.

CRICOS Provider #00120C

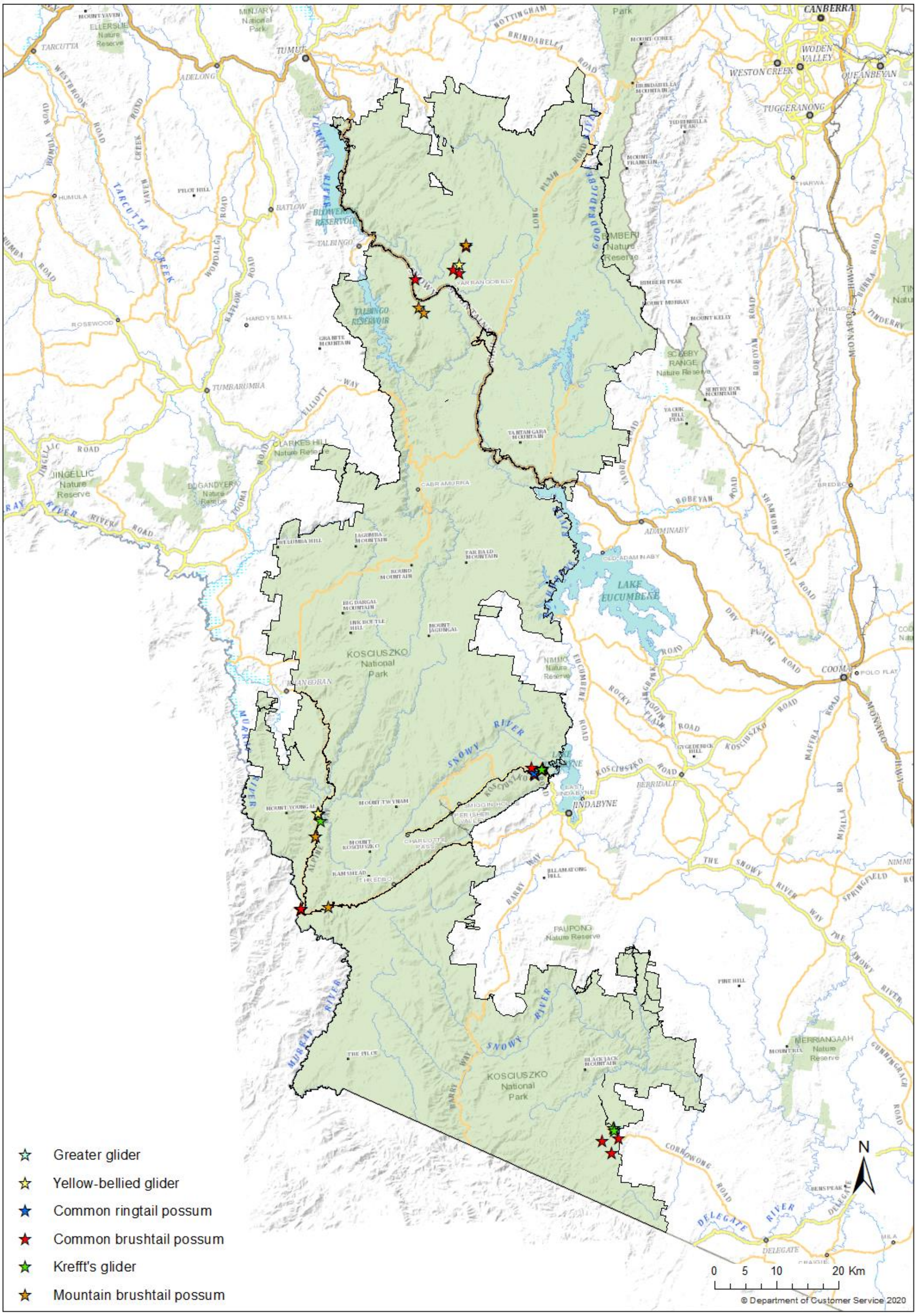

Figure 2. Locations of all arboreal marsupials observed during spotlighting surveys.

CRICOS Provider #00120C

One hundred and twenty-two bellows from male koalas were detected on passive acoustic recordings at 14 of 92 acoustic survey sites in KNP (Table 2; Figure 3; Figure 4). The number of bellows detected varied between 2 and 25 per site (Table 2; Figure 5), with an average of 0.56 bellows detected per recording night at active sites (i.e. sites at which koalas were detected). Bellow detections occurred in late December (2 bellows per recording night), January (0.9 bellows per recording night) and February (1 bellow per recording night). At 79 % of active sites, bellows were detected within the first four days of acoustic recorder deployment. Bellows were detected across all recording hours (2000 h to 0600 h), but 98 % of detections occurred between 2100 h and 0500 h (Figure 6).

Table 2. Koala bellow detections at sites within Byadbo Wildnerness Area, KNP. See Table A 7 for additional details about each site.

Site name	Number of bellows	Number of days recorder deployed	Number of days on which bellows were detected	Days until first detection	Month of detection
KNPS5	8	16	5	1	Dec, Jan
KNPS7	3	15	2	3	Dec
KNPS30	17	16	6	3	Dec, Jan
KNP172	2	16	1	1	Jan
KNP179	5	16	1	1	Jan
KNP189	25	15	11	1	Feb
KNP190	2	13	1	4	Feb
KNPS31	11	16	5	8	Jan
KNPS311	14	15	5	6	Jan
KNPS40	5	16	2	12	Feb
KNP185	4	16	2	1	Feb
KNP187	11	14	5	1	Feb
KNP188	3	16	2	4	Feb
KNPS41	12	16	4	4	Jan

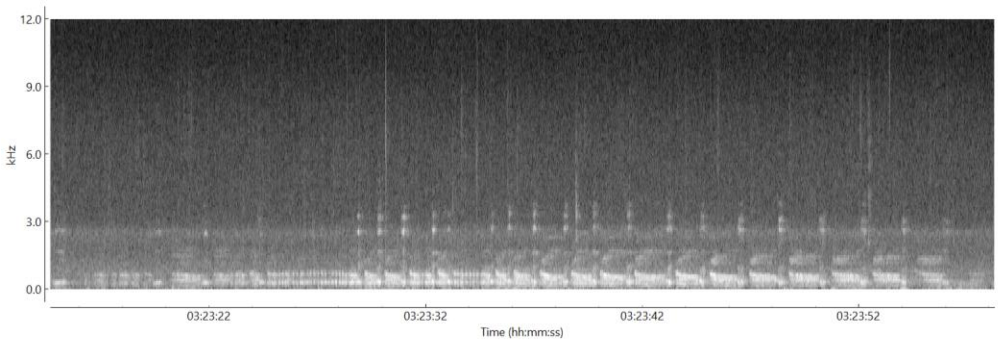

Figure 3. Audio spectrogram of a male koala bellow recorded on 18/01/2022 at site KNPS311 in Byadbo Wilderness Area.

CRICOS Provider #00120C

All koala detections were within an area encompassing around 300 km^2 in the Byadbo Wilderness Area (Figure 4; Figure 5), which was surveyed from late December 2021 to mid-February 2022. Two other arboreal marsupials, the common brushtail possum and Krefft's glider, were observed during the five spotlighting surveys that were undertaken in Byadbo. Possible koala scats were observed at another two sites outside Byadbo, near Island Bend and Lower Kosciuszko Road (Figure 4; Figure 7) in November 2021, but koala bellows were not detected at those locations.

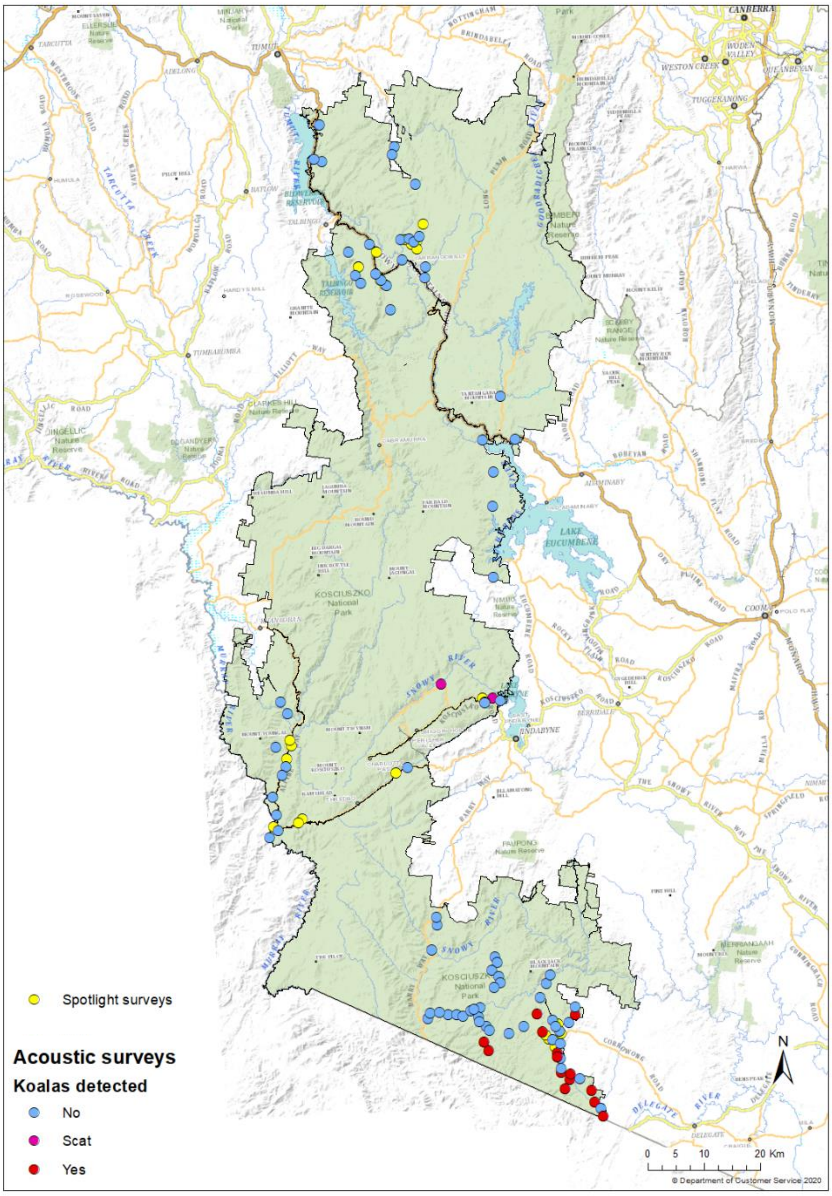

Figure 4. Locations of spotlighting (yellow) and acoustic surveys in Kosciuszko National Park. The acoustic survey points are coloured to indicate whether koalas were detected (red) or were not detected (blue). Locations at which possible koala scats were observed are coloured pink.

