Problems With NSW's Koala Baseline Model

Dailan Pugh. North East Forest Alliance, January 2026

Is this really some of the very best Koala habitat in NSW?

The NSW Government recently released the outcomes of their Koala baseline assessments, intended to identify koalas' distribution and abundance across NSW, and to provide a baseline against which future population changes can be correlated. The outcome included models of Koalas' distribution and densities, and a total NSW koala population estimate of around 274,000, which is over 10 times higher than most other estimates.

The aims of the baseline survey are important and worthy, with the NSW Government now claiming:

> *Results from the koala baseline survey provide a strong foundation to track population changes over time and guide conservation actions, but this does not change the need for protection and management".*
>
> *…*
>
> *While establishing a baseline population is critical, it is also essential to examine long-term population trends to fully understand the status and dynamics of koala populations in New South Wales.*

Since the release of the data I have repeatedly raised my concerns with the Department of Climate Change, Energy, the Environment and Water (DEECCW) that the model of Koala Abundance identifies cleared land as having high Koala densities (which inflates population estimates), is inconsistent with earlier models, and is fundamentally flawed because it primarily relies on the calls of male Koalas to determine densities. After DCCEEW dismissed my concerns in a teleconference, I provided them with maps showing high Koala densities on cleared lands in a brief report, focussing on the Kyogle and Gloucester areas as examples. On 24 December Laura Babian, Director Conservation and Restoration Science, provided me with a response that again dismissed my concerns.

This report delves into my concerns in more detail, as an example focussing on the largest area of the highest density modelled koala habitat in NSW, to the north-east of Kyogle in the upper Richmond River valley.

In summary, I consider that the derived baseline data is fundamentally flawed because:

1. The modelled koala densities have not adequately accounted for cleared land, identifying very high Koala numbers in farmers paddocks, resulting in misleading mapping and grossly inflated population estimates.
2. There is a high reliance on male koala calls to identify Koala habitat and extrapolate koala densities, which appears to have falsely inflated densities because it does not account for the fact that some males may be transients dispersing through poor quality or unsuitable habitat, therefore calls are not necessarily representative of good habitat or resident populations.
3. The covariates used for modelling are broad and simplistic and therefore do not adequately account for variations in habitat attributes known to affect Koala densities, resulting in broad and inaccurate mapping.

Based on this review, I consider the Koala baseline assessments are useful in defining key areas of occupied Koala habitat, but do not accurately identify Koala habitat and densities within these areas, and therefore do not provide a reliable population estimate or baseline against which future population changes can be determined. The data do not provide a "*strong foundation to track population changes over time"* because the records for the survey sites are inadequate to reliably measure future population changes against, and the derived models are too broad, erroneous and misleading to be used as benchmarks.

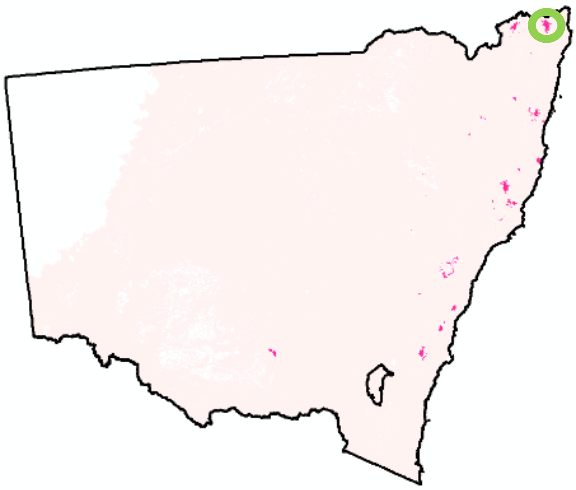
Neither does the data provide a "*strong foundation to … guide conservation actions".* It is apparent that the area to the north-east of Kyogle encompasses Koala habitat of state and national significance, most of which occurs on private lands. This area has been identified as particularly vulnerable to increases in hot days above 35^{o}C and droughts as climate change progresses, increasingly stressing Koalas. Retained Forest Red Gums in paddocks used by Koalas to disperse will increasingly succumb to droughts and old age, without replacements being available. For the long-term persistence of Koalas in this fragmented landscape there is a need to identify, retain and enhance core Koala habitat, including climatic refuges near permanent streams, and corridors linking these patches of core habitat. Kyogle Shire Council still does not have a Koala Plan of Management, nor Environmental Zones. Regrettably the baseline Koala models are too broad and misleading to facilitate the landscape planning required.

Contents

1. Identifying paddocks as the best Koala habitat in NSW

The largest patch of the highest density Koala habitat in NSW identified by DEECCW is to the north-east of Kyogle in the upper Richmond River valley. As in many areas, this patch extends across substantially cleared lands (see Appendix 1). The claimed Koala densities for farming land in the Kyogle area are amongst the highest in NSW, often exceeding 0.08/ha (one per 12.5 ha), and reaching up to 0.36/ha (one per 2.8 ha) for cleared paddocks. In semi-cleared lands there are amongst the highest claimed Koala densities in NSW of 0.81/ha (one per 1.2ha). Despite DEECCW claims that native vegetation, canopy height and Koala feed trees are the key factors that define Koala habitat and density (see section 3), it is evident that they have not been applied to limit the modelling of Koala densities in these areas. The attribution of exceptionally high densities of Koalas to cleared farming land in the model has the effect of providing misleading modelling and significantly increasing population estimates.

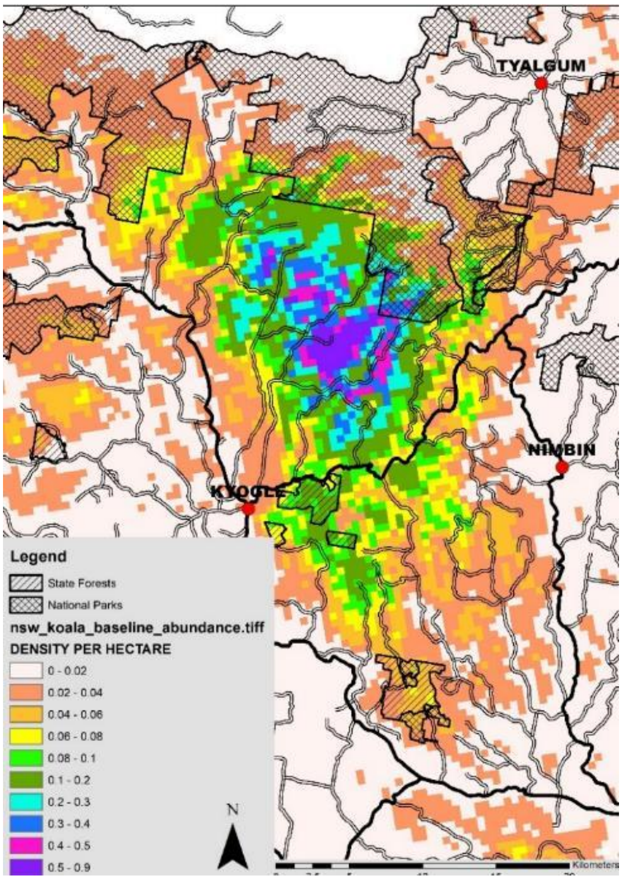
Across NSW, DEECCW identify scattered patches of modelled Koala habitat with densities greater than 0.8 Koalas per hectare, with the largest patch in the Kyogle area. DEECCW (Gallahar *et. al.* 2025a) note "*only a relatively small proportion (7,800 hectares) of the state contains high-density areas (0.28–0.91 koalas per hectare)*", with most of this concentrated to the north-east of Kyogle.

