Canine scent detectives promoting koala population health in Jaliigirr Corridors.

Report prepared for:

Jaliigirr Biodiversity Alliance Inc.
and
Coffs Harbour City Council.

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Summary

Jaliigirr Biodiversity Alliance and Canines for Wildlife received funding from the Coffs Harbour City Council Environmental Levy Grant 2020-21 to undertake a koala scent detection dog survey in the Sawtell-Toormina-Boambee area.

The Canines for Wildlife scent detection dog team surveyed for koala scats across 18 sites between September 2020 to March 2021. Koala scats were recorded at 202 locations across the sites and 39 koala scat samples were collected and stored for future genetic analysis.

The targeted sites were within three mapped koala habitat linkages:
Linkage 1 - Bongil Bongil NP west via RMS underpass, Titans close, south Boambee;
Linkage 2 - Hogbin drive west via RMS underpass to Englands Road and
Linkage 3 - Boambee East/Toormina Links: north of Lyons Road, Linden Av, Water Towers and Bruce King Drive.

Acknowledgements

Canines for Wildlife thank the Coffs Harbour City Council, NSW National Parks and Wildlife Service, England's Road Waste facility and private landholders. In particular, thanks to Greg Elks and Peter Elks and the other private landholders for permission to survey their properties with the detection dog team. Thanks to Sally Whitelaw and Sally Spunner (CHCC), Justin Couper (Envite), John Turbill (DPIE), Martin Smith (NPWS) and Dave Yarnold (Englands Road Waste Facility) for assistance with planning, logistics and site orientation.

The Coffs Harbour City Council Environmental Levy Grant 2020-21 provided funding for the project which was delivered through a collaboration between Jaliigirr Biodiversity Alliance and Canines for Wildlife.

Canine scent detectives supporting koala population health in Jaliigirr Corridors.

Project description

The Sawtell-Toormina-Boambee area is known to support an important but fragmented koala population (Lunney et al. 1999). The study focused on the peri-urban, semi-rural and linkage vegetation corridors. The project aimed to assess koala activity and habitat usage across the mapped koala habitat and linkage corridors (Map 1a, b). Koala activity was assessed through intensive scat detection surveys with a trained koala scent detection dog. Koala scat locations were recorded and mapped. Fresh scat material was collected where available and stored for future genetic analysis.

The targeted sites were within three mapped koala habitat linkages:

Southern Linkage 1 - Bongil Bongil NP west via RMS underpass, Titans close, south Boambee;

Northern Linkage 2 - Hogbin drive west via RMS underpass to Englands Road and

North-South Linkage 3 - Boambee East/Toormina Links: north of Lyons Road, Linden Av, Water Towers and Bruce King Drive.