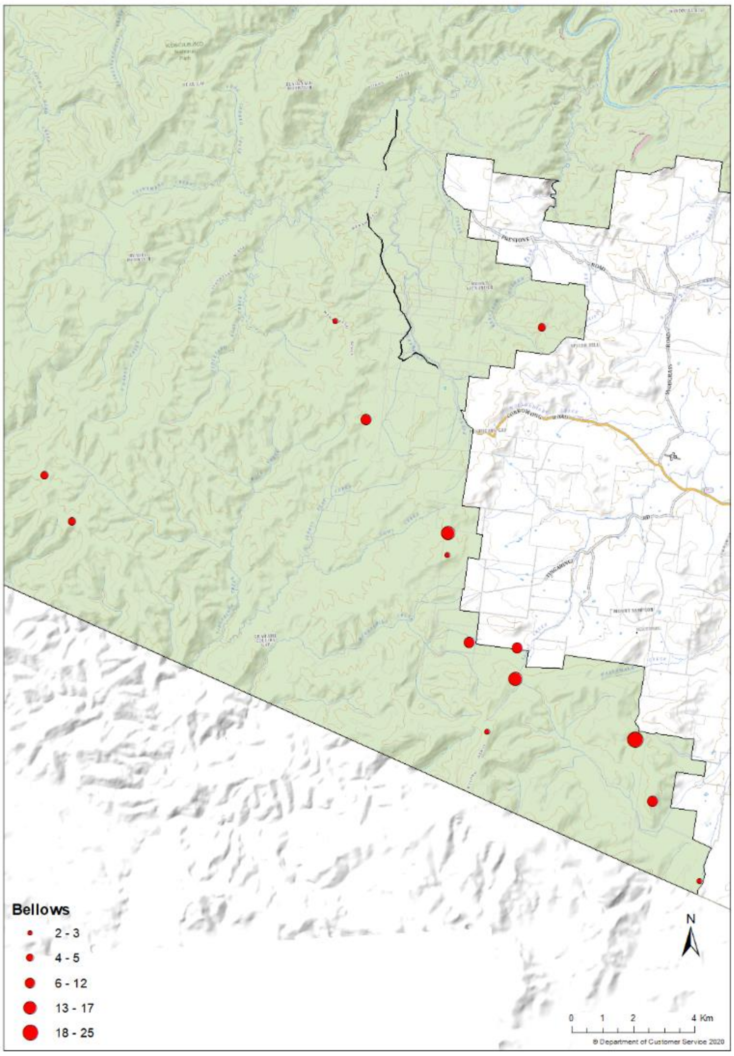

Figure 5. Sites at which male koala bellows were detected during passive acoustic surveys in the Byadbo Wilderness Area, Kosciuszko National Park. The size of circles is proportional to the number of bellows detected.

All koala detections were on SongMeter Mini acoustic recording devices. Almost 40 % of the 36 SongMeters deployed in Byadbo recorded male koala bellows, or just over 20 % of all SongMeters deployed across KNP throughout the study (n = 63). Male koala bellows were not detected on any Audiomoth acoustic recorders deployed in Byadbo Wilderness (n = 17) or elsewhere in KNP (n = 12).

All sites where koalas were detected were classified as having a very low to low probability of the presence of tree species known to be used by koalas (Table A 2), and almost 80 % had moderate or lower predicted koala habitat suitability (Table A 3) and were above 1,000 m in elevation (Table A 4). During on-ground surveys, the most common eucalypt species observed within 50 m of acoustic recorders at sites at which koalas were detected were *Eucalyptus dives* and *E. dalrympleana* (Figure 8). Other eucalypt species that were recorded within the vicinity of acoustic recorders at active sites were *E. delegatensis*, *E. macrorhyncha, E. mannifera, E. pauciflora*, *E. radiata*, *E. rubida* and *E. viminalis* (Figure 8).

CRICOS Provider #00120C

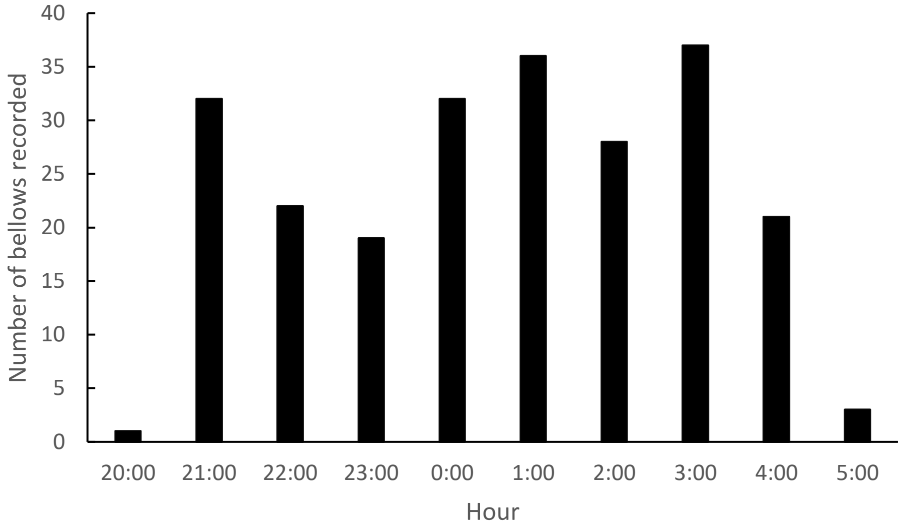

Figure 6. Hourly distribution of koala bellows detected on passive acoustic recordings.

Figure 7. A possible koala scat observed at site KNP135 (see Table A 7 for site details) near the Island Bend Campground on 17 November 2021.

CRICOS Provider #00120C

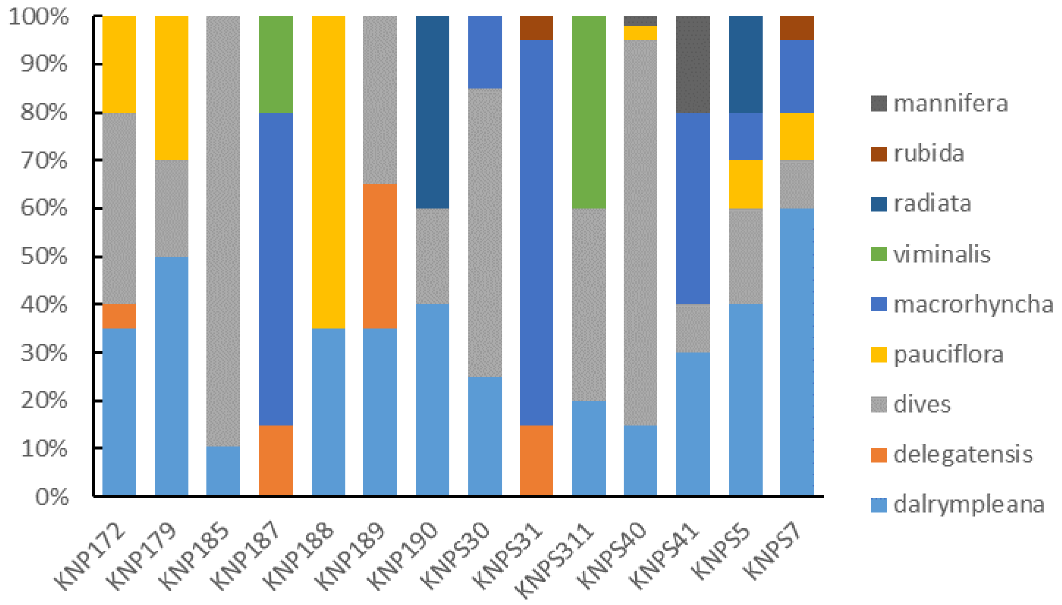

Figure 8. Proportions of eucalypt species recorded during on-ground surveys within 50 m of acoustic recorders at sites at which koalas were detected.

Discussion

Preliminary passive acoustic surveys in KNP clearly demonstrate the presence of koalas in at least the Byadbo Wilderness Area. KNP staff have reported several camera records of koalas over the last five years in the vicinity of one of the Byadbo acoustic survey sites, but the current study extends the area of known koala presence to the south, east and west by more than 10 km in each direction. Spotlighting surveys also identified new locations where the vulnerable greater glider and yellow-bellied glider occur in northern and western KNP. There was no overlap between observations of these species and the acoustic detection of koala bellows. However, it would be necessary to conduct additional targeted surveys stratified across the available plant community types to determine whether their habitat preferences differ within KNP.

Koalas were not observed while spotlighting, even when surveys were conducted close to locations at which they were detected on acoustic recordings. This supports suggestions that, at low densities and/or in areas with high or complex canopy cover, koalas are less likely to be detected by spotlighting than with passive acoustics and other methods such as thermal drones (Law et al. 2018, Witt et al. 2020). While spotlighting remains a viable and complementary method to investigate the occurrence of other arboreal marsupials in KNP, it should not be the primary method used for surveying koalas.

Two types of passive acoustic recording units (Audiomoths and SongMeter Minis) were used during acoustic surveys in KNP. The microphone used in SongMeters is likely to detect koalas at a greater distance than that in Audiomoths (Law et al. 2022), although the two have not been directly compared. Both types of recorders have been used successfully to detect koalas in previous studies (Hagens et al. 2018, Law et al. 2018, Law et al. 2020, Law et al. 2022), with Audiomoths gaining popularity because they are small and easy to deploy and are also substantially cheaper than SongMeters. In the current project, koalas were never detected on Audiomoths in KNP, even though the two types of recorders were deployed simultaneously and in nearby locations. Given the substantial difference in detection rates between them (almost 40 % of SongMeters vs 0 % of Audiomoths in Byadbo), it is likely that Audiomoths failed to detect koalas at some locations where they

CRICOS Provider #00120C

were present. SongMeters may therefore be more appropriate for monitoring koalas in KNP, although further investigation is needed to determine why. It would be valuable to compare the efficacy of the two recorder types by deploying both at the same location, and also to accurately determine detection distances in the different vegetation types and topography in KNP.

