REDLAND CITY COUNCIL KOALA POPULATION ASSESSMENT 2025

Dr. Douglas Kerlin
Dr. Robert Appleby
Justin Scott
Applied Transport Ecology Group

Final Report August 2025

Executive summary

The Redlands Coast koala population has national significance as one of our most important urban koala populations. However, this population is under threat from the pressure of urbanisation: habitat loss and fragmentation, vehicle strike and dog attack. The Redlands City Council (RCC) requested an investigation of available datasets to try and identify trends or changes in the koala population of the Redlands Coast from the period 2013-2018, in comparison to the period 2019-2024 (when targeted conservation management intervention was undertaken). While not a direct measure of koala abundance, koala sightings and hospital presentation rates provided a potential proxy measure of trends relating to abundance, such that the number of sightings and reported of sick and injured koalas may change in response to the underlying koala population.

We inspected a range of State Government, RCC and national datasets to examine temporal and spatio-temporal trends. Records offer no obvious evidence of significant LGA wide declines in koala abundance since 2019. However, there are some indications of continuing declines at the level of specific suburbs; this is offset by other suburbs, which appear stable or have somewhat rebounded.

We caveat this conclusion by stating that, given the reduced population abundance of koalas across the Redlands Coast since 2000, this is still a population under extreme pressure. The number of koalas in the wild are not sufficient to safeguard the population against significant adverse events such as a drought or fire event.

Despite this caveat, we also note other positive signs, with significant increases in records of koalas going into care, but more importantly, more koalas subsequently getting released back into the wild following treatment. We also detect a promising increase in the number of females observed with young. Reductions in the number of koalas negatively impacted by dog attack and vehicle strike are also identified and may reflect effective community awareness campaigns and direct-action initiatives from Council and other stakeholders.

Introduction

As part of the 'Koala Coast' region, the Redlands Coast has historically been home to one of the most significant urban koala populations in Australia. Urbanisation has significant impacts on biodiversity and wildlife (Niemelä 1999), as natural habitats are lost and fragmentated due to development pressure, increasing mortality and disrupting ecological function such as dispersal (McKinney 2002). However, in recent decades this population has been placed under considerable stress from key drivers of koala mortality; including habitat loss, vehicle strike, dog attack, disease and drought. A 2015 assessment estimated the Koala Coast population, a population including adjacent parts of the Redlands, Brisbane and Logan City Council areas, had declined in abundance by 80.3% (Rhodes et al. 2015).

In response to ongoing evidence of population declines, Redland City Council (RCC) developed and adopted a series of strategic conservation frameworks. The first of these was the Redlands Coast Koala Conservation Strategy and Action Plan 2016–2021, followed by the current Redlands Coast Koala Conservation Plan and Action Plan 2022–2027. These plans established a pathway for implementing targeted programs to support and protect koala populations across the Redlands Coast. Key initiatives include the *Redland Smart Signs Project* (addressing vehicle collisions), the Leave It campaign (reducing dog attacks), *the Koala Safe Neighbourhood Program* (promoting community custodianship), and the *Redlands Coast Koala Watch program* (encouraging early reporting of sick and injured koalas), among others.

This population assessment has been requested by RCC to investigate available datasets to potentially demonstrate trends or changes in the koala population of the Redlands Coast from the period 2013-2018, in comparison to the period 2019-2024 with a view to determining whether there is any evidence of recent population stability, potentially driven by targeted koala management intervention.

Datasets inspected include key records of koala sightings, reports of sick and injured koalas, and records of koala arrivals to wildlife care facilities (vets and specialised koala hospitals):

- Redlands Afterhours Wildlife Ambulance Service records (RCC data)
- Redlands Wildlife Carer Network records (RCC data)
- KoalaBASE (Qld State Government data)
- WildNet (Qld State Government data)
- Redlands Coast Koala Watch (BioCollect/ALA data)

Data Sources

Redlands Afterhours Wildlife Ambulance and Redlands Wildlife Carer Network records

The RAWA and RWCN records, collectively referred to as the Redlands 24hr Wildlife Rescue Service (RWRS) dataset, is the focus of an existing project, seeking to digitize existing paper records dating from January 2013 to December 2023. At present we have confidence in records dating from 2018 onwards, a parallel project is working to digitise remaining records dating to 2013. From December 2023 on, Redlands City Council commenced a new data entry system for wildlife rescues; we obtained a copy of this data for koalas for inclusion in this report.

Redlands Coast Koala Watch

Koala Watch data was obtained from the Atlas of Living Australia portal. Koala Watch is a citizen science collaboration between Redland City Council, Redlands Coast community, and researchers. It allows for recording of community sightings of koalas in the Redlands Coast area.

KoalaBASE

KoalaBASE is a Queensland Department of Environment, Tourism, Science and Innovation managed database. In Queensland, details of koalas arriving at koala hospitals and other care facilities are required to be reported to the State Government in line with the Nature Conservation (Koala) Conservation Plan 2006 and Management Program 2006–2016. Prior to 2014, these records were collated into what is colloquially known as the 'Moggill Koala Hospital Database' by the state government agency implementing the plan (at the time of writing, the Queensland Department of Environment and Science). Since 2014, these records have been stored in KoalaBASE. Spatial accuracy can vary dramatically, with some coordinates being at the suburb or main road level.

WildNet

WildNet is another database administered by the Queensland Department of Environment, Tourism, Science and Innovation. In contrast to KoalaBASE, which records of sick and injured koalas arriving into care through the SEQ wildlife hospital network, WildNet is a repository for sightings and other survey results.

Methodology

It is important to note that the datasets available do not allow for estimation of the Redland Coast koala population. Instead, we assumed that, in the short term, koala sighting and hospital presentation rates provided a potential proxy measure of trends relating to population abundance, such that the number of sightings and reported of sick and injured koalas may change in response to the underlying koala population. As such, a change in one can be interpreted to be indicative of a commensurate change in the other; a decline in sighting/ presentation rates indicates a decline in the underlying population, while stabilisation in sighting/ presentation rates indicates a stabilization in the population. Our primary aim was therefore an attempt establish whether the available datasets provided any suggestion that the population could be continuing to decline, rather than commenting directly on population abundance. We looked for evidence of a reduction in threats such as dog attack, vehicle-strike and disease.

We also note that researchers have found consistent evidence of annual cycles in koalas appearing in records, driven by increased movement during the breeding season (August - December; Kerlin et al 2023). Koalas are more active during August to December each year, as juveniles disperse from mothers, and males search for mates. Examination of the long-term trend in koala population dynamics necessitates consideration of these annual cycles (the seasonal variation) in the data.

Other key caveats of this data include recognition that koalas from urban areas are more readily detected due to the increased human density, while koalas in more rural landscapes will likely be under-represented (Figure 1). Additionally, there may be significant lags in data capture (i.e. there may be records for recent koala sightings and/or hospitalisation events that have not made it into the database we are using at this time). There is also the possibility of double-counting (e.g. the same koala is detected and counted more than once in the same location and time) and non-random sampling (e.g. koalas near roads or walkways are more likely to be sampled). Taken together, such caveats suggest some caution is required in interpreting any results gleaned.

Datasets were aggregated by month and year, and analysed using time series techniques, allowing Identification of short term seasonal fluctuations and long-term trends. We also made use of general additive models, loess regression and moving averages to Identify long-term trends.

Chi-squared tests were used for comparisons between koala records from the time period 2013-2018 and 2019-2024.