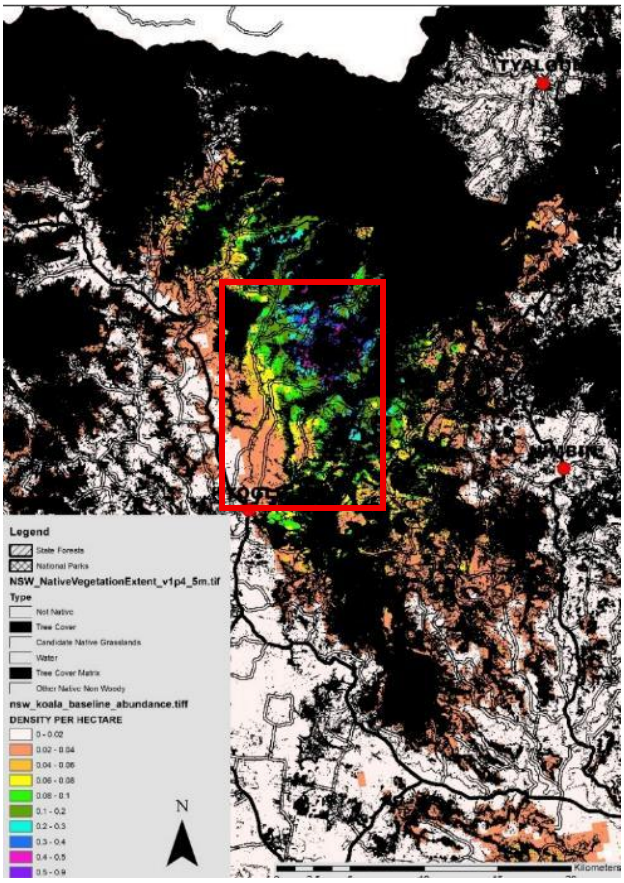


Koala densities >0.08/hectare (one per 12.5 ha)

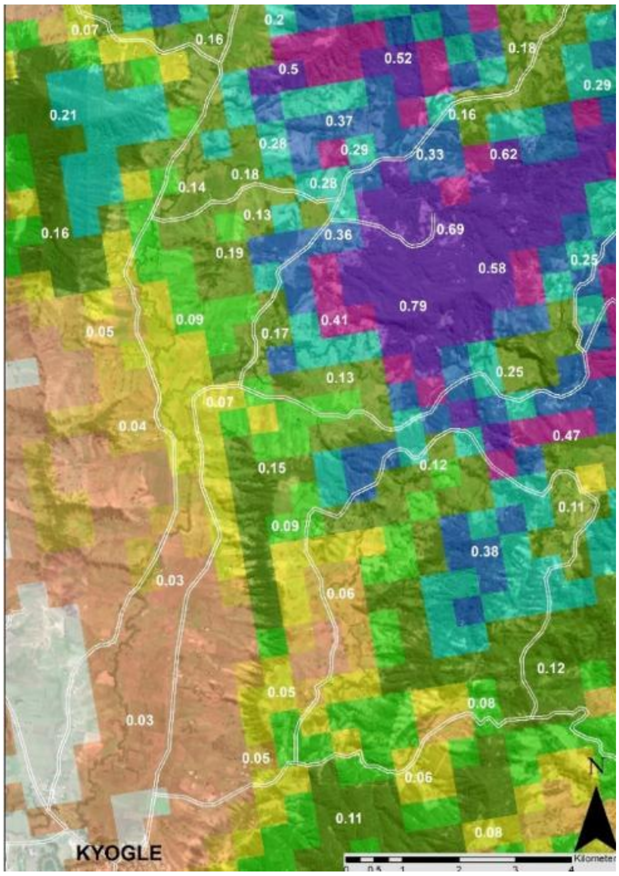
From their intensive study of Koalas in the Pine Creek area, an area reputed to support the largest and most stable Koala populations in NSW, Smith and Pile (2024) identified average Koala densities in natural forest in their study area as 0.076/ha, increasing to 0.28/ha in the highest quality habitat, noting "*koala density may vary more than 10-fold over short distances (200 m) in complex mosaics*".

Map 1 shows the largest highest density Koala population identified by DEECCW's [Modelled Koala Abundance] in NSW. Map 2 shows native vegetation as a black overlay, highlighting the extensive areas of cleared lands in the Kyogle area claimed to have Koala densities above 0.8 Koalas/ha, for significant areas of cleared lands even claiming densities above 0.28 Koalas/ha. The inclusion of cleared land is explored in more detail on maps 3 and 4, where examples of claimed densities are overlaid on satellite images. As shown on Map 5, a brief field inspection was undertaken to take representative photographs of claimed high density Koala populations. Problems with the mapping of Koala abundance in this area is further explored in Sections 2 and 3.

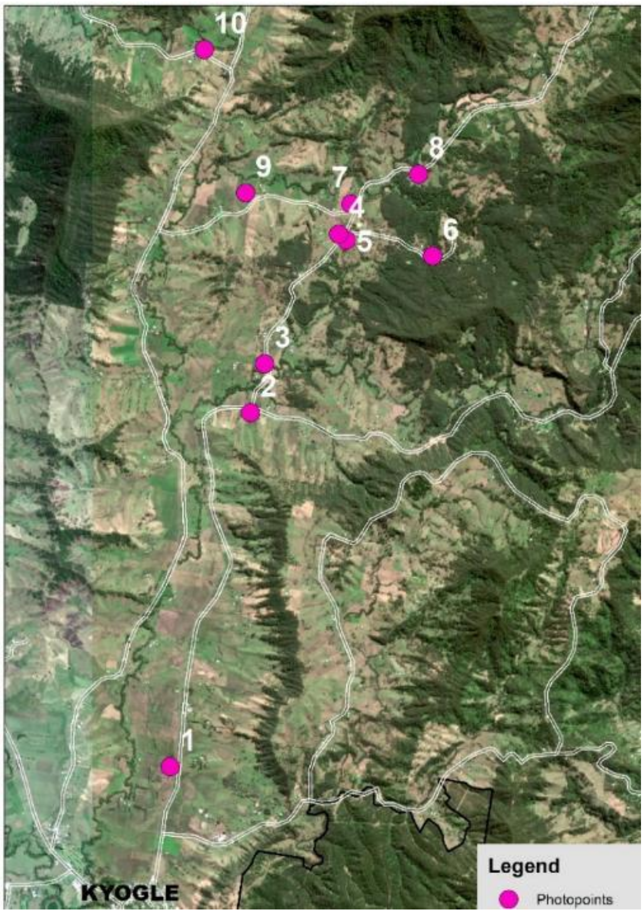




Map 1; DEECCW's [Modelled Koala Abundance] showing estimated Koala densities per hectare.
Map 2; Modelled Koala Abundance overlaid with DECCW's NSW Native Vegetation Extent (black) (from [NSW Koala Habitat Information Base]) the remaining coloured areas are modelled Koala habitat outside native vegetation on cleared land. This reveals the extent of modelled Koala habitat on cleared lands, including many areas with claimed high densities. The model is thus claiming thousands of Koalas on cleared lands across this area. Further examples are provided in Appendix 1. **Red rectangle: Area for detailed assessment.**



PREVIOUS PAGE Maps 3 and 4; Detail of above. Modelled Koala densities overlaid on satellite image, showing the high densities of Koalas on cleared lands. Claimed densities for grid cells have been extracted and provided as an overlay showing representative actual values.



A brief inspection of the cleared lands claimed to have high Koala densities was undertaken, with photographs taken at representative sites. In general the riparian vegetation along creeks was found to be predominately the introduced Camphor Laurel, with occasional River Oaks, rainforest species and Forest Red Gums. At lower elevations there were Forest Red Gums scattered across farming land, mostly remnant old trees at very low densities.

It is apparent that some of these extensively cleared lowlands can support transient Koalas because of the Forest Red Gums, with some patches of higher density red gums likely to support breeding females, though it is wrong to extend Koala densities from these fragments of habitat across extensive cleared farmland.

Map 5. Location of photopoints. Foregrounds of photos correspond to claimed densities.

Photo 1 (LEFT): example of the extensively cleared floodplain, with a narrow band of vegetation along the creek in the distance. Claimed to have a Koala density of 0.028/ha
Photo 2 (RIGHT); example of extensively cleared paddocks with scattered remnant Forest Red Gums. Claimed to have a Koala density of 0.08/ha.

Photo 3 (LEFT): overlooking an extensively cleared floodplain, with a narrow band of vegetation along the creek in the distance. Claimed to have a Koala density of 0.11/ha
Photo 4 (RIGHT); lower slopes of extensively cleared paddocks with scattered remnant Forest Red Gums. Claimed to have a Koala density of 0.19/ha.

Photo 5 (LEFT): ploughed paddocks with scattered remnant Forest Red Gums. Claimed to be some of the best Koala habitat in NSW with a Koala density of 0.36/ha
Photo 6 (RIGHT); semi-cleared land with extensive areas of mixed regrowth, with a scattering of potential feed trees (Flooded Gum and Blue Gum) observed along the road. Claimed to be the very best Koala habitat in NSW with a Koala density of 0.81/ha. The Koala Tree Species Index (Map 8) shows this area as having no feed tree species, so it is perplexing as why it was identified so highly.