Methodology

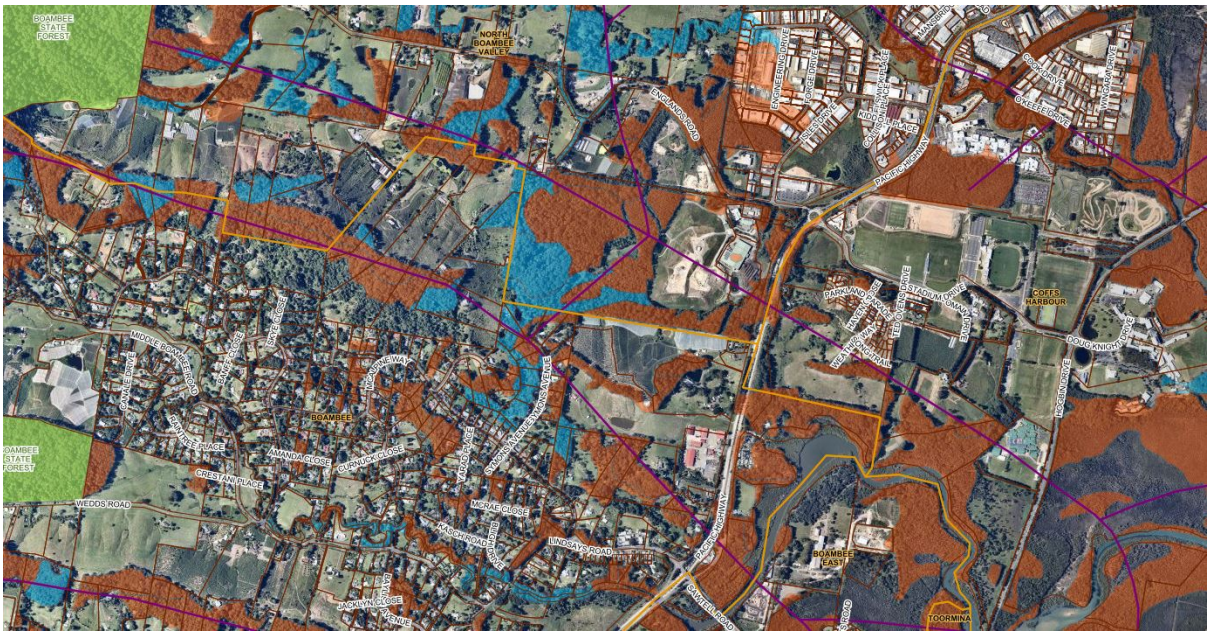
Survey sites were selected by a working group including Coffs Harbour City Council (CHCC), Department of Planning, Industry and Environment (DPIE), Jaliigirr Biodiversity Alliance (JBA) and Canines for Wildlife (CFW). Locations for potential survey sites were focused in three priority linkages areas (Map 1a, b). The Canines for Wildlife survey team comprised Lynn Baker, Jack Nesbitt and Max a certified koala scat detection dog (Canine Detection Certification of Australia).

Each site was divided into approximately 1 hectare plots which were systematically searched for koala scats. The scent detection dog worked off leash, controlled by voice, whistle and hand signals and worked closely with his handler, coursing in zig zag fashion using his nose to locate the presence of koalas and their scats. When a scat was located the dog indicated with a passive response of lying down with his nose near the scat. He was rewarded by playing with a tennis ball. The CFW scent detection dogs are trained to be safe with wildlife. To maintain search motivation for the detection dog, Koala scat targets were placed for the detection dog when no scats had been detected on a day or for several searches. The targets were laid 'blind' i.e. the dog did not know of their location or 'double blind' when the target was placed by an assistant and the handler and dog were unaware of the location.

The detection dog wore an identifying harness to inform the public that it is a koala detection dog as well as a GPS tracking collar. The handler used a Garmin GPS to record the detection dog search tracks and GPS locations of the koala scats. The distance from the scat that the detection dog can detect odour is influenced by weather conditions including temperature, relative humidity, wind direction/speed and rainfall.

Fresh koala scats were carefully collected using clean gloves or toothpicks to minimise abrasion and contamination of the scat. The scats were placed into clean labelled storage vials and placed in a cold esky until they were transferred to a freezer to be stored for future genetics analysis.

Map 1a Koala mapped habitat and northern corridor linkages (Coffs Harbour City Council).



Key= Orange – Primary Koala Habitat, Blue- Secondary Koala Habitat, Linkages – Purple lines

Map 1b Koala mapped habitat and southern corridor linkages (Coffs Harbour City Council).

Key= Orange – Primary Koala Habitat, Blue- Secondary Koala Habitat, Linkages – Purple lines

The koala scats were recorded in age classes of Fresh: covered in mucus, wet or dry, shiny and dark with distinct green or yellow interior; Moderate – non-shiny but with structural integrity, Old-weathered exterior, crumbly and dried out interior or powdered remnants. The rate of scat decay can vary significantly based on factors such as ground layer and litter structure and moisture, rainfall history over sampling period, invertebrate and vertebrate mammal activity eg bandicoot diggings, burrows (Rhodes et al 2011, Cristescue et al 2018, OWAD 2020).