Data quality checks and statistical analyses were performed using the R software version R version 4.5.1 (2025-06-13).

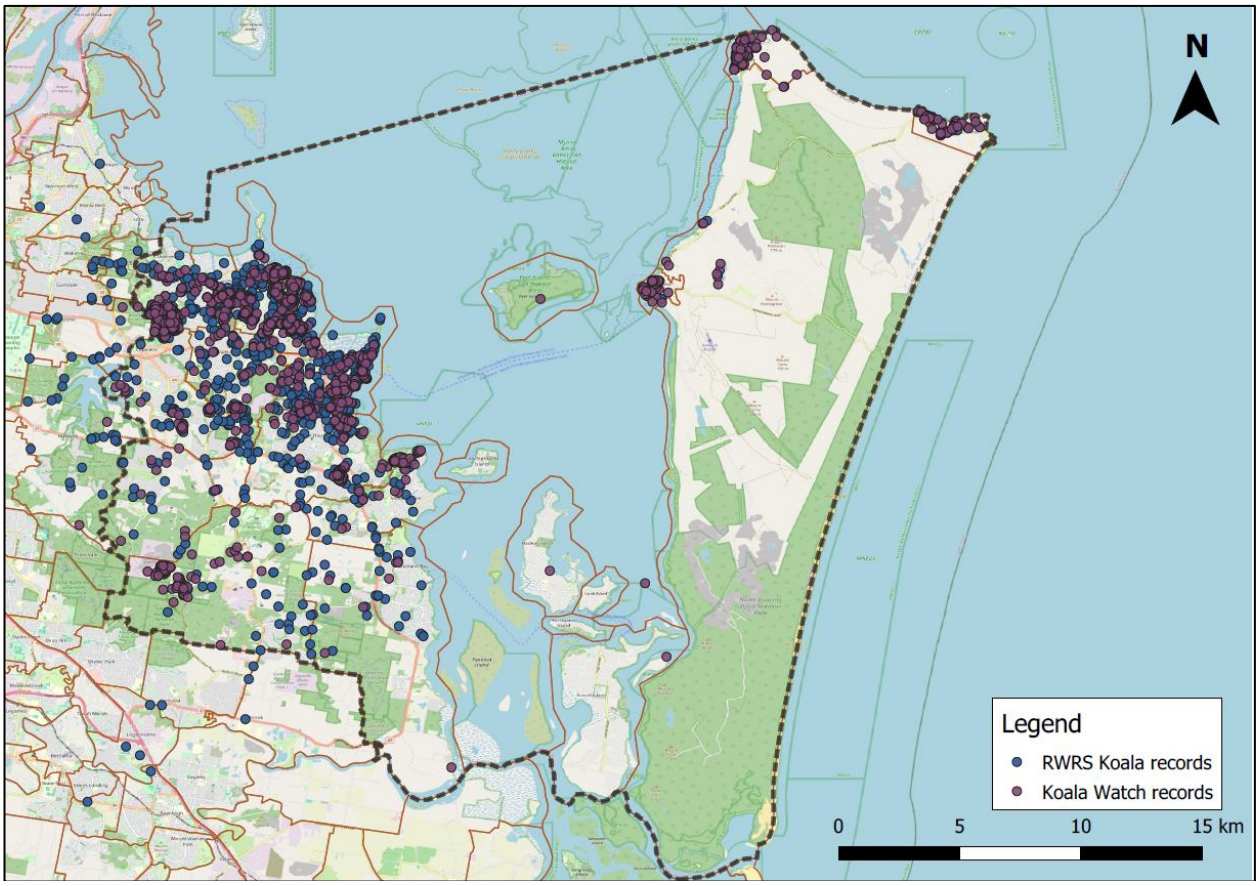

Figure 1. Redland City Council area, with RWRS koala records (blue) and Redland Cost Koala Watch records (purple). Note the concentration of records from north of the RCC area, and the relative paucity of records from the south, which is likely driven by a lack of human activity in these areas leading to reduced sightings of wildlife. Background imagery from OpenStreetMap (openstreetmap.org/copyright).

Data comparisons

A control comparison time series plot was derived, comparing normalized time series for Redland koalas, possums and macropods. This check was conducted to see if koala records in the dataset were behaving in a similar manner to possum and macropod records, to establish whether there was evidence of bias in the data particular to koalas (this check was only possible for RWRS data, no other species information was available in other datasets). Correlation analysis (Figure 2) established that there is a moderate correlation between koalas and macropods ($r^2 = 0.42$, $p < 0.001$), and between koalas and possums ($r^2 = 0.643$, $p < 0.001$). This check allowed sufficient confirmation that the koala data in the RWRS dataset is not behaving differently to that of other major species in the dataset.

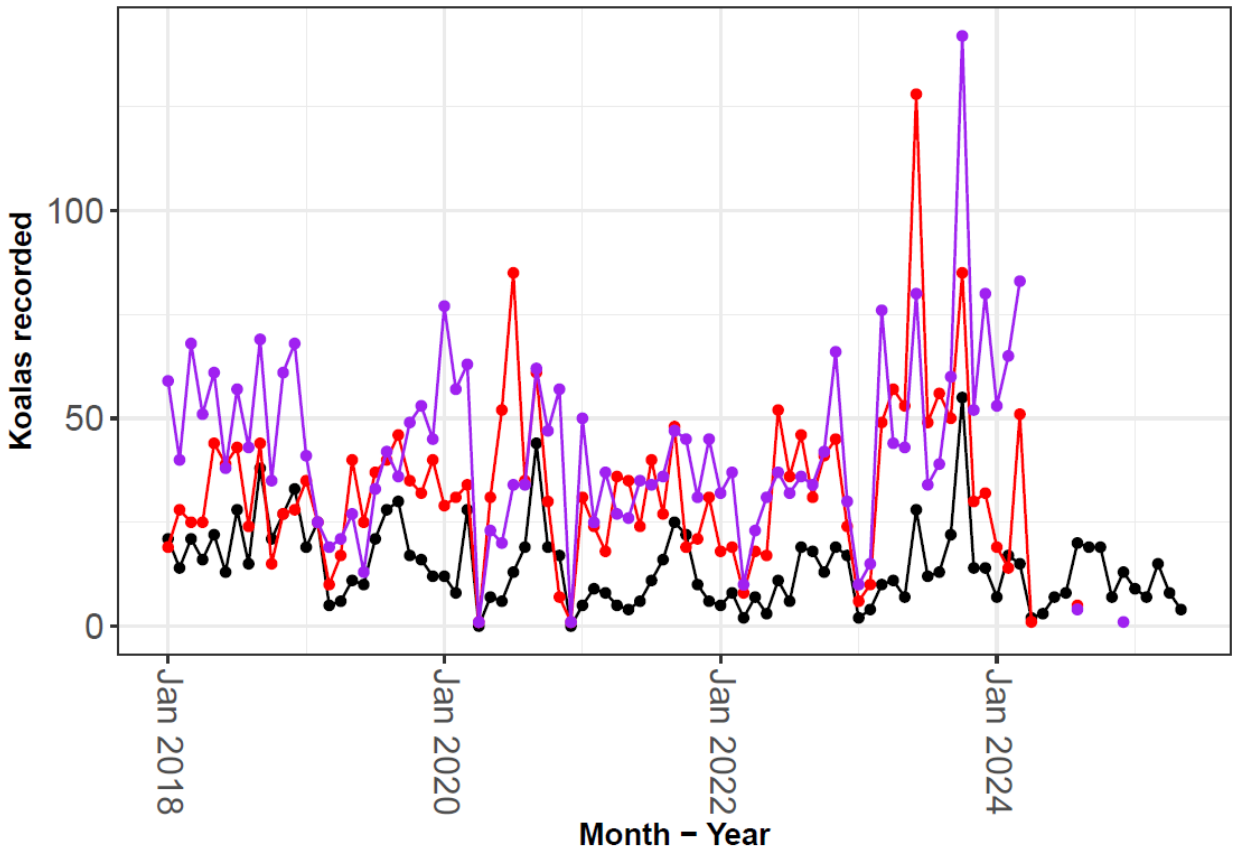

Figure 2. Comparison plot of koalas (black), compared to possums (purple) and macropods (red). Koalas are less common that possums and macropods, as expected, however the general trends suggest the koala records are not being impacted by any unexpected bias. Macropod and possum records were not available post February 2024.