PREVIOUS PAGE. Photo 7 (LEFT): cleared creek flats, with a narrow band of vegetation along the creek in the distance . Claimed to be some of the best Koala habitat in NSW with a Koala density of 0.28/ha
Photo 8 (RIGHT); predominately cleared land with narrow band of Camphor Laurel dominated riparian vegetation and scattered Forest Red Gums. Claimed to be some of the best Koala habitat in NSW with a Koala density of 0.58/ha.

Photo 9 (LEFT): cleared creek flats, with a narrow band of vegetation along the creek in the distance . Claimed to have a Koala density of 0.14/ha
Photo 10 (RIGHT); predominately cleared foothills with scattered remnant Forest Red Gums. Claimed to have a Koala density of 0.16/ha.

In response to my raising concerns with DEECCW about paddocks being identified with high Koala densities, they responded (Laura Babian, 24 December 2025); *"Although some surveyed paddocks appear cleared, they are generally surrounded by bushland and riparian areas with trees. Individual paddock trees are also well documented as being used by koalas for movement and resting."* As identified in the above photos, most of the valleys are characterised by narrow strips of riparian vegetation along permanent creeks (which may or may not include Forest Red Gums) and cleared grassy paddocks that may include scattered Forest Red Gums. These cleared paddocks are not generally surrounded by bushland, and should not have been identified as amongst the highest density Koala habitat in NSW. There are patches of remnant vegetation on steeper slopes and on ridges, where indeed cleared land may be in the vicinity of areas of native vegetation, though not necessarily comprising Preferred Koala Feed Trees.

Could cleared paddocks in the Kyogle area really support far higher Koala densities than found in the best Koala habitat in the Pine Creek area of the Great Koala National Park?

A more nuanced modelling approach was adopted by DPIE's 2019 Koala Habitat Suitability Modelling (see Map 12) which distinguished the narrow strips of riparian vegetation and scattered patches of feed trees as Koala habitat, rather than applying such a broad categorisation to erroneously and misleadingly include extensive areas of cleared paddocks as high quality habitat.

2. Relying on male Koala calls to identify habitat and abundance

A principal problem with the survey records relied upon for modelling Koala habitat and densities is that most records were obtained from recordings of male calls during the breeding season. Calling males may be displaced individuals calling from poor habitat or wandering through unsuitable habitat. They may also be calling from outside the area where habitat attributes are attributed. Given that Koalas recorded may not be resident or may be calling from outside the site where habitat attributes are measured, such records do not provide a reliable baseline for modelling preferred habitat or densities.

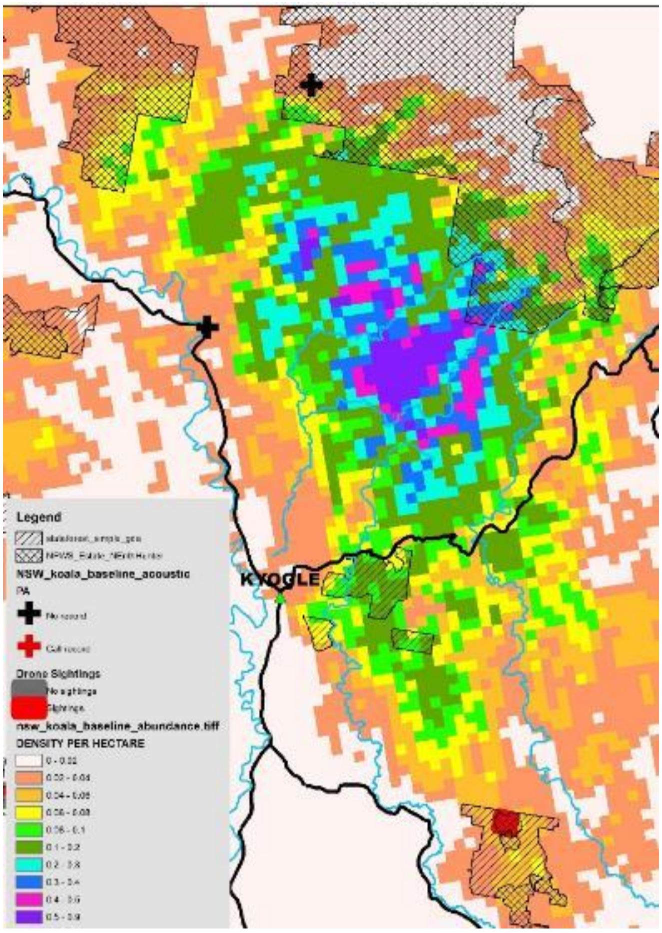
One-off drone surveys were undertaken on cold nights over 56ha sites, where all observed koalas were recorded. For acoustic records a ‘passive acoustic recorder’ is placed on a site for at least 14 days in the breeding season to record any calling males within at least 300m at that time. A single call somewhere in the distance is sufficient to be counted as a presence record and used in modelling.

DEECCW (Gallahar *et. al.* 2025a) identify that across NSW Koalas were detected during 384 of 1,160 (33%) drone surveys and at 1,179 of the 2,979 (40%) acoustic sites used in the modelling. Records from 384 sites across the whole of NSW where actual numbers of Koalas were recorded is a small sample to extrapolate from. This indicates the high reliance on recordings of calling males, for determining Koala habitat and densities. For the analysis the acoustic records were only counted on a present/absence basis, yet were used to determine Koala densities. When I questioned DEECCW on the use of the acoustic records for abundance modelling I was told they were not used, though this is not correct.

DEECCW (Gallahar *et. al.* 2025a) report “*An integrated species distribution model combined acoustic and drone data to predict koala abundance across New South Wales*” and in reference to acoustic records states “*The large areas of low-density populations found by this study contribute noticeably to the total population estimate for New South Wales”.* The problem is that application of these records did significantly increase the extent of identified habitat and did significantly increase population estimates.

In response to my concerns about cleared paddocks being shown with high Koala densities near Kyogle and Gloucester, DEECCW (Laura Babian, 24 December 2025) told me “*In the area you identified, multiple survey sites recorded koala activity, with both acoustic recorded and relatively high drone counts*”. The accompanying data released only includes one drone site in the vicinity of the claimed highest density population near Kyogle, to the south in a large expanse of extant vegetation in Bungabbee Nature Reserve (2 Koala records), with two nearby acoustic sites at which no Koalas were heard. The relatively high densities on these cleared lands could not be because of these records. DEECCW (Gallahar et. al. 2025a) identify there were additional Koala acoustic sites in the Kyogle area obtained from ‘priority population monitoring’, though these records were not located by me.

It is apparent that modelling of Koala densities to the north-east of Kyogle was based solely on acoustic records. How these presence/absence male acoustic records were analysed to identify the highest densities of Koalas in NSW is not apparent. This may help explain why high Koala densities are claimed for cleared lands, as males could have been utilising scattered Forest Red Gums to move over large distances searching for mates in the breeding season, being recorded on multiple recorders and allowing false interpretations of resident population densities.



Map 6; Koala records utilised in modelling from the data released with the DECCW report. Note that additional acoustic records collected in another project were included in modelling.

It is of particular concern that the NSW baseline Koala Abundance model appears to be principally based on the results of acoustic surveys that only record male Koala bellows (up to 300m away) during the breeding season and ignore female Koalas. The assumption that male Koala calls are representative of female population densities and breeding habitat has been shown to be invalid by Smith and Pile (2024) who found that male Koalas call in a wide variety of degraded and poor quality habitat, which may in part reflect transient, dispersing males in unsuitable habitat, whereas observations of reproducing females were largely confined to the highest quality habitat. As such, reliance on male calls and site attributes at recording sites, where calling Koalas may be 300m away, provide an unreliable basis for identifying key variables influencing koala habitat quality, and questionable basis for identifying Koala density.

Based on years of study at Pine Creek (south of Coffs Harbour) Smith and Pile (2024) note:

> *Average koala density increased steeply and significantly, from 0.02 – 0.20 koalas/hectare, with increasing mapped habitat quality based on increasing forest age, structural complexity, local food tree species diversity, history of prior koala occurrence and decreased past logging intensity. This relationship was driven primarily by breeding females, with the number of male koala calls weakly or uncorrelated with koala sightings and mapped habitat quality. Male koalas were more widely and uniformly distributed than females, including areas of low quality, plantation, and intensively logged forest. This finding explains the discrepancy between our results and those of other recent studies which concluded that koalas are*

tolerant of intensive logging based on modelling of calling male koalas and reliance on an untested assumption that male calling is indicative of female breeding success.