All passive acoustic koala detections in the current study occurred during late December, January and February. This is later in the breeding season than was found to be optimal for the detection of koalas on the NSW north coast (detections declined from September to December) (Law et al. 2018), although Hagens et al. (2018) found that acoustic sampling in Victoria was more effective during the late breeding season (December/January) than early (August/September). In the current study, it is clear that koalas can be detected via passive acoustic surveys in January and February in KNP. Several studies suggest that koalas bellow less frequently on warmer nights, possibly because bellowing has high energy costs (Ellis et al. 2011, Law et al. 2018, Law et al. 2020). It is possible that the cooler climate of KNP, or the generally cooler spring/summer of 2021-22 would allow koalas to bellow over a longer time period during the breeding season.

Almost 80 % of the sites at which koalas were detected in the current study were above 1,000 m ASL. This runs counter to previous suggestions that koalas are more likely to be found at lower elevations (Kavanagh et al. 1995, Moore et al. 2004, Law et al. 2018). For example, Law et al (2018) found that sites on the NSW north coast above 1,000 m ASL had the lowest occupancy rates, although these sites were also less likely to have suitable koala browse trees. In the NSW Monaro region, koalas are often found at elevations above 1,000 m, although they also chew the bark of salty trees to obtain adequate dietary sodium (Au et al. 2017). Apart from *E. delegatensis*, all of the eucalypt species present at sites at which koalas were detected in KNP are also found in koala habitat in the Monaro region, and some, such as *E. mannifera, E. viminalis, E. dalrympleana* and *E. rubida* are known to be eaten by koalas in reasonable amounts. Koala browse trees may therefore be more readily available at higher elevations in southern NSW than elsewhere in the State. This should be taken into consideration when assessing koala habitat suitability in KNP.

Most sites at which koalas were detected were at the lower ends of the scale for both the NSW koala tree index and habitat suitability models. There are a variety of reasons why koalas might be found at these locations rather than at predicted higher quality sites, but one important possibility is that information about koala habitat and tree species preferences from other locations in NSW may not adequately predict koala habitat characteristics in KNP. Koalas eat a wide variety of eucalypt species across their distribution (Moore and Foley 2000), and species that are preferred in one area may be eaten relatively little in another. Thus, it can be difficult to extrapolate habitat suitability parameters from well-studied areas to other areas where relatively little is known about koalas. It would be valuable to collect additional data on the habitat in which koalas are located in KNP to assist with refining models to improve habitat suitability predictions in the region.

It is not possible to determine from the current study whether the 2019-20 fires affected the distribution and/or abundance of koalas in KNP. Koalas were not observed in any surveyed areas of KNP that burnt in 2019-20, but they were also not observed in nearby areas of similar habitat types that did not burn. We did not, however, undertake a detailed analysis of plant community type by fire severity to quantify this. Koalas may have been absent from areas that burnt pre-fire, or the survey methods or survey timing may have been insufficient to detect any koalas present. Certainly, koalas can live in burnt and recovering habitat provided they survive the initial effects of the fire (Lunney et al. 2004, Matthews et al. 2007, Matthews et al. 2016). Furthermore, other arboreal marsupials were recorded in burnt habitat in KNP during spotlighting surveys, demonstrating that some animals did survive and/or have recolonised local eucalypt forests post fire.

Limitations

The timing of passive acoustic surveys in the current study (November to February) was dictated by a combination of Covid-19 lockdowns, the timing of funding, and constraints on access due to poor weather

CRICOS Provider #00120C

and road conditions. The optimal period for detecting male koalas during the breeding season can differ between regions due to variation in the peak timing of bellowing (Hagens et al. 2018, Law et al. 2018). In KNP, nothing is known about whether male koalas bellow more frequently during the early (e.g. September/October) or late (e.g. December/January) breeding season. We considered this in our survey design by deploying each acoustic recorder for at least ten days, which is the recommended timing to maximise detection probability at sites with low densities and outside of peak breeding season (Hagens et al. 2018). Although we detected twice as many bellows during late December compared to January or February, the sample size from these preliminary surveys is too small to make any meaningful conclusions. It remains possible that the lack of detection of koalas outside of Byadbo, including at sites where koala-like scats were observed, was because these sites were surveyed in November and early December, whereas Byadbo sites were surveyed in late December, January and February. On the other hand, if spring is the peak time for calling, koalas may have been detected at additional sites in Byadbo if it had been possible to deploy recorders there earlier. These considerations could be addressed in future studies by monitoring bellow frequency throughout the breeding season at sites in KNP that are now known to support koalas.

Male koalas are more vocal than females, which means that females are generally under-represented in passive acoustic recordings (Hagens et al. 2018). In addition, sound recognition software cannot be used to detect female calls at this stage. There is an underlying assumption that the presence of male koalas indicates the co-occurrence of females, which, in most situations, is likely to be correct. For example, Law et al. (2021) found a 1:1 sex ratio of male:female koalas at acoustic survey sites in northern NSW. The widespread nature of koala detections in Byadbo suggest that the majority of detections are likely to be due to resident males rather than those that are dispersing, and that female koalas are therefore also present. Nevertheless, further research, such as locating and observing individuals or sexing koalas from their scats, would be needed to confirm this.

Different numbers of bellows were detected at different sites. Hagens et al. (2018) found a significant relationship between koala density and the number of bellows recorded, suggesting that the number of calls may indicate relative koala abundance. However, this has not been widely validated. Currently, the occurrence of bellows on a single acoustic recorder demonstrates koala presence at a site but cannot be used to determine how many individual koalas were recorded. There is also the possibility that one koala might be detected on multiple recorders depending on the home range sizes of individuals, which can be highly variable between populations and are not known for KNP. Data from the nearby NSW Monaro region suggests that GPS-tracked male koalas moved 328 m per night on average during summer (M. Lane and K. Marsh, unpublished data). One resident male koala was recorded 4.5 km from his capture location during the 9-month study, but most other males remained within 1 km of their capture location (M. Lane and K. Marsh, unpublished data). In KNP, all sites at which koalas were detected were a minimum of 1 km (and up to 25 km) apart, suggesting that the findings could represent at least 14 different males. Nevertheless, given the limitations outlined here, additional methods would be needed to estimate koala density and abundance in KNP.

The breadth of locations selected for koala surveys in Tranche 1 of this study focussed on accessible areas in the vicinity of habitat of predicted moderate to high quality and/or where koalas have previously been recorded. These selection criteria were appropriate given the need to collect preliminary evidence of koala occurrence in KNP, in a very short timeframe. The sites that were actually surveyed were further restricted by a lack of access to some areas due to exceptionally wet weather, and from the need to deploy acoustic recorders for longer periods per site to achieve at least ten days of recordings during clear weather. Thus, some selected sites with predicted high quality koala habitat (e.g. in south-east and north-west KNP) were not surveyed in the current study. These sites could be prioritised in the next breeding season, and the study could also be expanded to incorporate areas that are more remote, including lower slopes or gullies that may contain koala browse species that are less common near roads or that have been less impacted by fire. Future surveys should also consider areas that are currently predicted to be of lower habitat quality for koalas. This would assist with determining the ecological and environmental factors that influence koala

CRICOS Provider #00120C

habitat quality in KNP and whether they are adequately captured in NSW habitat suitability models that are based on data from koalas in other regions.

Recommendations

This project has confirmed the presence and extended the known range of koalas in the Byadbo Wilderness Area of KNP. It is also possible that the species occurs in the Island Bend and Lower Kosciuszko Road areas. There is significant potential to expand the breadth of surveys within KNP under Tranche 2 to incorporate additional high-priority areas, such as Pilot Wilderness and north-eastern KNP, and to address some of the identified gaps and limitations that occurred due to the short time frame of Tranche 1. The site characteristics of koala locations identified in the current study could also be used to identify additional priority locations for targeted surveys. A second phase of this work would likely be more productive in terms of detections because it could begin earlier in the breeding season and could target key areas that were not accessible this year. Furthermore, the addition of a more balanced selection of sites would allow investigation of how koala occurrence relates to a variety of environmental characteristics, such as tree species composition, elevation and fire history. For example, future surveys could be stratified by plant community type rather than by habitat suitability given that koala detections always occurred in apparently low-quality habitat. This would address the bias in the current study and allow more accurate mapping of absence. Survey sites could be designed, planned and coordinated in conjunction with the NSW state-wide survey, where appropriate, to ensure that the work was complementary.

Given how little is known about the koala population in KNP, additional work should also be undertaken to determine, for example, abundance, population health (e.g. presence and impact of chlamydia), genetics (e.g. sex ratios, genetic diversity and relatedness to other Victorian and NSW populations), diet, and preferred habitat characteristics. These factors are important for providing baseline data for future monitoring under the NSW Koala Monitoring Framework (NSW Department of Planning, Industry and Environment 2021), understanding the longer-term conservation requirements of the population, and establishing the role of KNP in conserving koalas in NSW.

Future acoustic surveys in KNP and any ongoing monitoring using passive acoustics should utilise SongMeter recording units rather than Audiomoths to facilitate more effective detection of koalas. Koala bellows were detected predominantly between 2100 h and 0500 h, and given the relatively even distribution of bellows throughout this period, it may be possible to further reduce the number of hours of recording without compromising detection probability to minimise data processing time and costs. If a single bellow is sufficient to determine koala presence, sites could also be monitored for fewer days, because koalas were detected within six nights at all but two of 14 active sites.

We suggest that sites with koalas in Byadbo should be incorporated into the broader NSW and/or national koala monitoring programs. Sites in KNP are likely to differ from many other areas across the State in terms of habitat composition, elevation, and key threats. As such, they could make a valuable contribution to understanding the factors affecting the distribution, abundance and population dynamics of koalas across their range.