Results

Eighteen sites across three koala habitat linkages were surveyed from September 2020 to March 2021 (Table 1). The surveys were focussed on sites within mapped koala habitat (Map 1). The detection dog searched 155.5 kms covering approximately 114 hectares across the 18 sites (Map 2). A total of 202 koala scat locations were recorded on 13 of the 18 sites (Table 1) (Map 3). Thirty-nine scat samples were collected and stored for future genetic analysis (Table 2) (Map 4).

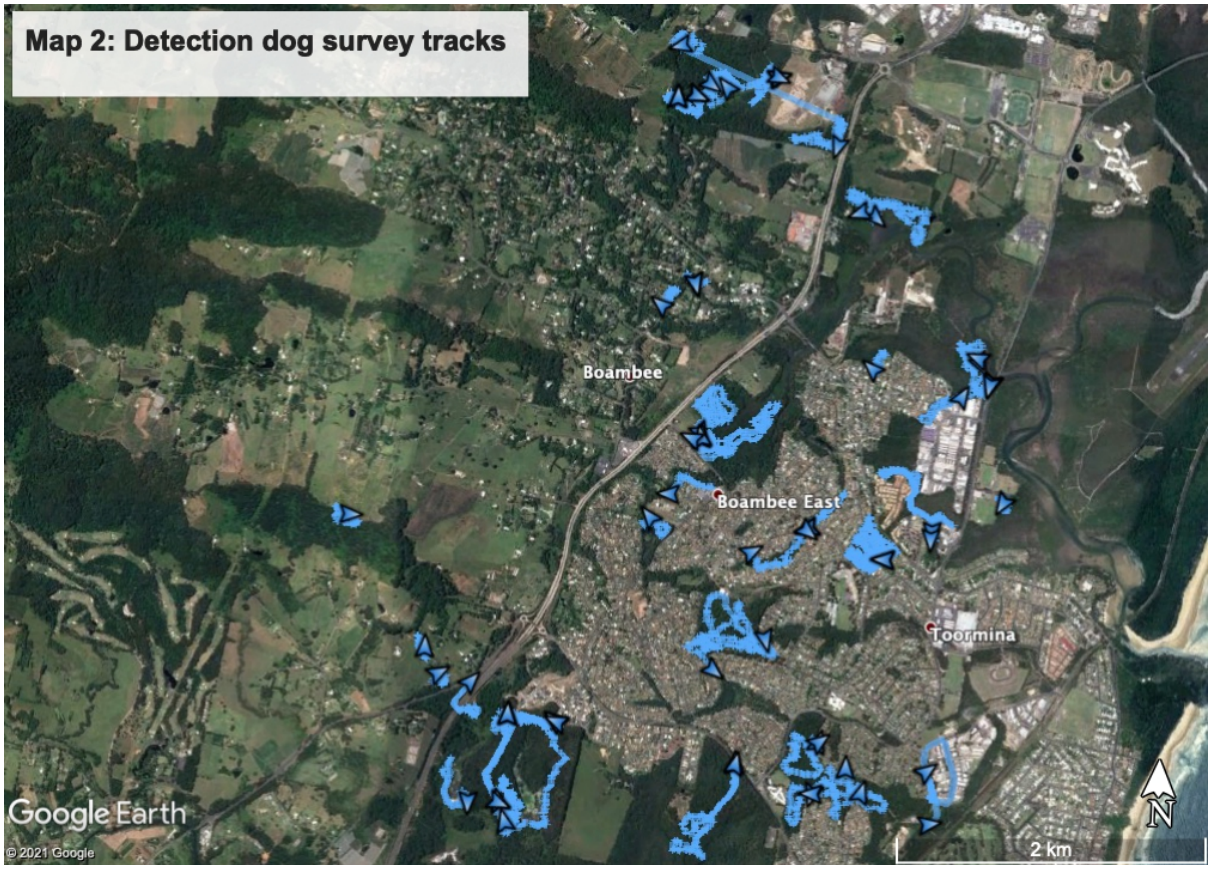


Table 1: Koala records for sites surveyed within each habitat linkage

Habitat Linkage	Linkage description	Site No.	Kms searched	Hectares estimate	Scats recorded	Scat collected
Linkage 1	Bongil Bongil NP west via RMS underpass, Titans close, south Boambee	3	3.6	1.6	Y	N
		7	23.1	20.6	Y	Y