Temporal analysis

Koala data from RWRS, KoalaBASE and WildNet were examined to decompose the time series to subtract out the seasonal trend to identify the long-term population dynamics. This process is akin to the process of making seasonal adjustments to economic indicators to establish underlying trends in the economy. An estimate of the season trend was generated using the decompose function in r (cran.r-project.org). Figure 3 gives an indication of what the seasonal component of the time series might look like.

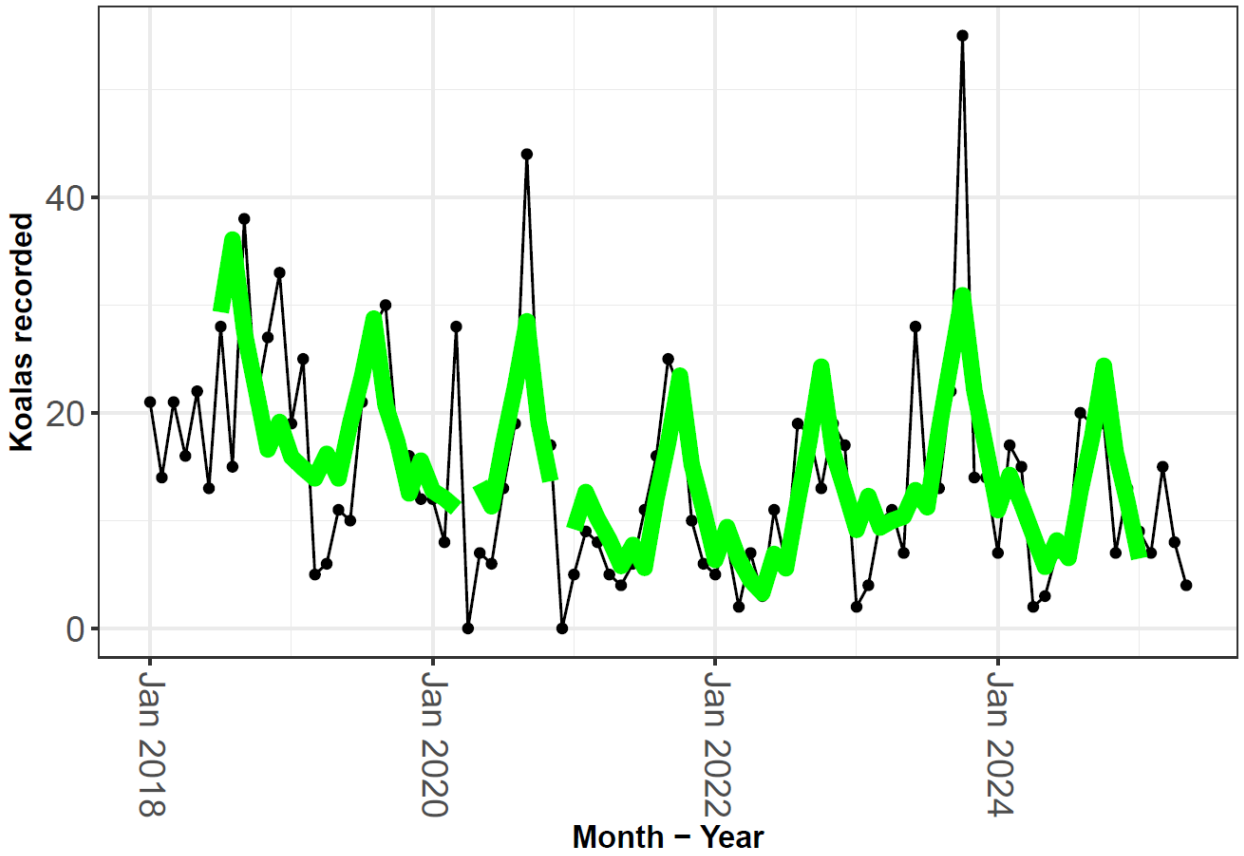

Figure 3. Indicative depiction of the expected seasonal fluctuations in koala records in the RWRS dataset. This seasonal trend needs to be 'extracted' from the time series data to reveal the underlying trend. Some seasonality remains even after decomposition.

Redlands Afterhours Wildlife Ambulance and Redlands Wildlife Carer Network records

The underlying long-term trend in the RWRS dataset was explored through three separate analyses. The analyses included i) general additive modelling, ii) local polynomial (Loess) regression, and iii) using the decompose function in r (Figure 5). There is no objectively 'correct' method to this kind of analysis; instead we rely on a subjective, collective interpretation of the various analyses to reach a considered judgement about the results.

In this instance, all analyses suggest a decline in reports of koala sightings 'abundance' (assumed to be a proxy measure of abundance) since 2010. That decline appears to 'bottom-out' late 2021 and early 2022, with an apparent stabilisation of koala numbers around 2023. The general additive model suggests that stabilisation is continuing, however, the loess regression and moving average suggest potentially further decline in 2024 and 2025.

However, this interpretation does need to be taken with a strong degree of caution. Notably, there was a substantial change in reporting procedures for the RWRS dataset commencing in 2024, which may

have resulted in a lag in record collation. Additionally, there may simply be a lag between koalas being picked up by the Redlands Afterhours Ambulance service (irrespective of procedures), and the record of that koala getting into the RWRS dataset. For example, ambulance volunteers may submit their records in bulk at some time after any incidents. We anticipate that there are additional records from the final months of this time series that have not yet been included in the dataset analysed here. The decline post 2024 may simply reflect that lack of records.