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Appendix

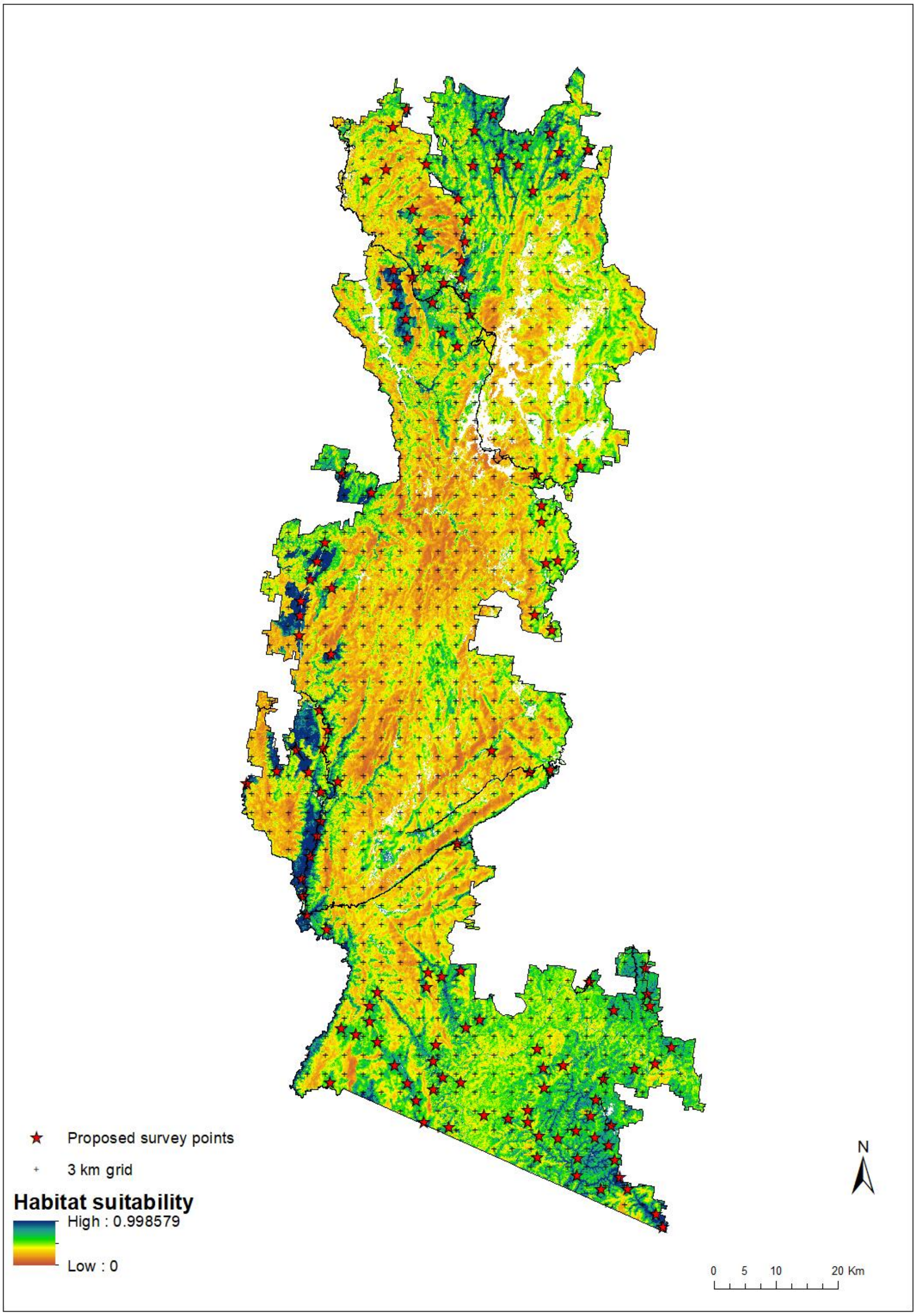

Figure A 1. Preliminary site selection for proposed koala surveys in KNP based on proximity to access tracks, previous koala records, and predicted suitable koala habitat. KNP was divided into 3 km x 3 km squares to ensure that sites were sufficiently spaced.

Table A 1. Summary of the number of sites surveyed by passive acoustics or spotlighting within each fire severity category. Descriptions are adapted from DPIE (2020). Note: category 1 is not included because it is a reserved class that does not occur in the study area.

Category	Severity class	Description	% foliage affected	Site count	Sites with koalas
0	Unburnt	Unburnt surface and green canopy	0 %	84	14
2	Low	Burnt understorey with unburnt canopy	>10 % burnt understorey >90 % green canopy	11	0
3	Moderate	Partial canopy scorch	20-90 % canopy scorch	14	0
4	High	Complete canopy scorch and/or partial canopy consumption	>90 % canopy scorch <50 % canopy consumed	12	0
5	Extreme	Complete canopy consumption	>50 % canopy consumed	1	0

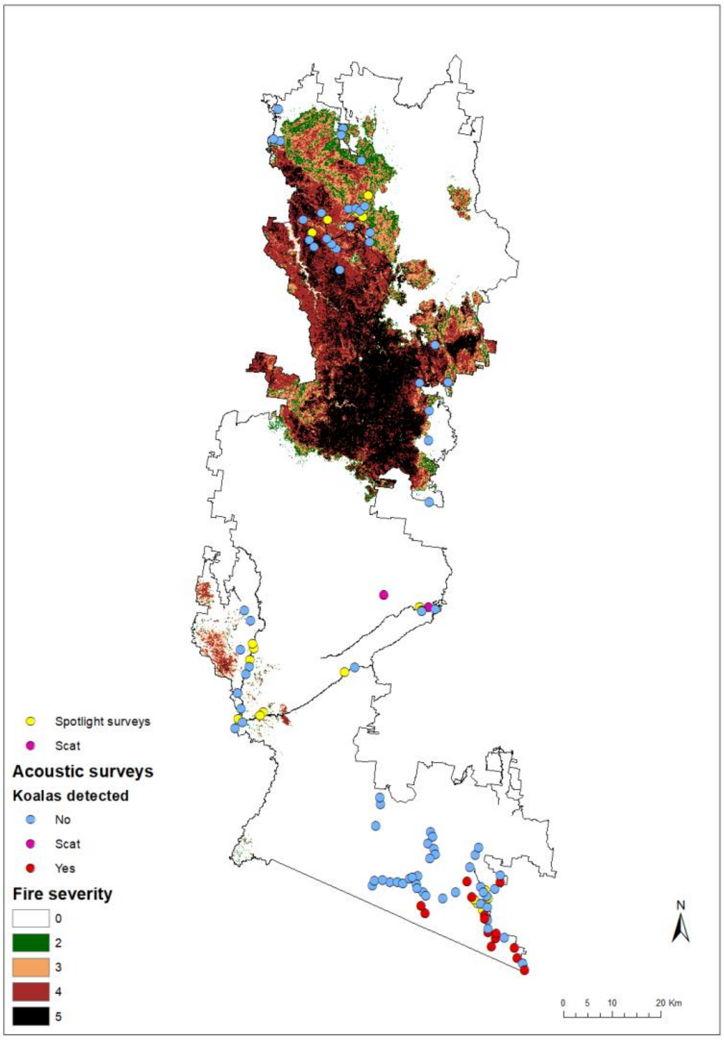

Figure A 2. Location of koala survey sites in KNP relative to fire extent and severity.

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Table A 2. The number of sites surveyed relative to the predicted likelihood of finding a eucalypt species known to be used by koalas (Koala Tree Index (KTI)) according to the NSW Koala Habitat Information Base.

KTI probability	Description	Count	Sites with koalas
0.0 - 0.2	Very low probability	69	6
0.2 - 0.4	Low probability	38	8
0.4 - 0.6	Moderate probability	11	0
0.6 - 0.8	High probability	4	0
0.8 - 1.0	Very high probability	2	0

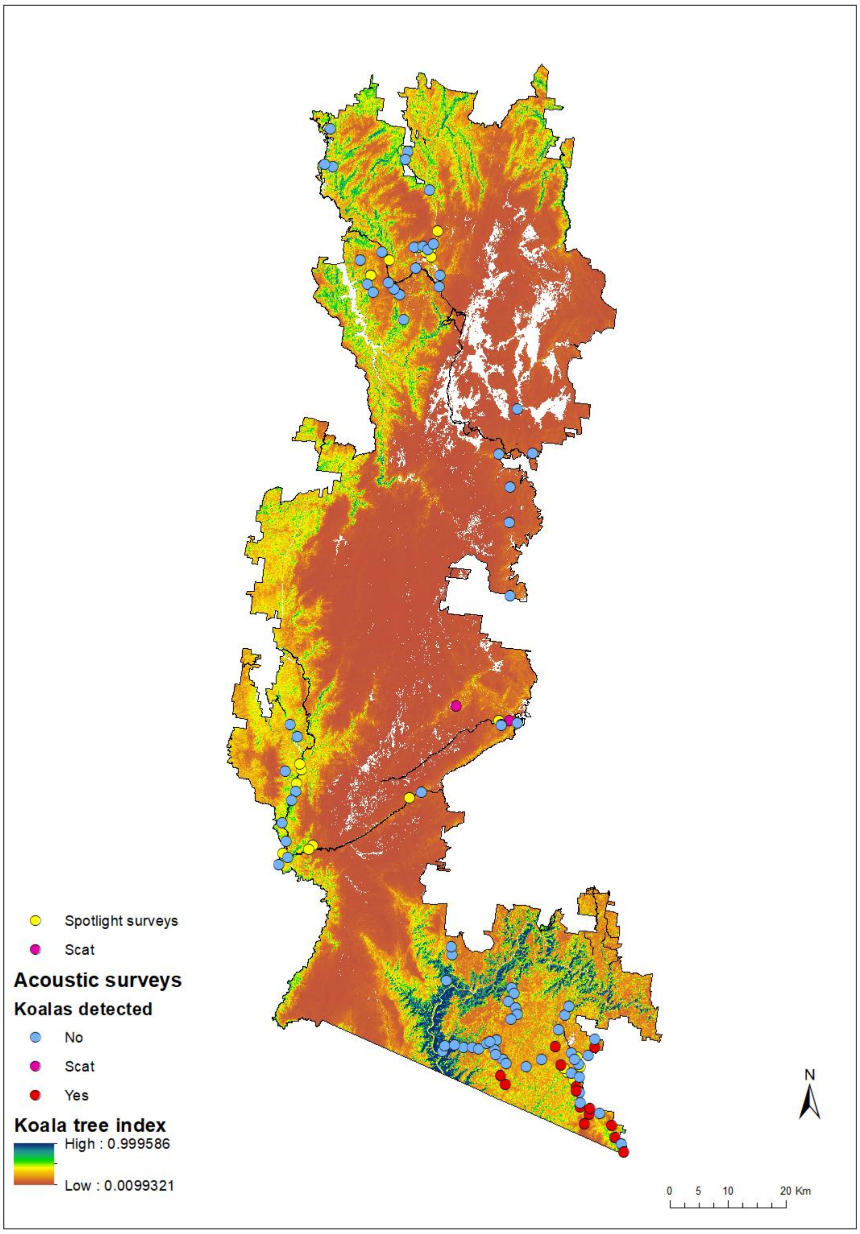

Figure A 3. Locations of koala survey sites in KNP relative to the predicted likelihood of finding eucalypt species known to be used by koalas.