…

The frequency of koala calls in the Pine Creek State Forest did not correlate with the combined number of male and female koalas sighted, and the distribution of male koala calls differed from that of female koala sightings. These findings confirm that male and female koalas are distributed differently across the landscape, with calling males widespread in both low and high quality habitat while adult breeding females are largely confined to high quality habitat …

…

The male koala population in the study area appears to comprise two parts, a resident breeding part that occupies higher quality habitat with breeding females, and a non-breeding or transient part that occupies low quality or unsuitable (sink) habitat with few or no breeding females. …

Data are provided by DEECCW for 452 of the drone sites. Most of these drone sites included acoustic recorders. Koalas were acoustically recorded on 114 drone sites, with Koalas only observed on 61 of these, meaning that Koalas were heard but not seen on 53 of the sites. This suggests that there were not resident Koalas present at many of the sites where their calls were recorded. Further to this, on 26 drone sites where acoustic surveys recorded Koalas, only one Koala was observed. These results support concerns that calling males do not necessarily represent good Koala habitat, or stable populations.

It is apparent that records of calling males do not provide a reliable baseline against which future population changes can be measured, as a male could be calling now in the midst of a dense colony of breeding females and in the future on its own, desperately searching for a mate.

Unfortunately, it is also apparent that one-off drone surveys, as used for the baseline surveys, do not reliably identify extant populations. For their Great Koala National Park assessment DEECCW (Jessop et. al. 2024) undertook 2 surveys for each site on the same night with a temporal separation, finding that due to “imperfect detection” fewer than half of koalas seen on the first survey were then observed on the second survey. As Gallahar *et. al.* (2025a) only relied on single surveys, then any subsequent drone surveys of the same sites using the same methodology could result in estimates that mask substantial population changes that may have since occurred. It also means that population densities are likely to have been significantly understated for many drone sites used in modelling.

3. Extrapolating records using a few broad environmental variables

The principal problem with the Koala abundance model is that it has extrapolated the results from DEECCWs limited number of drone sites, and presence/absence acoustic records, across NSW using a small number of broadly “mapped” environmental variables. These show that Koalas are found in better watered landscapes, with the only other variables counted as significant being coarse mapping of canopy height, Koala feed trees and soil nitrogen. Despite these, and native vegetation, being identified as key variables, the models include cleared lands, forests without feed trees, and young regrowth as high quality habitat. There are numerous other variables that affect Koalas’ abundance that are not mapped at a statewide scale and are therefore not accounted for.

The habitat mapping has been undertaken at too broad a scale and is too coarse to provide data of sufficient refinement to be useful in monitoring or land-use planning.

DEECCW (Gallahar *et. al.* 2025a) identify "*Our models describe that, in general, koalas inhabit fertile areas with higher moisture where feed trees are present and have a moderate climate*". The variables used for modelling abundance were:

- Euclidean distance to 5 order streams and above
- Canopy height (m)
- Koala Tree Species Index: C1 species - 1750 (whole- of-landscape) predicted extent
- Distance to all major population centres
- Total nitrogen (%) in topsoil (0–30 cm)
- FESM (fire extent and severity mapping) maximum severity class (per pixel) between 2006 and 2024
- Aridity Index 2 – Max difference between successive months

Below, Figure 8 from DEECCW (Gallahar *et. al.* 2025a) showing significance of covariates in modelling.

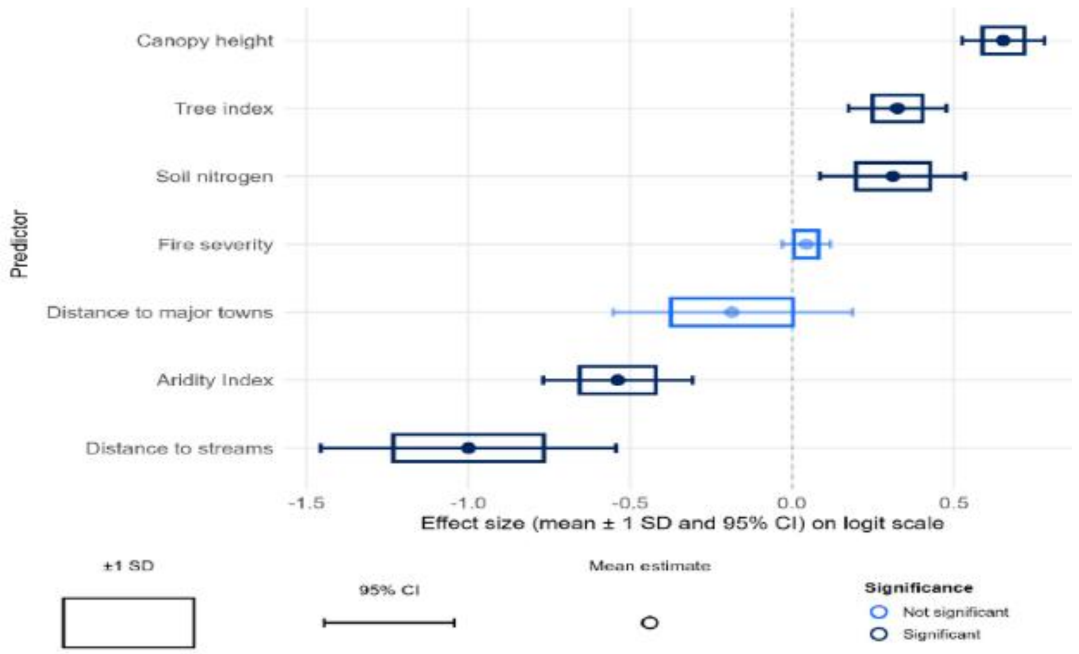


Figure 8 **Effect size of predictors used in the RISDM distribution model, dark blue indicates significant effects and light blue non-significant effects**

DEECCW (Gallahar *et. al.* 2025b) conclude:

> *The abundance model shows that at a state scale there are likely to be more koalas in areas with taller trees, where known feed trees are present and in areas with higher soil nitrogen. The model shows that there are likely to be fewer koalas in areas further from waterways (rivers, streams and ephemeral creeks) and in arid areas.*

For their Great Koala National Park assessment DEECCW (Jessop *et. al.* 2024) found four covariates best matched their plot data, application of which would generate significantly different models than Gallahar *et. al.* (2025a). The three positive covariates applied by Jessop *et. al.* (2024) to generate their model were:

1. Normalized Difference Vegetation Index Q3 (covariate 'rs_ndvi_q3'), a measure of vegetation health and growth in each quarter of the calendar year, in this case the third quarter (July to September, Spring)

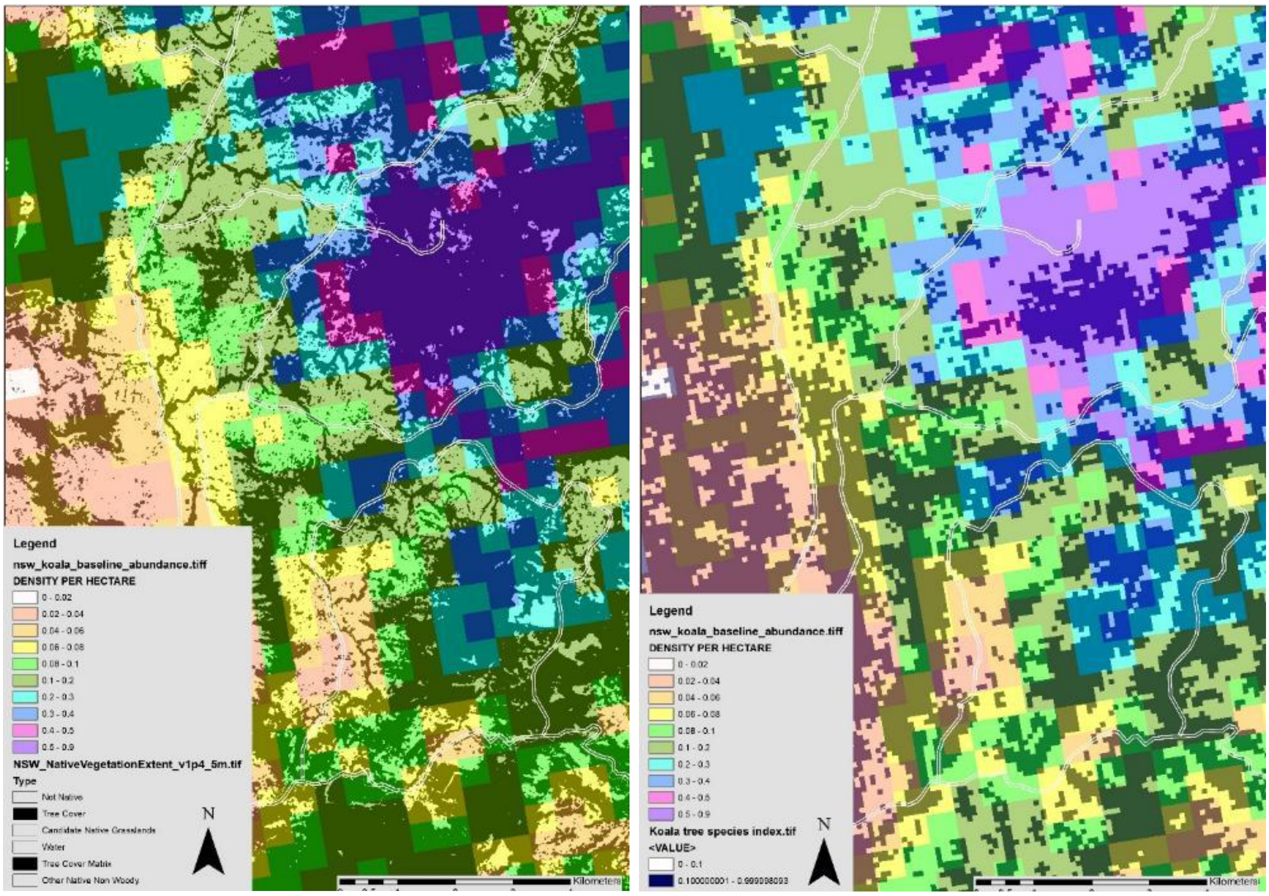
2. Soil depth (covariate 'sp_des0220'), which is the depth of soil (A and B horizons) down to 2 m