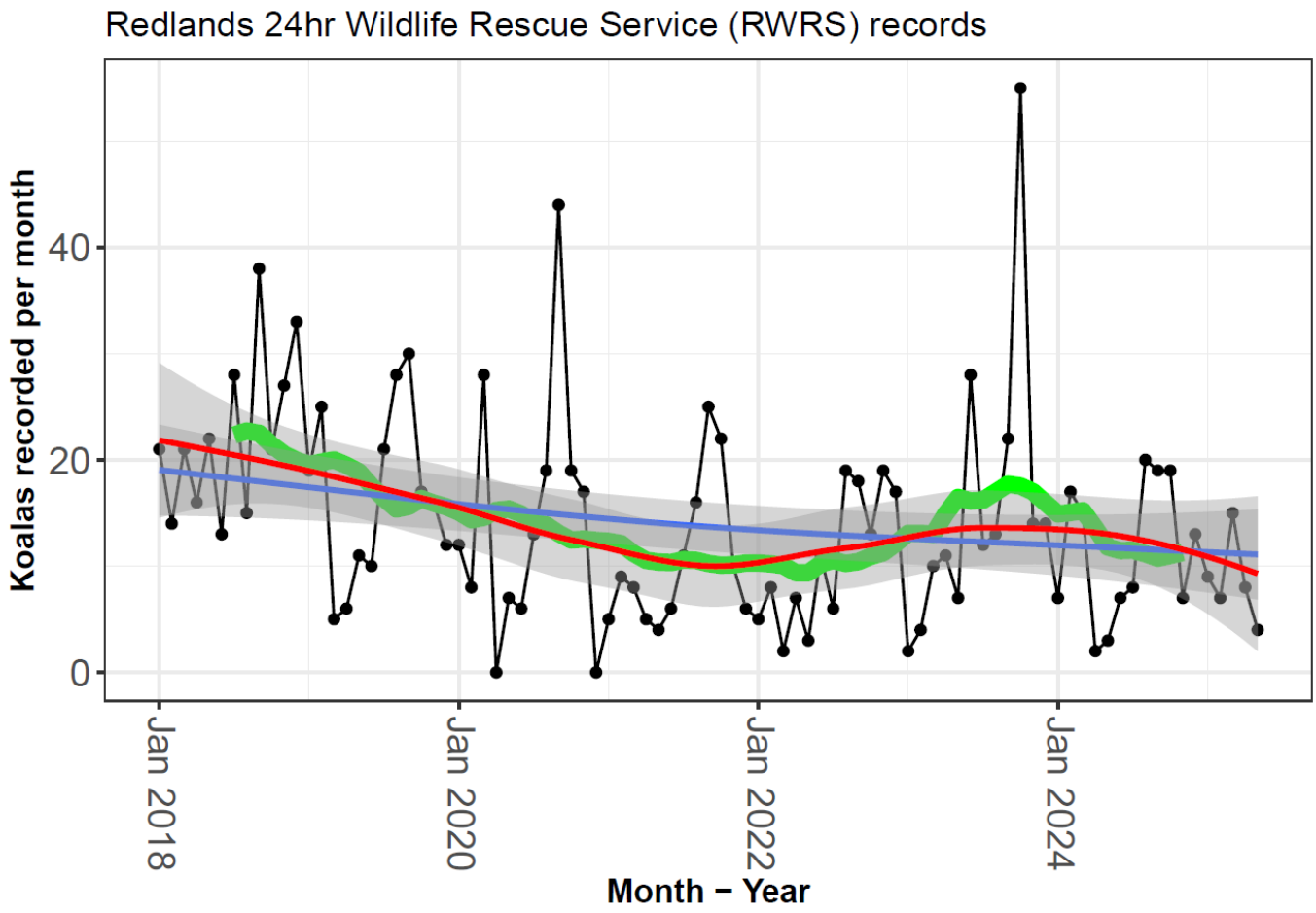

Figure 4. General additive modelling (blue), Loess regression (red) and the decomposed 'trend' (green) in RWRS koala records.

An alternative approach is to use changepoint analysis to determine significant inflection points in the data – points at which the mean number of koalas observed shifts from one value to another, as determined through a model fitting approach. We applied an 'at most one change' analysis to the RWRS data, and detected a change point at February 2019 (Figure 5). Note that this analysis was fixed to fit only a single change point (allowing more change points resulted in overfitting of the model to the data), and the analysis was only looking at the mean number of koalas recorded. This analysis found

that, prior to February 2019, the mean number of koalas recorded per month was 22.4. this figure declined to 12.7 following February 2024. Note that while the mean dropped, it is clear from Figure 5 that the variation in koalas recorded per month increases significantly following February 2019.

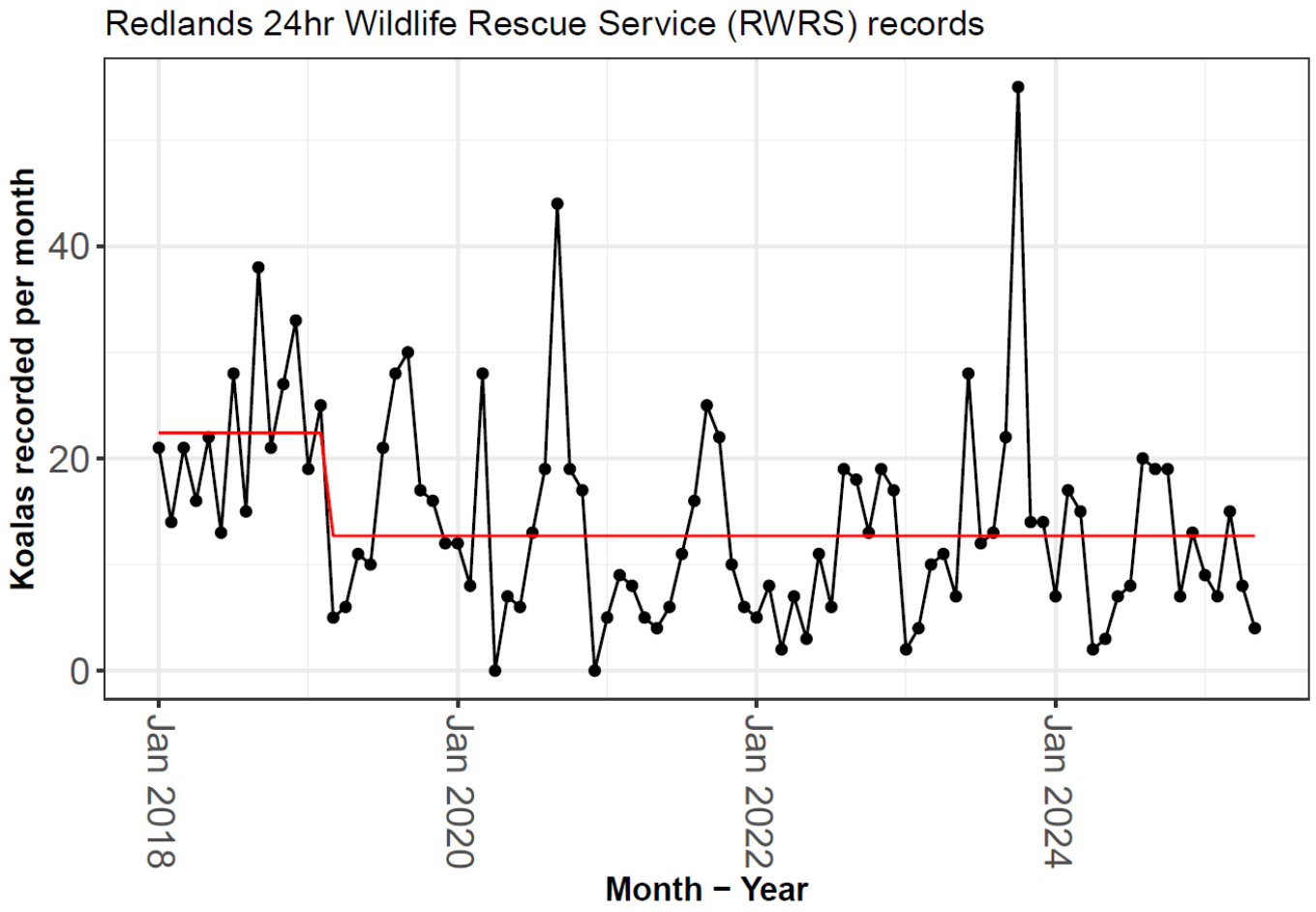

Figure 5. Changepoint analysis of RWRS records detects a change in the mean number of koala recorded at February 2019 (red line).