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Table A 3. The number of koala survey sites within different levels of predicted koala habitat suitability (KHSM) from the NSW Koala Habitat Information Base.

KHSM range	Description	Count	Sites with koalas
0.0 - 0.2	Very low suitability	5	0
0.2 - 0.4	Low suitability	56	7
0.4 - 0.6	Moderate suitability	35	4
0.6 - 0.8	High suitability	20	3
0.8 - 1.0	Very high suitability	8	0

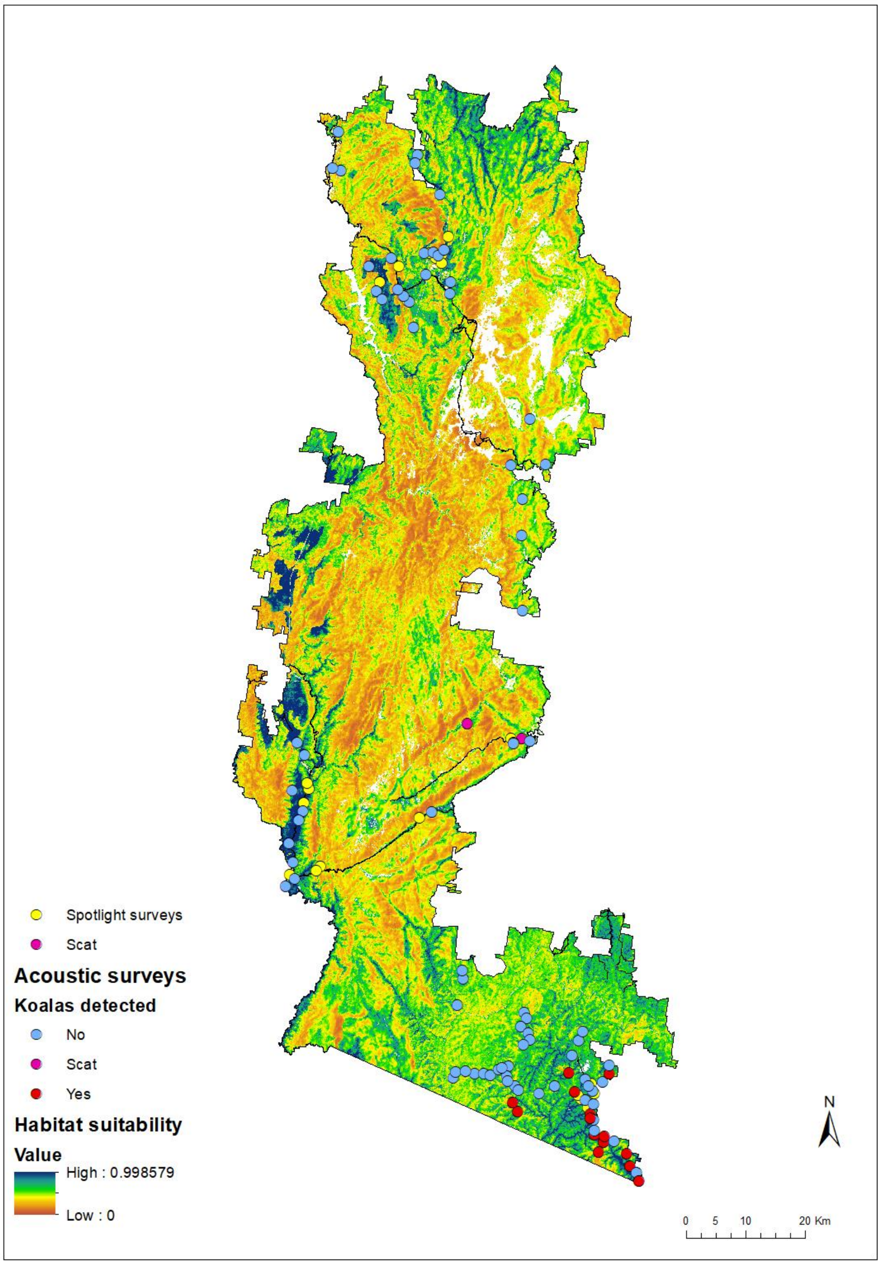

Figure A 4. Locations of koala survey sites in KNP relative to predicted koala habitat suitability.

Table A 4. The distribution of koala survey sites across different elevations.

Elevation	Count	Sites with koalas
<600 m	18	0
600 – 800 m	10	0
800 - 1,000 m	27	3
>1,000 m	69	11

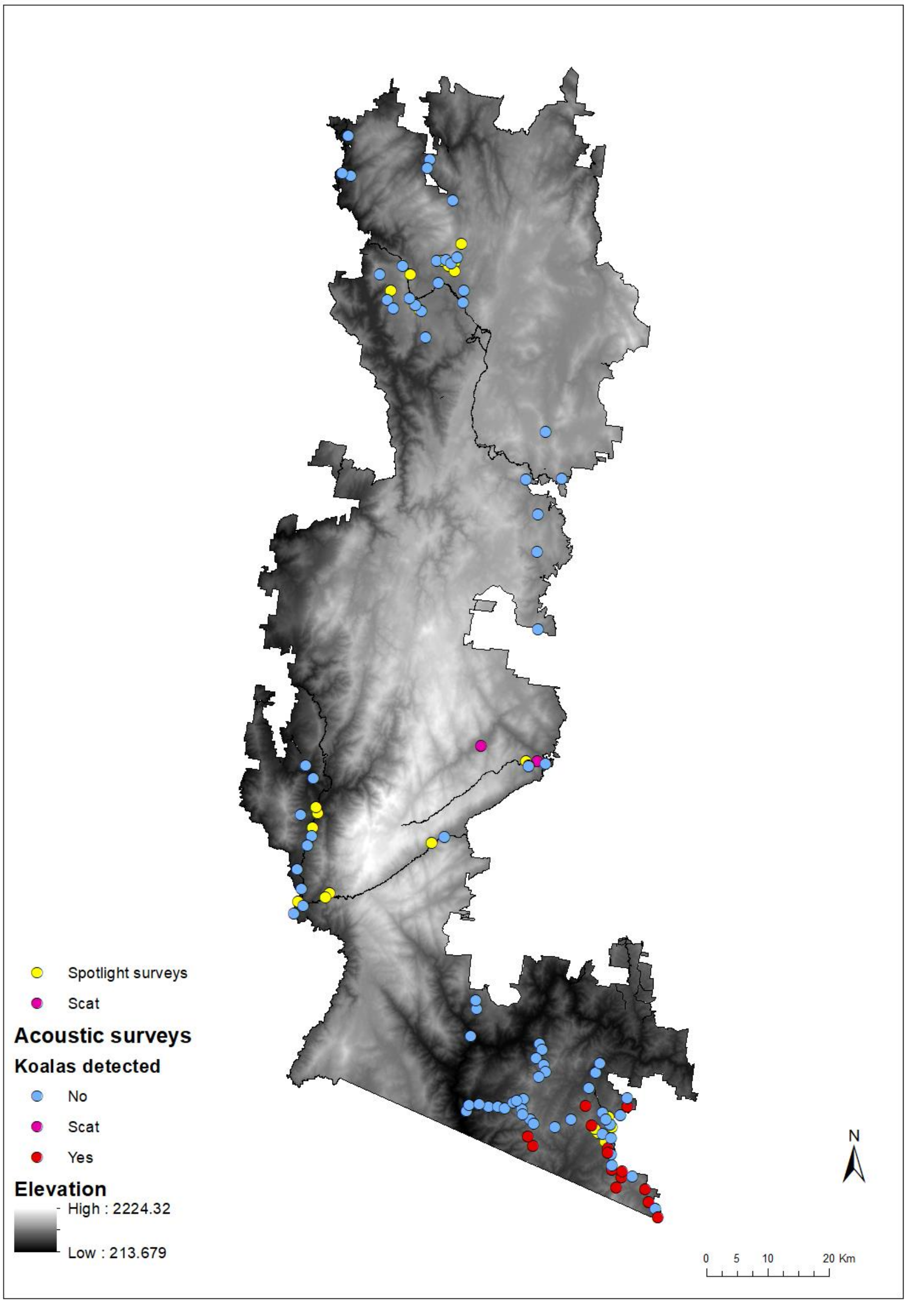

Figure A 5. Locations of koala survey sites in KNP relative to elevation.

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Table A 5. Summary of survey sites by mapped vegetation class. Note: some sites map to vegetation classes without eucalypts. This differs from the on-ground determination.

Vegetation class	Count	Sites with koalas
Not native vegetation	5	1
Southern Tableland Wet Sclerophyll Forests	54	7
South East Dry Sclerophyll Forests	2	2
Montane Wet Sclerophyll Forests	6	0
Tableland Clay Grassy Woodlands	6	0
Southern Tableland Grassy Woodlands	5	1
Temperate Montane Grasslands	0	0
Subalpine Woodlands	6	0
Upper Riverina Dry Sclerophyll Forests	10	0
Southern Wattle Dry Sclerophyll Forests	0	0
Southern Tableland Dry Sclerophyll Forests	22	3
Montane Bogs and Fens	1	0
Eastern Riverine Forests	0	0