3. Tree Species Index (TSI) (14 species) – binary thresholded version (covariate 'TSI_14sppb'), which represents locations where there is a greater than 50% chance of at least one of the 14 most important koala feed trees in the assessment area occurring.

The negative covariate applied was Fire Extent and Severity Mapping representing class 4, extreme severity, fires in 2019–20.

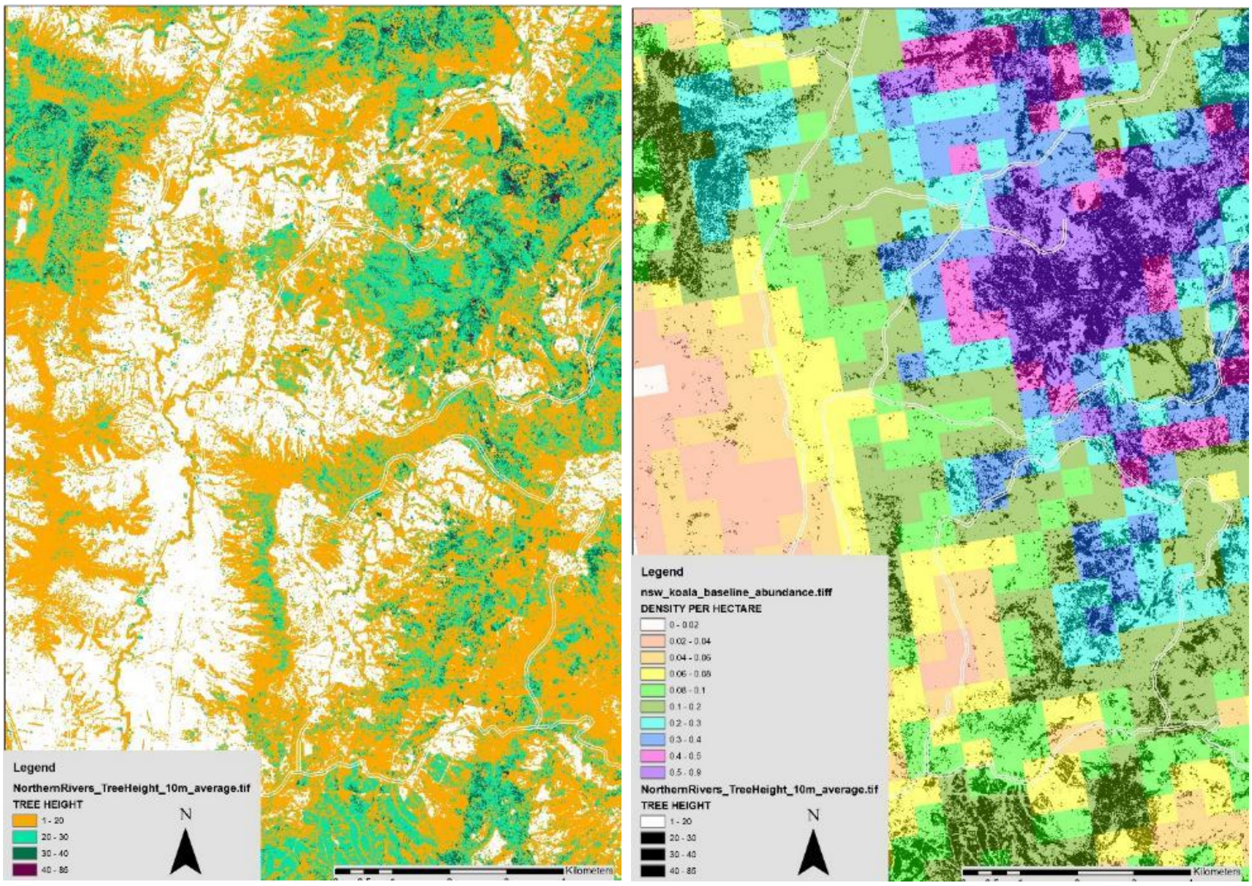
As well as a variety of climate variables, DPIE's (2019) Koala Habitat Suitability Model utilised their Koala tree species index, depth to bedrock, cold-air drainage, projected foliage cover and land–soil capability.

There is also poor visual correlation between DEECCW's modelling and the covariates relied upon. DEECCW (Gallahar et. al. 2025a) claim "*To obtain an abundance estimate, the integrated species distribution abundance model and a measure of available habitat (based on the proportion of woody vegetation present in each 500 × 500 m grid cell) were used to predict koala abundance*". While it does appear the proportion of woody vegetation in a grid cell does reduce the modelled Koala density, it is only a marginal reduction, meaning that where high modelled density classes occur on extensively cleared land there is only a marginal reduction in claimed densities (Map 7).



PREVIOUS PAGE Maps 7 and 8: **LEFT** Modelled Koala Abundance in the Kyogle area overlaying DEECCW's Koala Habitat Information Base 'NSW Native Vegetation Extent' mapping to show correspondence of modelling and vegetation (dark shadows). **RIGHT** Modelled Koala Abundance overlain over DEECCW's Koala Tree Species Index, which is included in models as a key determinant of Koala habitat – the Koala Tree Species appear as the dark shadows under the Modelled Koala Abundance. Note that most of the areas claimed as having the highest density NSW Koala habitat (purple and blue) is inexplicitly identified as having no feed trees.

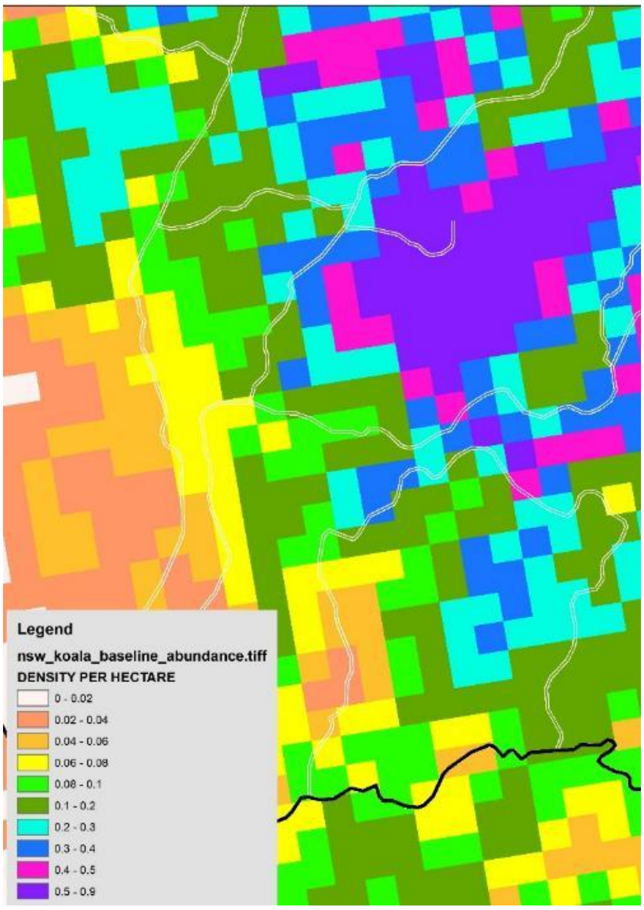
One of the key variables relied upon in all the above models is the Koala Tree Species Index, though strangely DEECCW's 2025 Abundance Mapping relies upon a pre 1750 version (before the vegetation was cleared). DEECCW's Koala Tree Species Index is available as part of their Koala Habitat Information Base. The index "*reflects the probability of finding a tree species that a koala is known to use for food or shelter*" and is therefore supposed to be the key determinant of Koala habitat. As shown in Maps 7 and 8, the Koala Tree Species Index differs significantly from native vegetation mapping, showing Koala feed trees to be far more constrained than native vegetation in DEECCW's 2025 Abundance Mapping of highest density koala habitat (Map 8, purple and blue), meaning that even where it is native vegetation much of the modelled habitat is unlikely to have the exceptional koala densities claimed.