KoalaBASE

Analysis of KoalaBASE records (Figure 6) show a marked decline in koala abundance from January 2000. This finding is supported by reports from Rhodes et al (2015) and Biolink (2019). There is a suggestion that this population decline stabilises following 2020, but numbers are so diminished that it is difficult to make any conclusions about population change post 2020. Changepoint analysis on koala records from 2013 to 2024 finds a transition point as at October 2019, with a decline in mean koalas recorded from 15.13 to 8.96, but stability at this lower mean number of koalas since that time.

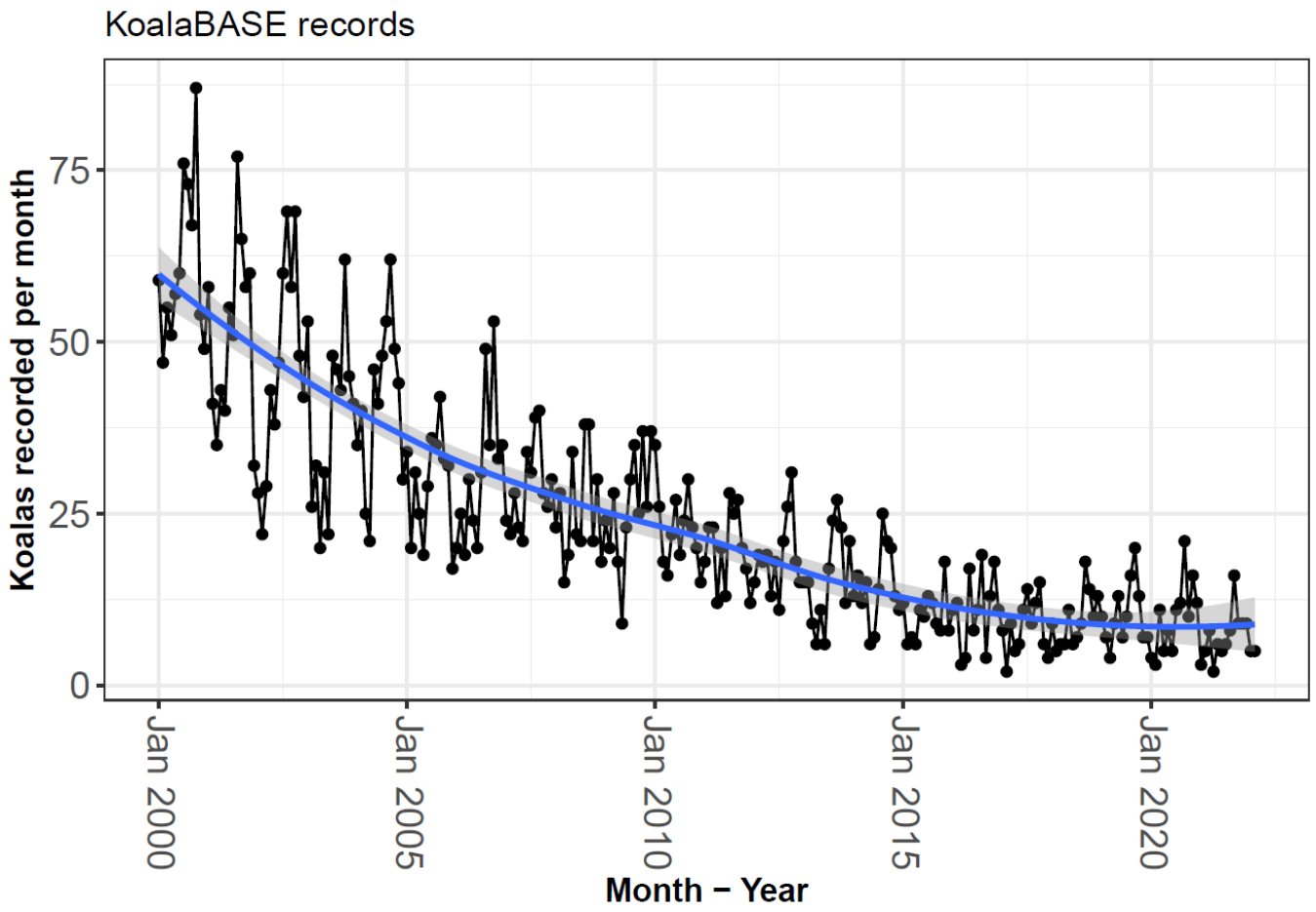

Figure 6. KoalaBASE records dating back to January 2000. We observe a substantial reduction in koala records from January 2000 to approximately January 2020.

WildNet

Unlike RWRS and KoalaBASE, which summarise data on koala mortalities and morbidities, the WildNet database records observations of all koalas, not just those needing assistance. This can include koalas reported by the community, or by Government officers, consultants or other environmental professionals. Consequently, the total number of koala observations documented in WildNet is substantially higher than those reported in RWRS and KoalaBASE.

WildNet contains a mix of citizen science reports of koalas, in addition to data collected by Government surveys and environmental consultants. The highly variable koala observations recorded in the dataset may be a result of this mix of contributing factors. WildNet records show evidence of annual cycles, and a reduction in koala reports to some point from 2018 to 2020 (Figure 7). Since this point, current data is suggestive of stabilisation, but again this interpretation requires caution because numbers are so diminished.