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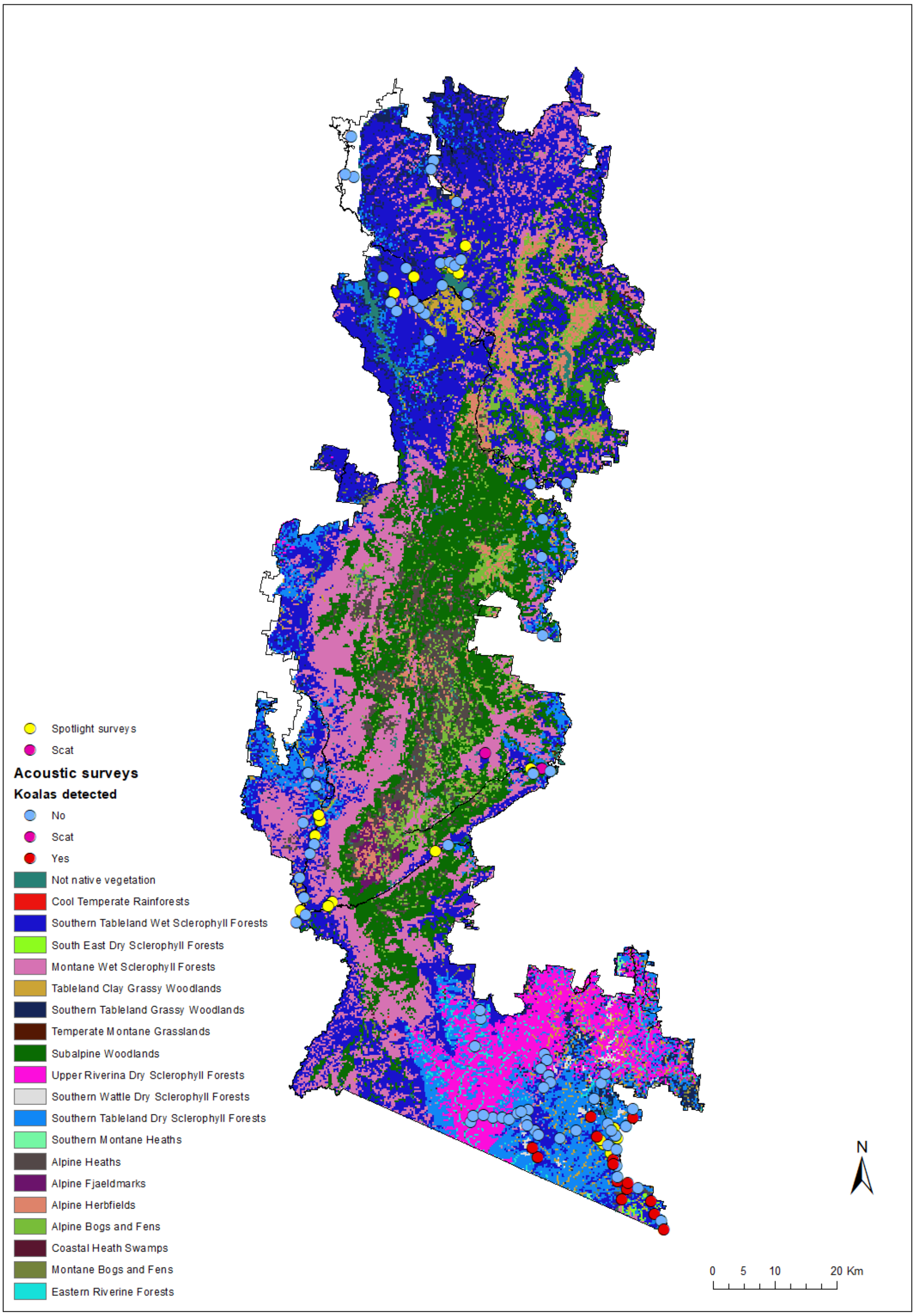

Figure A 6. Locations of koala survey sites in KNP relative to mapped vegetation class.

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Table A 6. Summary of survey sites by mapped plant community type. Note: some sites map to plant community types without eucalypts. This does not match the on-ground determination.

Plant community type	Count	Sites with koalas
Not native vegetation	5	1
Bondo Montane Valley Flats Forest	3	0
Bondo Slopes Peppermint Moist Grassy Forest	8	0
Bondo Slopes Peppermint Sheltered Fern Forest	1	0
Kosciuszko Flanks Moist Gully Forest	3	0
Kosciuszko Snow Gum-Mountain Gum Moist Forest	32	4
Monaro Ranges Montane Gully Forest	0	0
Southeast Tableland Ranges Snow Gum Sheltered Forest	7	3
Kosciuszko Alpine Ash High Wet Forest	0	0
Kosciuszko-Namadgi Alpine Ash Moist Grassy Forest	6	0
Kosciuszko Western Flanks Moist Shrub Forest	0	0
Bondo Frost Hollow Grassy Woodland	5	0
Monaro-Gourock Frost Hollow Grassy Woodland	1	0
Southern Tableland Creekflat Ribbon Gum Forest	0	0
Bondo Slopes Red Stringybark Grassy Forest	2	0
Monaro-Queanbeyan Rolling Hills Grassy Forest	3	1
Southwest Foothills Apple Box Grassy Forest	0	0
Jounama Snow Gum Shrub Woodland	1	0
Kosciuszko Alpine Sally Woodland	1	0
Kosciuszko Eastern Slopes Mountain Gum Forest	2	0
Kosciuszko Subalpine Hollows Black Sally Woodland	2	0
Monaro Kangaroo Grass Woodland-Grassland Complex	0	0
Snowy Gorge White Box-Pine Woodland	10	0
Southwest Ranges Stringybark-Box Sheltered Forest	0	0
Southwest Rockplate Shrub Woodland	0	0
Southeast Mountain Dry Shrub Forest	2	2
Snowy Gorge Currawang Shrub Woodland	0	0
Bondo Slopes Dry Stringybark Forest	2	0
Goulburn-Lithgow Tableland Hills Grassy Forest	0	0
Monaro Mountains Peppermint Shrub Forest	6	2
Monaro Mountains Snow Gum Shrub Forest	2	0
Monaro Ranges Sheltered Shrub Forest	6	1
Snowy Gorge Grassy Box Woodland	2	0
Bondo Montane Flats Swamp Woodland	1	0
Southern Tableland Ranges Boggy Open Woodland	0	0
Southwest Tableland Gorges Riparian Shrubland	0	0
Bondo Slopes Dry Peppermint Shrub Forest	4	0

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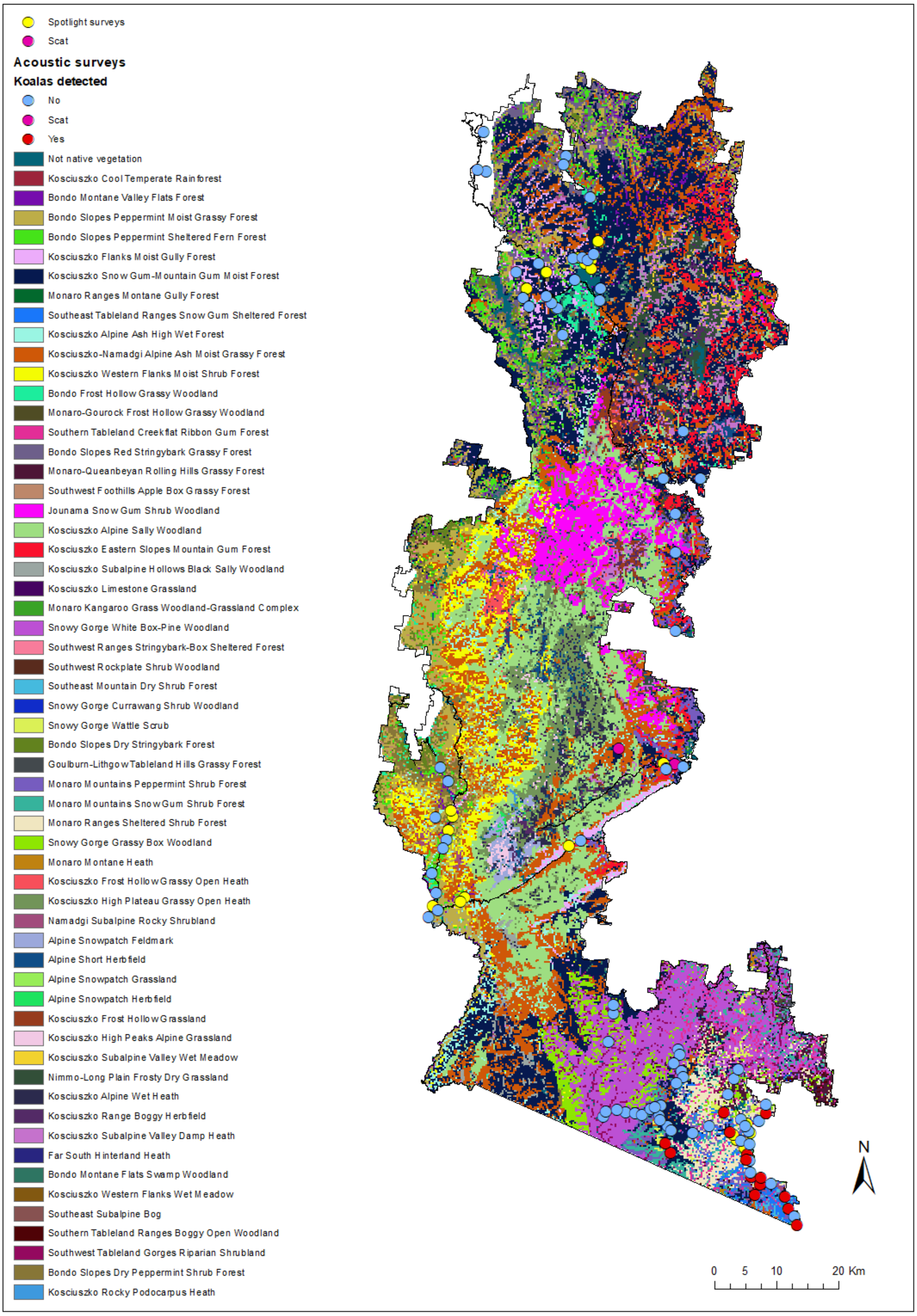

Figure A 7. Locations of koala survey sites in KNP relative to mapped plant community type.

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Table A 7. Details of all sites surveyed for koalas in spring-summer of 2021-2022 in Kosciuszko National Park. ASL = elevation; FESM = fire severity; KTI = koala tree index; KHSM = koala habitat suitability. Note: blank cells in the "koalas found" column indicate sites for which acoustic data have not yet been analysed.