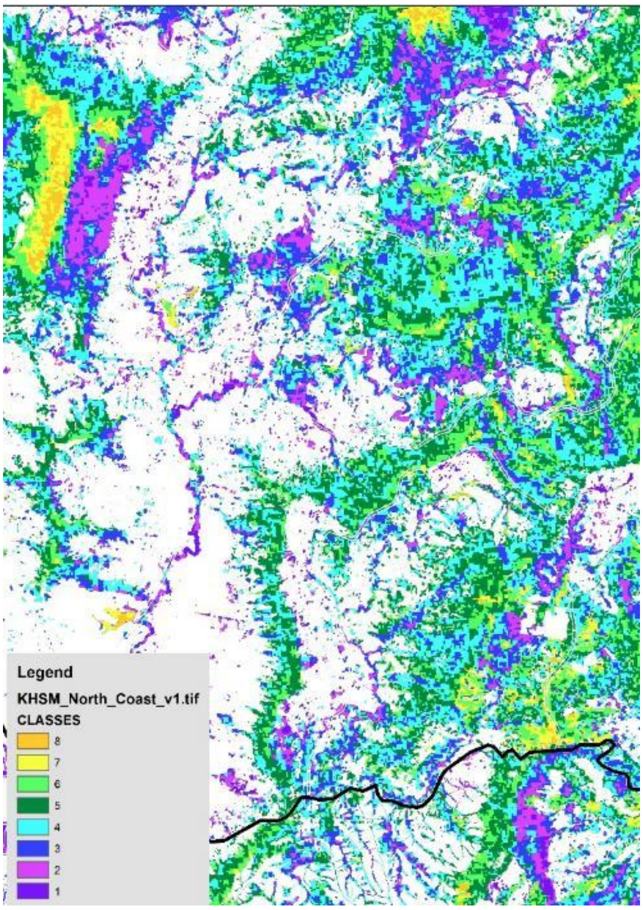


Maps 9 and 10; Griffith University (Norman *et. al*. 2025) mapping of actual tree height identified from LiDAR, showing the extensive disturbance to native vegetation has resulted in reduced canopy height over extensive areas. **RIGHT** overlaid with claimed Koala density, showing claimed Koala densities in forests more than 20m tall (dark shadows), and extensive areas of high density Koala habitat in areas with a canopy height less than 20m.

The key variable relied upon for DEECCW's 2025 Abundance Mapping is canopy height. The data they rely upon was not accessed, though Map 9 shows Griffith University's (Norman *et. al*. 2025) mapping of actual tree height identified from LiDAR, with occasional trees reaching over 50m tall in this area. A comparison with DEECCW's 2025 Abundance Mapping (Map 10) again reinforces the poor correspondence of their mapping with native vegetation, as well as showing that extensive areas of the highest quality Koala habitat is under 20m tall, a poor correlation with canopy height except at the broadest level.

DPIE's (2019) Koala Habitat Suitability Model was based on all Koala records, rather than just recent acoustic and drone records. Maps 11 and 12 show the Koala Habitat Suitability Model (Map 12) primarily differs from the Abundance Mapping (Map 11) by being far more refined, its exclusion of cleared land (with the retention of fragments of native vegetation), and a dramatically different ranking of habitat quality. It is hard to believe that DEECCW's 2025 Abundance Mapping is an improvement.

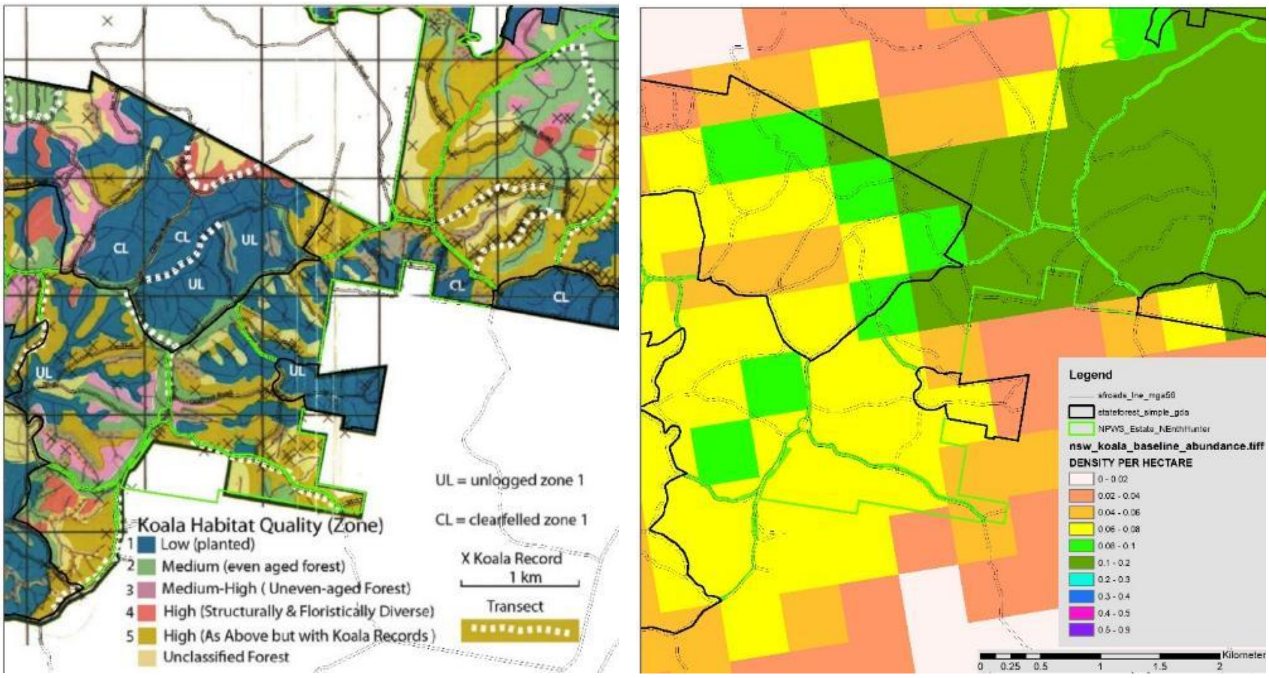




Maps 11 and 12: Comparison of DEECCW's 2025 Abundance Mapping (**LEFT**) with DPIE's 2019 Koala Habitat Suitability Model (**RIGHT**). The Koala Habitat Suitability Model depicts modelled habitat quality rather than population density, here arranged in classes 1 (highest) to 8 (lowest), with colours chosen to be relatively (but not directly) comparable to the Abundance Mapping.

The principal problem with modelling Koalas across NSW is that many of the variables affecting Koala's distribution are not available as data layers or only as broad surrogates with insufficient discrimination. Smith and Pile (2024) mapped koala habitat based on long-term ground based spotlighting surveys, and on-ground assessments of environmental variables, identifying "*Average koala density increased steeply and significantly, from 0.02 – 0.20 koalas/hectare, with increasing* *mapped habitat quality based on increasing forest age, structural complexity, local food tree species diversity, history of prior koala occurrence and decreased past logging intensity".* Smith and Pile (2024) also found that females '*preferred, patches of forest with a high diversity and abundance of locally preferred tree species including non-eucalypts (Allocasuarina and Syncarpia), a complex more mature forest structure, and the absence of past intensive logging".*

A comparison of survey-based habitat mapping by Smith and Pile 2025 (Map 13) with DEECCW abundance mapping (Map 14) shows the coarseness of DEECCW's mapping, with patches identified as low habitat value with densities of 0.018/ha by Smith and Pile (2025) shown as having densities as high as 0.14/ha by DEECCW, and conversely areas identified as having densities of 0.203/ha identified as low as 0.06/ha by DEECCW. This illustrates the spatial inaccuracies of the DEECCW mapping.