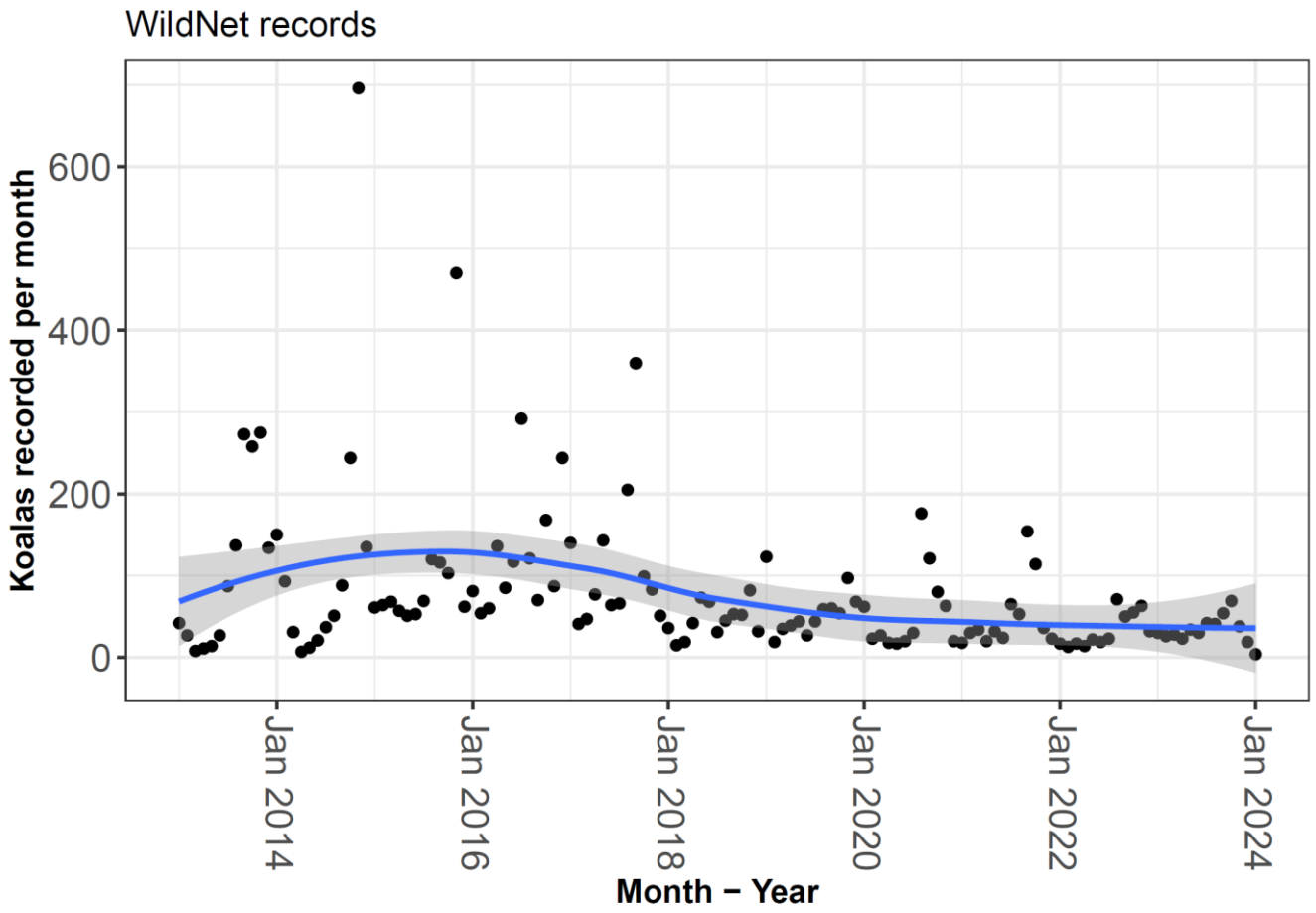

Figure 7. WildNet records for koalas in the Redlands Coast area, dating back to January 2013.

Redlands Coast Koala Watch

The Redlands Coast Koala Watch program is a collaborative partnership between Redland City Council, koala researchers, and the community. Established in 2020, the program serves as a key community engagement initiative designed to encourage public participation in local koala conservation. A precursory glance at the Koala Watch data will note the lack of consistency with the patterns observed in other datasets (Figure 8). We speculate that changes observed in Koala Watch data are primarily driven by promotional activities run through Redlands City Council (RCC). Following the start of the program in 2020 in late 2020, we observe a significant increase in records from mid-2022. This correlates with a significant ramp-up in RCC publicity for the program, and increased community engagement with the program. Declines post-late 2023, further correlate with a pause in public relations promotions of the scheme while it was undergoing a redesign.

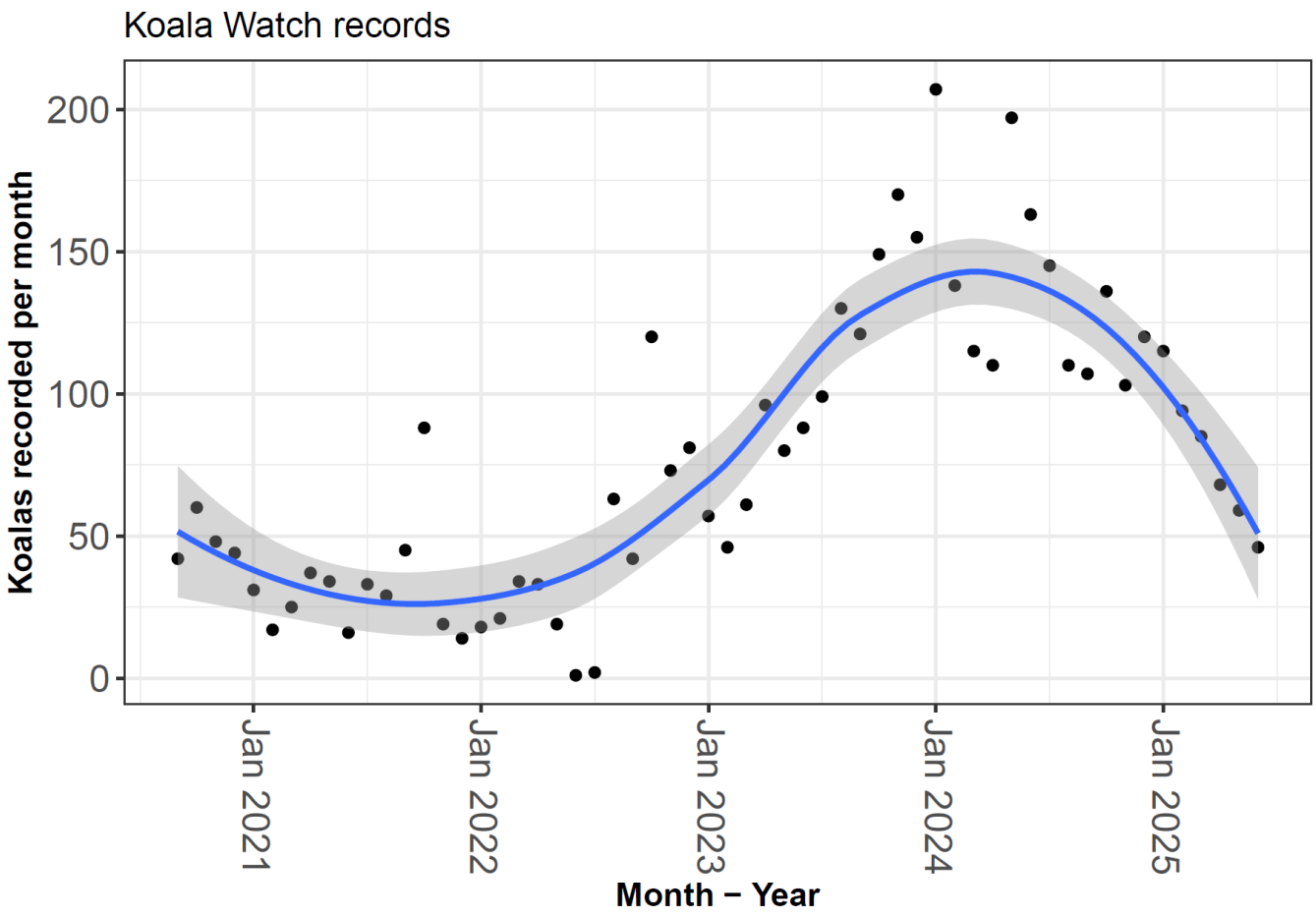

Figure 8. Redlands Koala Watch records through time. Unlike other data sources, the shifting dynamics of this time-series are likely driven by public relations activities by Redlands City Council.

Our assumption is that, rather than provide a proxy for koala population abundance, the Koala Watch dataset instead provides a useful indication of the degree of community engagement in koala conservation concerns. The Koala Watch dataset trend may also inform other datasets; for example the observed increase in RWRS records in 2023, corresponds to the peak of Koala Watch activity in the area, and may be suggestive that increased community engagement was resulting in increased vigilance in the community for koalas requiring treatment.

Spatio-Temporal analysis

Spatial data for koalas was not available for all records. An ongoing project with the RCC is currently working to improve the spatial accuracy of records in the RWRS dataset, and will report in September. Due to privacy concerns, some data in the KoalaBASE and WildNet datasets were withheld. KoalaBASE data did identify records to a suburb, so this has been used to undertake some spatio-temporal analyses. Koala records are unequally distributed across the Redlands Coast (Figure 9).