Site ID	Survey type	Latitude	Longitude	ASL	FESM	KTI	KHSM	Plant community type	Vegetation class	Koalas found?
Extra1	Spotlight	-36.5257	148.1934		0	0.262	0.657	Bondo Montane Valley Flats Forest	Southern Tableland Wet Sclerophyll Forests	No
KNP135	SM mini	-36.3221	148.4804	1252	0	0.082	0.232	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	No/Scat
KNP136	Spotlight	-36.348	148.5802	1076	0	0.082	0.410	Monaro Mountains Peppermint Shrub Forest	Southern Tableland Dry Sclerophyll Forests	No/Scat
KNP137	SM mini	-36.5523	148.1268	552	0	0.607	0.979	Bondo Slopes Peppermint Moist Grassy Forest	Southern Tableland Wet Sclerophyll Forests	No
KNP138	SM mini	-36.4524	148.406	1197	0	0.170	0.474	Kosciuszko-Namadgi Alpine Ash Moist Grassy Forest	Montane Wet Sclerophyll Forests	No
KNP139	SM mini	-36.6921	148.4497	866	0	0.237	0.326	Snowy Gorge Grassy Box Woodland	Southern Tableland Dry Sclerophyll Forests	No
KNP140	Spotlight	-36.5361	148.1353	523	0	0.695	0.943	Bondo Montane Valley Flats Forest	Southern Tableland Wet Sclerophyll Forests	No
KNP141	Spotlight	-36.3466	148.5602	1243	0	0.113	0.387	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	No
KNP142	SM mini	-35.8678	148.6221	1372	4	0.052	0.315	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	No
KNP148	SM mini	-36.4544	148.1583	805	0	0.372	0.879	Bondo Slopes Peppermint Moist Grassy Forest	Southern Tableland Wet Sclerophyll Forests	No
KNP149	Spotlight	-36.4081	148.179	497	0	0.478	0.886	Bondo Montane Valley Flats Forest	Southern Tableland Wet Sclerophyll Forests	No
KNP150	Audiomoth	-35.616	148.3792	1074	4	0.183	0.575	Kosciuszko Flanks Moist Gully Forest	Southern Tableland Wet Sclerophyll Forests	No
KNP151	Audiomoth	-35.682	148.4088	1149	3	0.112	0.596	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	No
KNP151	Spotlight	-35.6811	148.407	1155	3	0.137	0.535	Bondo Frost Hollow Grassy Woodland	Tableland Clay Grassy Woodlands	No

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Site ID	Survey type	Latitude	Longitude	ASL	FESM	KTI	KHSM	Plant community type	Vegetation class	Koalas found?
KNP151	Spotlight	-35.681	148.4062	1159	3	0.114	0.260	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	No
KNP152	Audiomoth	-35.6741	148.3996	1202	3	0.108	0.218	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	No
KNP152	Spotlight	-35.6731	148.3984	1202	4	0.155	0.229	Not native vegetation	Not native vegetation	No
KNP153	Audiomoth	-35.6633	148.3899	1201	4	0.090	0.228	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	No
KNP154	Audiomoth	-35.6107	148.4412	1171	2	0.105	0.231	Bondo Slopes Peppermint Moist Grassy Forest	Southern Tableland Wet Sclerophyll Forests	No
KNP155	Spotlight	-35.6103	148.4499	1186	2	0.096	0.234	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	No
KNP156	Audiomoth	-35.6099	148.4579	1211	2	0.117	0.221	Kosciuszko Subalpine Hollows Black Sally Woodland	Subalpine Woodlands	No
KNP157	Audiomoth	-35.6146	148.4666	1254	2	0.088	0.201	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	No
KNP158	Audiomoth	-35.4626	148.4375	841	2	0.276	0.369	Bondo Slopes Red Stringybark Grassy Forest	Southern Tableland Grassy Woodlands	No
KNP159	Audiomoth	-35.6062	148.478	1220	3	0.228	0.288	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	No
KNP160	Spotlight	-35.6142	148.4727	1213	2	0.162	0.227	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	No
KNP161	Spotlight	-35.6188	148.4615	1248	2	0.107	0.178	Kosciuszko-Namadgi Alpine Ash Moist Grassy Forest	Montane Wet Sclerophyll Forests	No
KNP162	Spotlight	-35.5877	148.4866	1279	2	0.077	0.445	Not native vegetation	Not native vegetation	No
KNP163	SM mini	-35.4763	148.2801	434	0			-	-	No
KNP164	SM mini	-35.4216	148.2939	572	0	0.495	0.319	-	-	No

Site ID	Survey type	Latitude	Longitude	ASL	FESM	KTI	KHSM	Plant community type	Vegetation class	Koalas found?
KNP165	Spotlight	-36.3993	148.1767	519	0			Bondo Slopes Dry Peppermint Shrub Forest	Southern Tableland Dry Sclerophyll Forests	No
KNP166	SM mini	-36.8832	148.6828	894	0	0.143	0.648	-	-	No
KNP167	Spotlight	-36.8724	148.6795	856	0	0.191	0.540	Southeast Tableland Ranges Snow Gum Sheltered Forest	Southern Tableland Wet Sclerophyll Forests	No
KNP168	Spotlight	-36.8867	148.6856	915	0	0.153	0.568	-	-	No
KNP169	SM mini	-36.9026	148.6834	1041	0	0.276	0.579	-	-	
KNP170	Spotlight	-36.8953	148.6594	985	0	0.217	0.469	Monaro Mountains Peppermint Shrub Forest	Southern Tableland Dry Sclerophyll Forests	No
KNP171	Audiomoth	-36.9263	148.6814	978	0	0.276	0.502	Monaro Ranges Sheltered Shrub Forest	Southern Tableland Dry Sclerophyll Forests	No
KNP172	SM mini	-36.9239	148.6761	1090	0	0.221	0.403	Not native vegetation	Not native vegetation	Yes
KNP173	Audiomoth	-36.7919	148.5669	1009	0	0.152	0.258	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	No
KNP174	Audiomoth	-36.8014	148.5694	1162	0	0.092	0.277	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	No
KNP175	Spotlight	-36.8879	148.6542	950	0	0.239	0.509	Monaro Ranges Sheltered Shrub Forest	Southern Tableland Dry Sclerophyll Forests	No
KNP176	Spotlight	-36.9074	148.6725	1117	0	0.234	0.355	Southeast Tableland Ranges Snow Gum Sheltered Forest	Southern Tableland Wet Sclerophyll Forests	No
KNP177	SM mini	-36.8759	148.6758	879	0	0.232	0.623	Not native vegetation	Not native vegetation	No
KNP178	SM mini	-36.8696	148.7023	999	0	0.213	0.495	Monaro Mountains Peppermint Shrub Forest	Southern Tableland Dry Sclerophyll Forests	No
KNP179	SM mini	-36.8587	148.7142	1049	0	0.252	0.370	Monaro Ranges Sheltered Shrub Forest	Southern Tableland Dry Sclerophyll Forests	Yes
KNP180	Audiomoth	-36.8463	148.716	769	0	0.219	0.512	Monaro-Queanbeyan Rolling Hills Grassy Forest	Southern Tableland Grassy Woodlands	No

Site ID	Survey type	Latitude	Longitude	ASL	FESM	KTI	KHSM	Plant community type	Vegetation class	Koalas found?
KNP1801	Audiomoth	-36.961	148.7184	1117	0	0.148	0.327	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	No
KNP181	SM mini	-36.8497	148.4798	640	0	0.355	0.386	Snowy Gorge White Box-Pine Woodland	Upper Riverina Dry Sclerophyll Forests	No
KNP1811	SM mini	-36.853	148.4226	264	0	0.604	0.387	Snowy Gorge White Box-Pine Woodland	Upper Riverina Dry Sclerophyll Forests	No
KNP182	Audiomoth	-36.8443	148.5085	1082	0	0.243	0.411	Monaro Mountains Snow Gum Shrub Forest	Southern Tableland Dry Sclerophyll Forests	No
KNP1821	SM mini	-36.8454	148.4275	353	0	0.987	0.259	Snowy Gorge White Box-Pine Woodland	Upper Riverina Dry Sclerophyll Forests	No
KNP183	Audiomoth	-36.8426	148.5151	1112	0	0.120	0.280	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	No
KNP1831	SM mini	-36.8442	148.4469	651	0	0.385	0.332	Snowy Gorge White Box-Pine Woodland	Upper Riverina Dry Sclerophyll Forests	No
KNP184	Audiomoth	-36.8702	148.538	1124	0	0.134	0.300	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	No
KNP1841	SM mini	-36.8618	148.5243	1149	0	0.134	0.366	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	No
KNP185	SM mini	-36.8952	148.5312	1068	0	0.200	0.368	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	Yes
KNP186	SM mini	-36.9531	148.6901	928	0	0.449	0.770	Southeast Tableland Ranges Snow Gum Sheltered Forest	Southern Tableland Wet Sclerophyll Forests	-
KNP187	SM mini	-36.9519	148.6999	935	0			Southeast Tableland Ranges Snow Gum Sheltered Forest	Southern Tableland Wet Sclerophyll Forests	Yes
KNP188	SM mini	-36.9759	148.6876	1245	0	0.060	0.251	Southeast Mountain Dry Shrub Forest	South East Dry Sclerophyll Forests	Yes
KNP189	SM mini	-36.9799	148.7414	1030	0	0.331	0.624	Southeast Tableland Ranges Snow Gum Sheltered Forest	Southern Tableland Wet Sclerophyll Forests	Yes

Site ID	Survey type	Latitude	Longitude	ASL	FESM	KTI	KHSM	Plant community type	Vegetation class	Koalas found?
KNP190	SM mini	-37.0221	148.7621	874	0	0.320	0.698	Monaro Mountains Peppermint Shrub Forest	Southern Tableland Dry Sclerophyll Forests	Yes
KNPE122	SM mini	-36.355	148.5645	1215	0	0.170	0.286	Kosciuszko Eastern Slopes Mountain Gum Forest	Subalpine Woodlands	No
KNPE122	Spotlight	-36.3535	148.564	1216	0	0.109	0.251	Kosciuszko Eastern Slopes Mountain Gum Forest	Subalpine Woodlands	No
KNPE124	SM mini	-36.3525	148.5952	969	0	0.094	0.390	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	No
KNPE126	Spotlight	-36.4595	148.3831	1230	0	0.083	0.542	Kosciuszko Flanks Moist Gully Forest	Southern Tableland Wet Sclerophyll Forests	No
KNPE127	SM mini	-36.0425	148.5979	1376	0	0.049	0.275	Jounama Snow Gum Shrub Woodland	Subalpine Woodlands	No
KNPE129	SM mini	-36.1554	148.5925	1318	0	0.138	0.359	Kosciuszko-Namadgi Alpine Ash Moist Grassy Forest	Montane Wet Sclerophyll Forests	No
KNPE131	SM mini	-35.9351	148.5827	1227	4	0.100	0.385	Monaro-Gourock Frost Hollow Grassy Woodland	Tableland Clay Grassy Woodlands	No
KNPE133	SM mini	-35.9868	148.6011	1352	2	0.070	0.268	Kosciuszko Alpine Sally Woodland	Subalpine Woodlands	No
KNPE134	SM mini	-35.9373	148.648	1270	3	0.078	0.419	Kosciuszko Subalpine Hollows Black Sally Woodland	Subalpine Woodlands	No
KNPN70	Audiomoth	-35.5231	148.4757	958	2	0.532	0.326	Bondo Slopes Red Stringybark Grassy Forest	Southern Tableland Grassy Woodlands	No
KNPN71	Audiomoth	-35.4743	148.4323	914	3	0.451	0.465	Bondo Slopes Peppermint Moist Grassy Forest	Southern Tableland Wet Sclerophyll Forests	No
KNPN75	Audiomoth	-35.5517	148.49	1214	3	0.085	0.227	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	-
KNPN76	Audiomoth	-35.5788	148.4857	1310	2	0.076	0.419	Kosciuszko-Namadgi Alpine Ash Moist Grassy Forest	Montane Wet Sclerophyll Forests	-
KNPN77	Audiomoth	-35.6039	148.4838	1207	3	0.143	0.624	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	-