		8	3.4	1.9	Y	N
		11	6.5	7.9	N	N
		14	18	16.7	Y	N
		18	2.1	1	Y	N
Linkage 2	Hogbin drive west via RMS underpass to Englands Road.	2	9.3	8.8	Y	Y
		4	7.7	7.6	Y	Y
		5	2.07	1.2	Y	N
		6	20.97	19.1	Y	Y
		17	1.4	1.3	Y	N
Linkage 3	Boambee East/Toormina Links: Lyons Road side of Bongil Bongil NP, Linden Av Water Towers, Bruce King Drive	1	11.4	1.2	Y	Y
		9	8	7.1	N	N
		10	3.5	3.8	N	N
		12	3.95	3.4	N	N
		13	19.8	4.1	Y	Y
		15	7.4	3.7	Y	N
		16	3.3	2.5	N	N
Total		**18**	**155.5**	**114**	**13**	**6**

Table 2 Number of koala scat locations and samples collected per site

Habitat Linkages	Site No.	Kms searched	No of scat locations	No of samples collected
Linkage 1				
	3	3.6	3	0
	7	23.1	20	3
	8	3.4	2	0
	11	6.5	0	0
	14	18	1	0
	18	2.1	2	0
Linkage 2				
	2	9.3	33	6
	4	7.7	44	2
	5	2.07	2	0
	6	20.97	38	14
	17	1.4	1	0
Linkage 3				

	1	11.4	26	9
	9	8	0	0
	10	3.5	0	0
	12	3.95	0	0
	13	19.8	29	5
	15	7.4	1	0
	16	3.3	0	0
Totals	**18**	**155.5**	**202**	**39**

Weather conditions varied across the survey period, with temperatures ranging from 22 to 33 degrees Celcius, and relative humidity ranging from 65 to 100%. Average wind speed varied from nil to 4.5 k/hr. Heavy rain events in October, December and January impacted on the condition of the koala scats and would likely have removed or degraded scats on the ground at the time. Surveys were halted for a period of time after heavy rain to allow time for new koala scat material to accumulate. All scats recorded after these rain events were most probably deposited post rainfall.

Of the six sites surveyed within Linkage 1, all but one recorded koala presence. However, only Bongil Bongil NP recorded a high level of activity and fresh scat samples. Across Linkage 2, five of the sites yielded multiple koala scat records and three sites had fresh scats collected. Linkage 3 had two sites, the Toormina water tower council reserve and Bruce King Drive council reserve which demonstrated high levels of koala activity and provided fresh scat material. Five sites had no koala presence detected at the time of sampling.

Discussion

Scent detection dogs are highly efficient at detecting koala scat and are regularly used to conduct koala surveys and to collect scat material for genetic analysis (Cristescu et al 2015, Cristescu et al 2018, DPIE 2020, OWAD 2020).

The current survey recorded koala activity at 13 of the 18 sites and fresh scat material collected from six sites. Five sites had no koala presence recorded, however, it should be noted that a recording of absence in the survey period does not preclude the possibility of koalas utilising the site on other occasions. Evidence of koalas being found on survey sites is likely to change seasonally (MacKenzie and Royle 2005, Ellis et. al. 2009) and the occurrence of several significant rainfall events over the survey period impacted the likelihood of scats being located. A number of the sites included creek-lines and swamps that offer potential koala habitat and at several sites these were not accessible for survey due to standing water. In addition, the survey intensity in areas of dense sword grass was reduced as the grass cut the dog's nose and tongue. It is possible that scats would be located on re-surveying these sites during drier weather.