Maps 13 and 14; Comparison of DEECCW abundance mapping (**RIGHT**) with survey-based habitat mapping by Smith and Pile 2025 (**LEFT**), where Koala Habitat Quality zones 1 to 5 correspond with Koala densities of 0.018, 0.053, 0.098, 0.083 and 0.203 Koalas/ha respectively. As well as extending over adjacent cleared lands (see Appendix 1), the DEECCW abundance mapping has poor correspondence with the detailed on-ground mapping.

It is clear that the use of different covariates and different modelling approaches have resulted in significant differences in the claimed distribution and quality of Koala habitat between models, and with on-ground assessments.

This highlights the problems with modelling Koala habitat as identified by the EPA 2016 in their detailed assessment of modelling approaches, which lead the EPA (2016) to conclude:

> *While resident populations of koala were found in all pilot areas, habitat utilisation was variable across the landscape. Areas of higher activity positively correlated with greater abundance and diversity of local koala feed trees, trees and forest structure of a more mature size class, and areas of least disturbance. Across the landscape, the majority of koala numbers reside in habitat with greater than 15% local koala feed trees in the canopy.*
>
> *The project results indicate that koala habitat maps produced via the tested methods, can only be reliably used to differentiate between suitable habitat and unsuitable habitat. The*

variability within vegetation types means it is difficult to accurately map koala habitat classes at a management scale of 1:5000 metres (discussed in Sections 7 and 8). The project findings also indicate that koalas occupy habitat to varying degrees for reasons other than floristic composition.

The limitations on the ability to accurately and reliably map Koala habitat, particularly with the limitations of broad statewide habitat data, need to be acknowledged. It is well recognised (ie EPA 2016, Smith and Pile 2024) that Koalas prefer larger trees (>30 cm DBH) of select species as feed trees, and that therefore forest structure is a key variable affecting habitat suitability for Koalas. While some recent LiDAR mapping of forest maturity (i.e. Norman *et. al*. 2025) could be used to improve modelling, it is not yet available at a State scale. There are also a variety of historical events that have affected Koala distributions.

Smith and Pile (2024) consider:

> *A key aim of koala habitat modelling is to generate accurate maps of habitat quality for mapping koala distribution and estimating koala density and population size. Habitat maps can only be generated from models that predict koala abundance as a function of a limited number of "mapped" environmental variables stored in GIS layers. … This presents a significant limitation for accurate and reliable koala habitat mapping and population estimation*.
>
> *We conclude from these findings that koala habitat models, especially those based on acoustic monitoring and large-scale GIS layers, are not reliable replacements for actual ground survey of koala habitat characteristics and female koalas for making important decisions about koala conservation and management.*

It is apparent that the exclusion of existing Koala records from DEECCW's 2025 modelling, and reliance on a relatively small number of survey sites, most of which were acoustic sites, have only enabled broad and inaccurate density mapping to be undertaken using a few State-wide variables that do not adequately define Koala habitat and usage. While this latest assessment is useful in refining key areas of occupied Koala habitat, it does not accurately identify key Koala habitat and densities within these areas.

4. References

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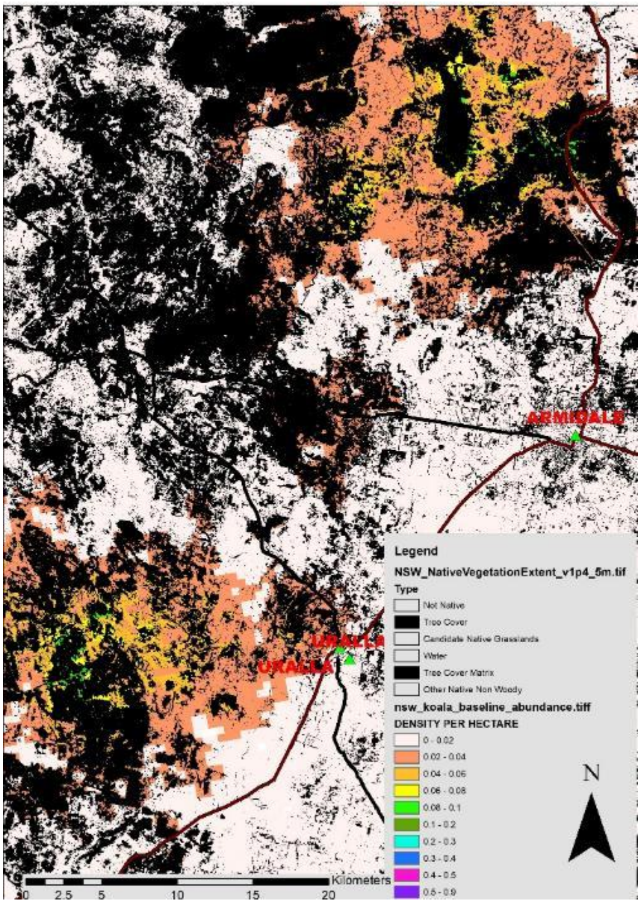
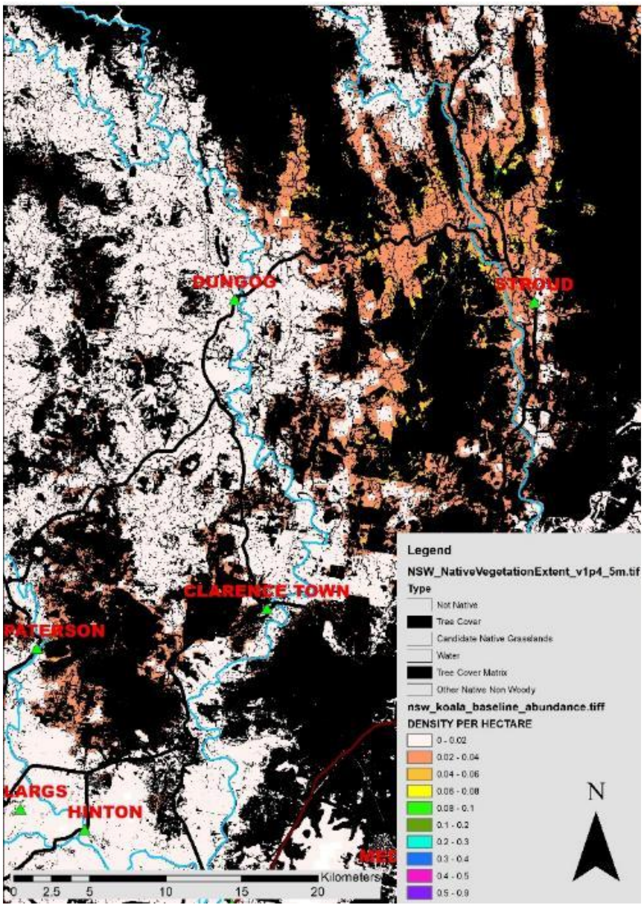
5. Appendix 1 Additional examples of the identification of modelled Koala densities on cleared lands.

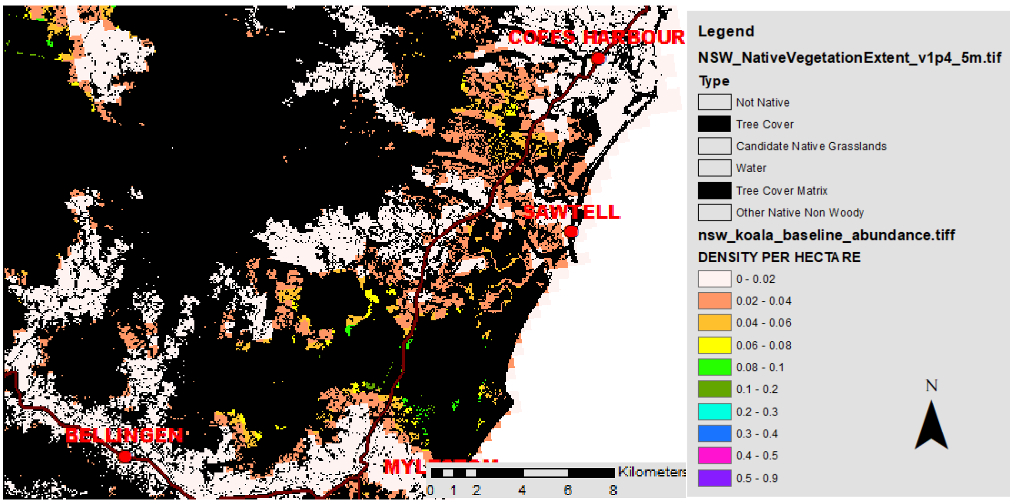
Modelled Koala Abundance overlaid with DECCW's NSW Native Vegetation Extent (black) (from [NSW Koala Habitat Information Base](#)) the remaining coloured areas are modelled Koala habitat outside native vegetation on cleared land.