Site ID	Survey type	Latitude	Longitude	ASL	FESM	KTI	KHSM	Plant community type	Vegetation class	Koalas found?
KNPN79	SM mini	-35.6425	148.4426	1101	3	0.124	0.634	Bondo Frost Hollow Grassy Woodland	Tableland Clay Grassy Woodlands	No
KNPN80	Spotlight	-35.6264	148.4715	1110	3	0.475	0.268	Kosciuszko-Namadgi Alpine Ash Moist Grassy Forest	Montane Wet Sclerophyll Forests	No
KNPN81	SM mini	-35.6559	148.4871	1084	3	0.152	0.417	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	No
KNPN82	Spotlight	-35.629	148.393	1080	4	0.239	0.876	Kosciuszko Flanks Moist Gully Forest	Southern Tableland Wet Sclerophyll Forests	No
KNPN83	Spotlight	-35.6505	148.3557	1095	4	0.173	0.629	Bondo Slopes Dry Peppermint Shrub Forest	Southern Tableland Dry Sclerophyll Forests	No
KNPN83	Spotlight	-35.6505	148.3557	1095	4	0.173	0.629	Bondo Slopes Dry Peppermint Shrub Forest	Southern Tableland Dry Sclerophyll Forests	No
KNPN84	SM mini	-35.6266	148.3386	1167	4	0.207	0.748	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	No
KNPN85	SM mini	-35.6639	148.3489	1065	4	0.152	0.714	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	No
KNPN86	SM mini	-35.6775	148.3595	1048	4	0.133	0.630	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	No
KNPN88	Audiomoth	-35.6702	148.4227	1100	4	0.102	0.517	Bondo Frost Hollow Grassy Woodland	Tableland Clay Grassy Woodlands	-
KNPN89	Audiomoth	-35.7112	148.4383	1167	3	0.107	0.515	Bondo Frost Hollow Grassy Woodland	Tableland Clay Grassy Woodlands	-
KNPN90	SM mini	-35.6733	148.4844	1088	3	0.243	0.774	Bondo Montane Flats Swamp Woodland	Montane Bogs and Fens	No
KNPN91	Audiomoth	-35.7211	148.4155	983	5	0.429	0.396	Bondo Slopes Dry Stringybark Forest	Southern Tableland Dry Sclerophyll Forests	
KNPN92	SM mini	-35.4796	148.2947	547	0	0.264	0.283	-	-	No
KNPS1	SM mini	-37.0091	148.7576	868	0	0.450	0.796	Southeast Tableland Ranges Snow Gum Sheltered Forest	Southern Tableland Wet Sclerophyll Forests	No
KNPS10	Audiomoth	-36.8828	148.5822	980	0	0.259	0.502	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	No

Site ID	Survey type	Latitude	Longitude	ASL	FESM	KTI	KHSM	Plant community type	Vegetation class	Koalas found?
KNPS11	Audiomoth	-36.8769	148.5439	1097	0	0.182	0.356	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	No
KNPS12	SM mini	-36.807	148.66	709	0	0.150	0.421	Monaro-Queanbeyan Rolling Hills Grassy Forest	Southern Tableland Grassy Woodlands	No
KNPS13	Audiomoth	-36.7937	148.6694	527	0	0.184	0.586	Snowy Gorge White Box-Pine Woodland	Upper Riverina Dry Sclerophyll Forests	No
KNPS29	SM mini	-36.7046	148.4501	761	0	0.176	0.463	Snowy Gorge Grassy Box Woodland	Southern Tableland Dry Sclerophyll Forests	No
KNPS30	SM mini	-36.9173	148.6767	1010	0	0.362	0.563	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	Yes
KNPS31	SM mini	-36.9495	148.6824	877	0	0.319	0.732	Southeast Tableland Ranges Snow Gum Sheltered Forest	Southern Tableland Wet Sclerophyll Forests	Yes
KNPS311	SM mini	-36.9608	148.6987	1091	0	0.149	0.387	Southeast Mountain Dry Shrub Forest	South East Dry Sclerophyll Forests	Yes
KNPS33	SM mini	-36.9428	148.6822	887	0	0.331	0.709	Monaro Ranges Sheltered Shrub Forest	Southern Tableland Dry Sclerophyll Forests	No
KNPS34	Audiomoth	-36.8523	148.4923	871	0	0.130	0.352	Monaro Mountains Snow Gum Shrub Forest	Southern Tableland Dry Sclerophyll Forests	No
KNPS35	Audiomoth	-36.781	148.5534	914	0	0.159	0.372	Snowy Gorge White Box-Pine Woodland	Upper Riverina Dry Sclerophyll Forests	No
KNPS36	Audiomoth	-36.8092	148.5568	1168	0	0.089	0.249	Kosciuszko-Namadgi Alpine Ash Moist Grassy Forest	Montane Wet Sclerophyll Forests	No
KNPS37	Audiomoth	-36.8403	148.5269	1047	0	0.139	0.369	Monaro Mountains Peppermint Shrub Forest	Southern Tableland Dry Sclerophyll Forests	No
KNPS38	Audiomoth	-36.8549	148.5226	1140	0	0.174	0.361	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	No
KNPS39	SM mini	-36.769	148.5646	698	0	0.140	0.325	Snowy Gorge White Box-Pine Woodland	Upper Riverina Dry Sclerophyll Forests	No
KNPS40	SM mini	-36.9089	148.5404	1082	0	0.163	0.333	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	Yes

CRICOS Provider #00120C

Site ID	Survey type	Latitude	Longitude	ASL	FESM	KTI	KHSM	Plant community type	Vegetation class	Koalas found?
KNPS41	SM mini	-36.9982	148.7466	1059	0	0.165	0.314	Monaro Mountains Peppermint Shrub Forest	Southern Tableland Dry Sclerophyll Forests	Yes
KNPS42	SM mini	-36.8485	148.463	583	0	0.156	0.309	Snowy Gorge White Box-Pine Woodland	Upper Riverina Dry Sclerophyll Forests	No
KNPS43	SM mini	-36.7603	148.5617	737	0	0.745	0.313	Snowy Gorge White Box-Pine Woodland	Upper Riverina Dry Sclerophyll Forests	No
KNPS44	SM mini	-36.8966	148.6683	1029	0	0.386	0.490	Monaro Ranges Sheltered Shrub Forest	Southern Tableland Dry Sclerophyll Forests	No
KNPS49	SM mini	-36.7444	148.4374	302	0	0.901	0.408	Snowy Gorge White Box-Pine Woodland	Upper Riverina Dry Sclerophyll Forests	No
KNPS5	SM mini	-36.8833	148.6488	990	0	0.213	0.425	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	Yes
KNPS6	SM mini	-36.8655	148.6693	835	0	0.269	0.627	Monaro Ranges Sheltered Shrub Forest	Southern Tableland Dry Sclerophyll Forests	No
KNPS7	SM mini	-36.8543	148.6392	1034	0	0.264	0.367	Monaro-Queanbeyan Rolling Hills Grassy Forest	Southern Tableland Grassy Woodlands	Yes
KNPS8	SM mini	-36.8282	148.6476	853	0	0.208	0.467	Not native vegetation	Not native vegetation	No
KNPS9	Audiomoth	-36.8731	148.6114	1090	0	0.124	0.288	Kosciuszko Snow Gum-Mountain Gum Moist Forest	Southern Tableland Wet Sclerophyll Forests	No
KNPW110	SM mini	-36.3373	148.1619	699	0	0.296	0.407	Bondo Slopes Dry Stringybark Forest	Southern Tableland Dry Sclerophyll Forests	No
KNPW111	SM mini	-36.3569	148.1747	484	0	0.377	0.634	Bondo Slopes Peppermint Moist Grassy Forest	Southern Tableland Wet Sclerophyll Forests	No
KNPW112	SM mini	-36.409	148.1485	831	0	0.308	0.405	Bondo Slopes Peppermint Moist Grassy Forest	Southern Tableland Wet Sclerophyll Forests	No
KNPW113	Spotlight	-36.4286	148.1693	611	0	0.563	0.969	Bondo Slopes Dry Peppermint Shrub Forest	Southern Tableland Dry Sclerophyll Forests	No
KNPW114	SM mini	-36.4411	148.1667	739	0	0.487	0.872	-	-	No

Site ID	Survey type	Latitude	Longitude	ASL	FESM	KTI	KHSM	Plant community type	Vegetation class	Koalas found?
KNPW115	SM mini	-36.4891	148.1376	572	0	0.359	0.564	Bondo Frost Hollow Grassy Woodland	Tableland Clay Grassy Woodlands	No
KNPW116	SM mini	-36.5173	148.1425	596	0	0.392	0.737	Bondo Slopes Peppermint Moist Grassy Forest	Southern Tableland Wet Sclerophyll Forests	No
KNPW117	SM mini	-36.5425	148.1439	569	0	0.506	0.899	Bondo Slopes Peppermint Moist Grassy Forest	Southern Tableland Wet Sclerophyll Forests	No
KNPW118	Spotlight	-36.532	148.1849	1048	0	0.098	0.189	Bondo Slopes Peppermint Sheltered Fern Forest	Southern Tableland Wet Sclerophyll Forests	No

CRICOS Provider #00120C