The survey focussed on sites within mapped koala habitat and were selected across the two east-west habitat linkages and one north-south habitat linkages within the Sawtell-Toormina-Boambee area as identified in Map 1. Koala activity was recorded in both primary and secondary mapped koala habitat across the three linkages. The northern Linkage 2 found a high level of koala activity across 3 sites from Hogbin drive on the east and to Englands Road on the west side of the Pacific highway. However, for the southern Linkage 1 only low levels of koala presence were located on the western side of the highway and no fresh scats were detected. Koalas are known to move seasonally between preferred habitats and it is recommended that the western sites and other potential sites be surveyed again to increase the opportunity to collect fresh material for genetic analysis. The Bongil Bongil National Park surveys found a cluster of activity but did not record activity in some other sites that are known to support koalas (Martin Smith NPWS pers. comm.). Additional surveys during different seasons would be of benefit to collect fresh scat material and determine whether these are different individuals to those represented by the scat material collected in this survey.

The north-south Linkage from Lyons Road to Sawtell Road includes two larger reserves with high koala activity but nil or low activity was recorded in the smaller reserves. Koala have been reported in some of these reserves and are likely to be utilised at different times of the year.

Conclusions

Koalas are actively utilising the mapped koala habitat on public and private lands within the Sawtell-Toormina-Boambee urban and peri-urban area, highlighting the importance of these habitats and movement corridors for sustaining koalas into the future. Coffs Harbour Council reserves link koala habitat in Bongil Bongil National Park north to koala habitat on private land, council and other government land parcels providing important corridors that allow koalas to move and access resources such as food and breeding opportunities. The east-west movement koala movement is constrained to linkages under the Pacific Highway through dedicated underpasses and bridges over creek-lines. These access points are critical to maintain the east-west populations connected. The question of whether koalas are actively utilising these movement opportunities may be partially addressed for the northern linkage through analysis of the stored material from this survey, however it is likely that additional survey to collect fresh scat material for genetic analysis in the southern linkages will be required.

Genetic diversity is important to maintain koala health and resilience to disease and other threats . Scat detection surveys and genetic analysis of scats provides a non-invasive and stress-free technique to survey koalas. Fresh scat material can be used to identify the DNA profile and gender of individual koalas within a sub-population, the comparative genetic diversity of sub-populations, and if sufficient samples are available, identify whether there is movement of genes between populations. The collected scat material could also be used to assess the presence of Chlamydia, KoRVA retrovirus in individuals and sub-populations. A total of 39 fresh scat samples were collected during the survey and stored for this purpose. The genetic material used for DNA analysis is isolated from the mucus coating on the exterior surface of the scats and is processed and quality assessed to determine the samples suitability for genetic profiling. Not all of the samples collected will have DNA material of sufficient quality to allow for testing (D. Higgins Sydney University pers comm) and therefore the number of results from the collected material will not be known until the samples are processed and quality tested. The larger the number of fresh quality scat material collected and processed the greater likelihood of successful DNA test results. Undertaking genetic processing and analysis of the koala scat samples collected in this survey would provide an important starting point to documenting the genetic diversity and health of the koala population in the CHCC area. These results will also identify where additional surveys may be required.

Genetic analysis of koala scat samples could provide insight into the comparative health and genetic diversity of the peri-urban koala population in the Coffs Harbour area. With a geographically representative collection of fresh scat material, genetic profiling and population analysis would inform understanding of koala movement through habitat linkages and, if sufficient samples are collected, the degree of genetic mixing between isolated koala populations. The information from the surveys and genetic analysis would inform Coffs Harbour City Council's (CHCC) koala habitat management and priorities for koala food tree planting programs to promote existing and new linkages to enhance koala genetic diversity, health and resilience.

Recommendations

1) Undertake genetic processing and analysis of the collected scat material.
2) Based on the outcomes of the genetic analysis, resurvey and collect scat material from priority sites within the 2020-21 survey area, particularly the east-west connection between Bongil Bongil National Park and south-west Boambee.
3) Undertake additional koala activity survey, scat collection and genetic analysis in new priority locations within the Coffs Harbour City Council area.

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