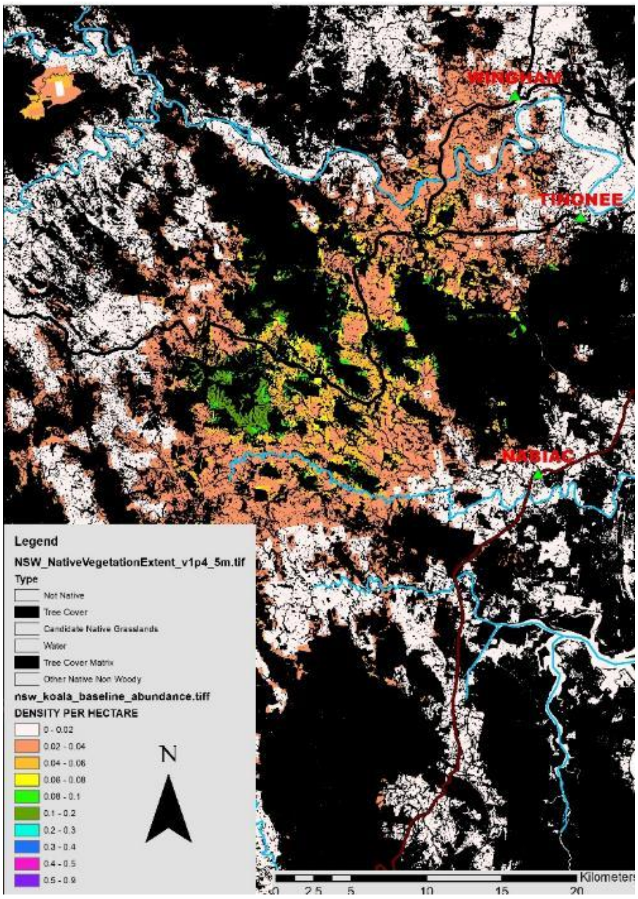


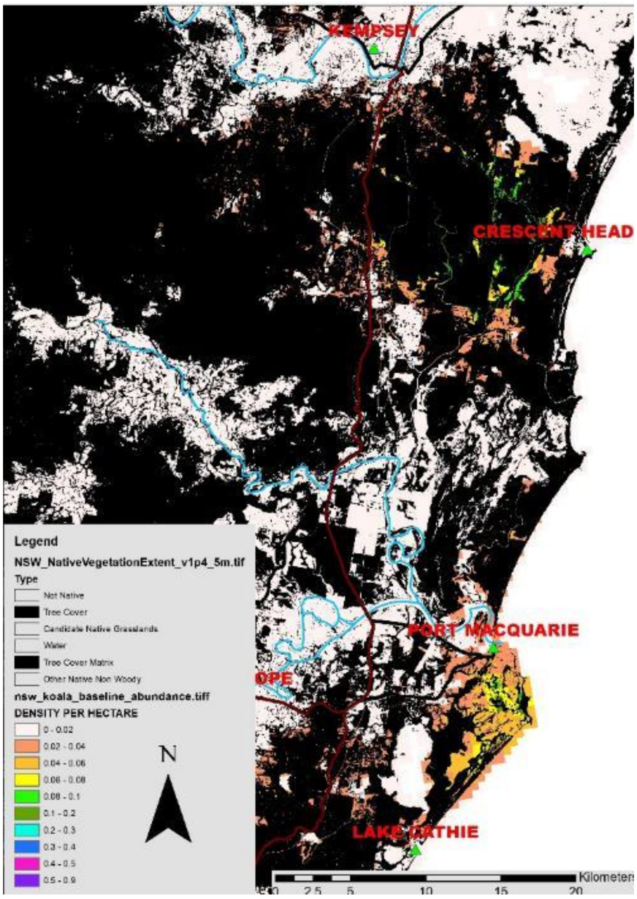
LEFT: Armidale-Uralla Area

RIGHT: Dungog-Stroud Area



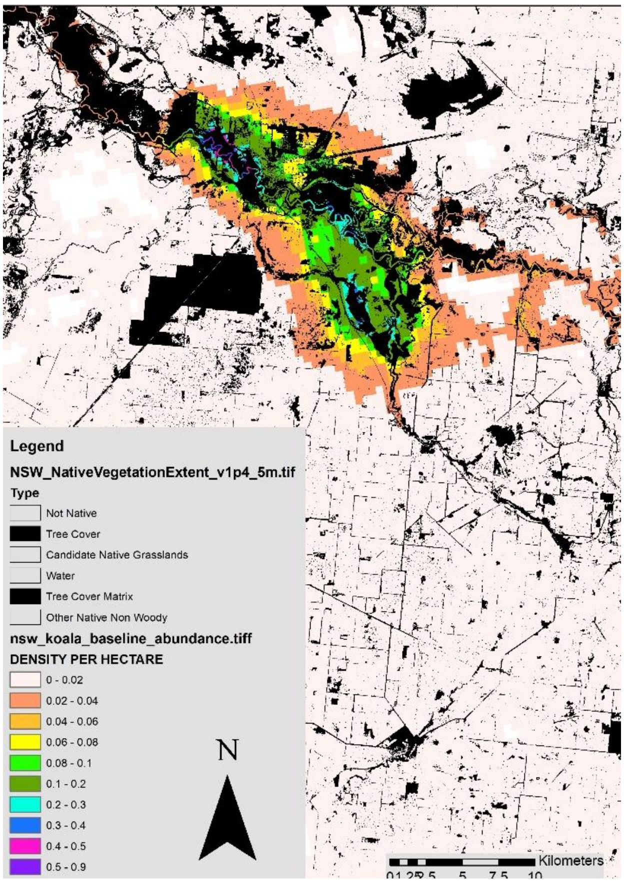
Coffs Harbor – Bellingen Area

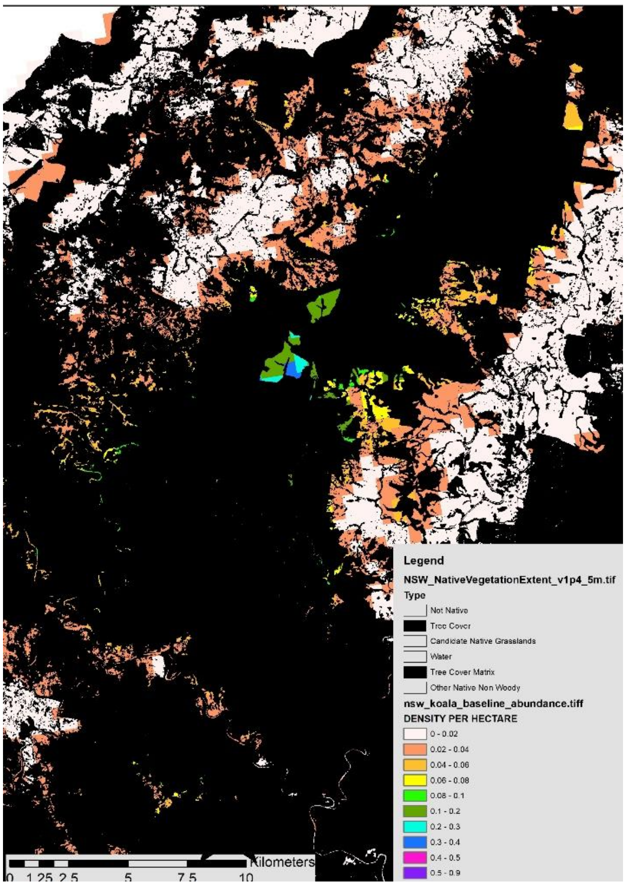




LEFT: Wingham-Nabiac Area

RIGHT: Crescent Head-Port Macquarie Area





LEFT: Narrandera Area

RIGHT: Urbenville Area