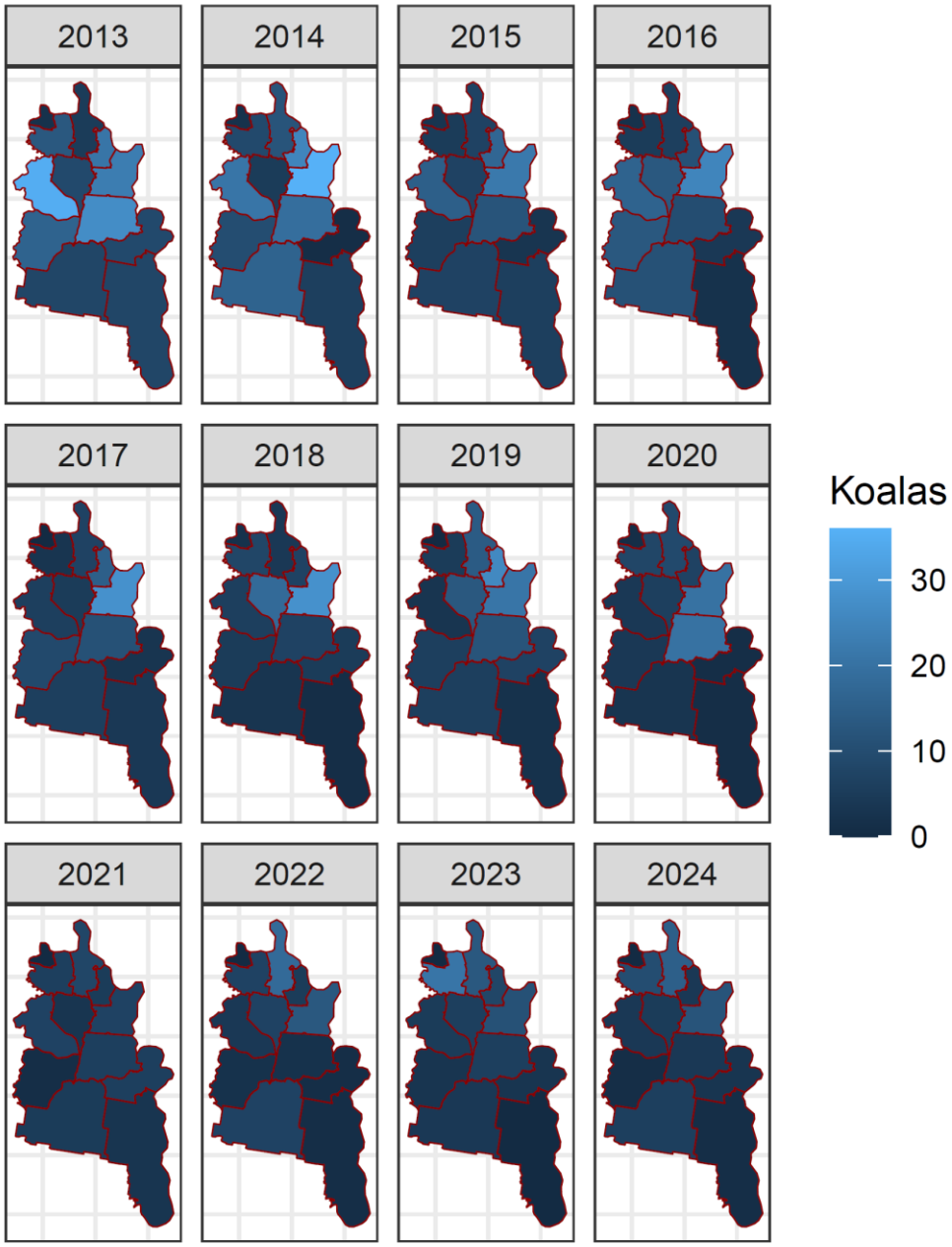

Figure 9. Spatio-temporal mapping of KoalaBASE records for the Redlands Coast, 2013 - 2024. Lighter areas represent higher koala reporting. Mapping is limited to mainland suburbs.

In 2013/2014, koalas were relatively abundant in Capalaba and Cleveland, with significant numbers also observed in Thornlands and Ormiston. However, koala records in Capalaba, Ormiston and Thornlands decline over the following years (Figure 10). Records in Cleveland remain relatively high, before also declining in 2021.

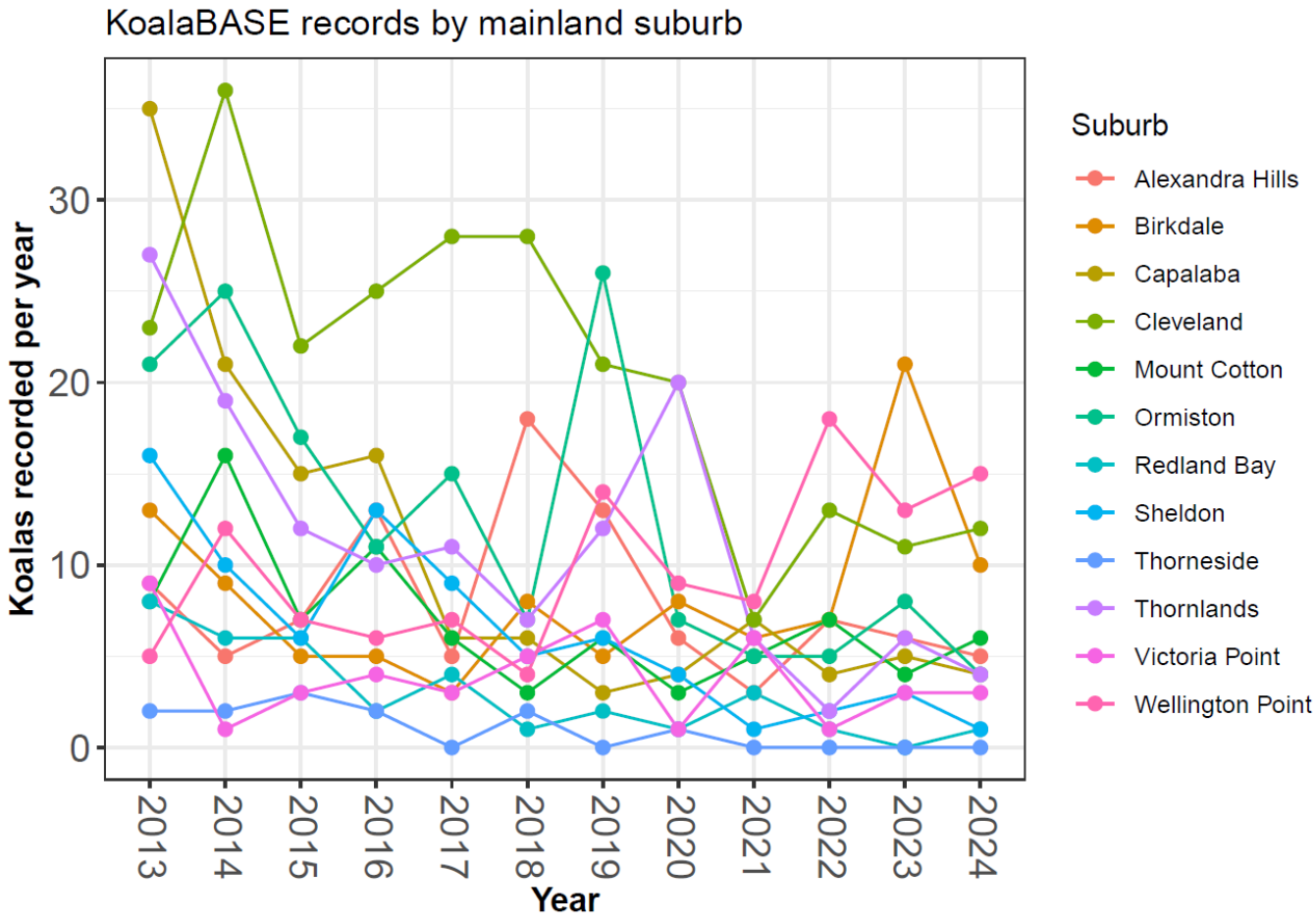

Figure 10. Time series plots of KoalaBASE records by suburb, 2013-2024.

Comparing 2013-2018 with 2019-2024, numbers are generally diminished, with two exceptions; there does appear to be an increase in records from Birkdale and Wellington Point post 2021. With the exception of Thornlands, which has seen relatively large fluctuations in koala records since 2019, with a significant jump to 2020, followed by sizable declines in 2021 and 2022 before a degree of stabilisation, there does not appear to be overwhelming evidence that the number of koala records is diminishing in a manner inconsistent with population stability since 2019. It is additionally note-worthy that Thorneside has had very few koalas reported since 2019, but in truth has had few reported since 2013. However, reports to Koala Watch indicate that koalas are still present in the suburb. Finally, it is crucial to again note that the decreased number of koala records are indicative of a koala population that is severely diminished in abundance relative to 2013, particularly in the suburbs of Capalaba and Thornlands.

Analysis of temporal shifts in koala data

A comparison between the 2013-2018 and 2019-2024 offer some promising changes in the data. We used the total number of koalas recorded in the 2013-2018 and the 2019-2024 period (825 and 627

respectively) and calculated an expected number of koalas in each category for the 2019-2024 time period, based on the relative abundance of each condition in 2013-2018.

Table 1. Comparisons of KoalaBASE records for the time period 2013-2018 and 2019-2024. Statistical significance was determine through Chi-squared testing.

Characteristic	2013-2018	2019-2024			
		Expected	Observed	Change E-O	*p* value
Young Present	29	21.34	41	19.66	0.008*
Healthy	11	8.09	44	35.91	<0.001*
Sick	512	376.71	401	24.29	0.491
Conjunctivitis	252	185.41	141	-44.41	0.023*
Cystitis	242	178.05	193	14.95	0.499
Wasted	431	317.11	345	27.89	0.372
Injured	137	100.8	119	18.2	0.25
Dog Attack	32	23.54	16	-7.54	0.271
Vehicle Strike	174	128.02	70	-58.02	<0.001*
Dead	160	117.72	22	-95.72	<0.001*
DOA	80	58.86	22	-36.86	<0.001*
Died	36	26.49	23	-3.49	0.7
Treated	209	153.77	250	96.23	<0.001*
Euthanised	415	305.34	342	36.66	0.227
Released	128	94.18	191	96.82	<0.001*

While there has been no significant relative change in reports of sick or wasted koalas, we do detect a significant reduction in reports of conjunctivitis in the population ($p = 0.023$). Conjunctivitis is a clinical indication of chlamydial infection, however we note that there has been no change in reporting of cystitis ($p = 0.499$), another symptom of chlamydial infection.

Key threatening processes including dog attacks (32% reduction compared with expected – not statistically significant due to the low occurrence) and vehicle strike (49.3% reduction compared with expected; $p < 0.001$) appear to have diminished. This is potentially attributable to council initiatives such as the “Leave It” campaign (responsible dog ownership), and the introduction of dynamic messaging signs within designated Koala Safe Neighbourhoods at key vehicle strike hotspots (i.e., Sturgeon St, Fitzroy St) along with associated community engagement programs.

We also detect a significant relative increase in the numbers of koalas receiving treatment (62.6% more than expected $p < 0.001$) and getting a subsequent release (102.8% more than expected, $p < 0.001$), compared to the period 2013-2018. This is a really promising change, and could potentially be attributed to increased public vigilance related to the Koala Watch program, leading to earlier identification and treatment of sick or injured animals. Another promising change Is the significant increase in the number

of young observed (92% more than expected p = 0.008), which is a potential sign of increased breeding success in the population.

Conclusions

This population assessment has been requested by RCC to investigate available datasets to potentially demonstrate trends or changes in the koala population of the Redlands Coast from the period 2013-2018, in comparison to the period 2019-2024 with a view to determining whether there is any evidence of recent population stability. Examination of koala records offers an indirect indicator of *changes* in the population, to potentially support findings from other methods.

Examination of koala records from a number of sources do offer some support for the suggestion that koala populations on the Redlands Coast have stabilised since sometime between 2018 and 2020. Put another way, there is little evidence to the contrary, albeit that there are some indications of continuing declines at the level of specific suburbs, whilst others appear stable or have somewhat rebounded. There is still significant variation year to year and month to month in koala reporting, but no clear trends since 2019. However, it is critical to note that koala population abundance is now so low in relative terms that further declines may be difficult to detect before localised extinction.

We also note that any useful inferences are predicated on the notion that koala records from these disparate sources are actually indicative of population abundance, which has obviously not been directly substantiated.

Positive signs are apparent, with significant increases in the number of koalas going into care resulting in a promising increase in the number of koalas subsequently getting released back into the wild. The increase in the number of females observed with young is also a hopefully sign of a population with the capacity to grow. Reductions in the number of koalas negatively impacted by dog attack and vehicle strike are also welcome, and may reflect effective community awareness campaigns from Council and other stakeholders. The contrarian view is that koala records are plateauing as numbers of koalas in the wild near extinction.

It is also important to state categorically that given the reduced population abundance of koalas across the Redlands Coast since 2000, this is still a population under extreme pressure. The number of koalas in the wild are not sufficient to safeguard the population against a significant adverse event. For example, stabilisation of koala numbers may be a result of a number of years of healthy rainfall; if instead Southeast Queensland had been in drought, we may have detected further significant declines. Koala populations on the Redlands Coast do not have much safety net in case of natural disasters.

Recommendations:

1) We recommend this assessment is repeated in 2026 or 2027, to allow urgent intervention if a fall in koala abundance is detected.
2) We believe that this assessment demonstrates the value of the Koala Watch program and other RCC initiatives for increasing community engagement, and it is likely the increased numbers of koalas receiving treatment and subsequent release following sickness and injury is being driven in part by increased vigilance amongst the public. Other initiatives such as ongoing population monitoring and disease management, as well as the 'Leave it' and the Smart signs project have also demonstrated their value.

References

Biolink (2019) Redlands Coast Koala Population and Habitat Assessment: Final Report to Redlands City Council. Available at: https://www.redland.qld.gov.au/files/assets/public/v/2/environment-and-sustainability/documents/biolink_redlands_koala_report_final_05042019.pdf

Kerlin, D.H., Grogan, L.F. & McCallum, H.I. (2023) Insights and inferences on koala conservation from records of koalas arriving to care in South East Queensland. *Wildlife Research,* **50,** 57-67.

McKinney, M.L. (2002) Urbanization, Biodiversity, and Conservation: The impacts of urbanization on native species are poorly studied, but educating a highly urbanized human population about these impacts can greatly improve species conservation in all ecosystems. *BioScience,* **52,** 883-890.

Niemelä, J. (1999) Ecology and urban planning. *Biodiversity & Conservation,* **8,** 119-131.

Rhodes, J. R., Beyer, H. L., Preece, H.J. & McAlpine, C.A. (2015) South East Queensland Koala Population Modelling Study. UniQuest, Brisbane, Australia.