



Department of Environment and Resource Management

Koala Coast

Koala Population Report 2010



This report has been developed to ensure that the community is kept informed on the status of the Koala Coast population on an ongoing basis. This report's findings have been peer reviewed by independent scientists, but should be considered preliminary until published in an appropriate scientific journal.

Prepared by: Koala Policy and Operations, Department of Environment and Resource Management

© The State of Queensland (Department of Environment and Resource Management) 2012

Copyright inquiries should be addressed to <copyright@derm.qld.gov.au> or the Department of Environment and Resource Management, 41 George Street, Brisbane QLD 4000

If you need to access this document in a language other than English, please call the Translating and Interpreting Service (TIS National) on 131 450 and ask them to telephone Library Services on +61 7 3224 8412.

This publication can be made available in an alternative format (e.g. large print or audiotape) on request for people with vision impairment; phone +61 7 3224 8412 or email <library@derm.qld.gov.au>.

Cover. Koala at the Australian Woolshed. Photo: DERM

January 2012

#30020

Executive summary

The Koala Coast is located 20 km south-east of Brisbane, Queensland, which covers an area of 375 km² (Figure 1) and encompasses portions of three local government authorities: the mainland portion of Redland City, the eastern portion of Logan City and the south-eastern portion of Brisbane City. It is regarded nationally as one of the most significant koala populations because of its size and genetic structure.

The Queensland Government has monitored the Koala Coast koala population since 1996, investigating koala distribution, abundance, comparative ecology and population dynamics. This continues to be the most detailed regional monitoring study of koalas undertaken to date in Queensland or indeed elsewhere in Australia.

Between 1996 and 1999, the Koala Coast koala population was estimated at approximately 6000 animals (Dique et al. 2004). A re-survey of the Koala Coast between 2005 and 2006 indicated that the population had declined by 26 per cent to an estimated 4600 animals (EPA 2007). In 2008, another round of comprehensive surveys revealed that the population had undergone a steep decline and was estimated at about 2300 animals, more than 50 per cent population loss in less than three years (DERM 2009).

An analysis of the raw survey data for the 2010 survey led to a population estimate of around 2000—a result that might mistakenly be interpreted as a 13 per cent decline in population based on comparison with the population estimate for 2008. As with all population estimates, the methodology used in these surveys involves a margin of error, in this case + or – around 500 koalas. The results were statistically analysed against the 2008 survey to determine whether the apparent change was statistically significant (i.e. that the change was not simply due to the margins of error). The apparent difference between the 2008 and 2010 surveys was revealed to not be statistically significant, meaning there was no clear evidence of a decrease between the two years when margins of error are considered. Further, it is also not possible to definitively conclude that koala population decline has stabilised either.

The long term downward trend since the 1996-1999 survey is still statistically significant, showing a 68 per cent decline between 1996-1999 and the latest (2010) survey. Additional surveys in future years will be required to establish whether the koala population continues to trend downwards or whether it has stabilised. An analysis of koala habitat also indicated that there was little change in tree cover in the Koala Coast between 2008 and 2010.

It should be noted that all prior survey findings involved margins of error also. However unlike the current survey findings there was no doubt, following similar statistic analysis that took into account these margins of error that there had been a significant decrease between all previous surveys.



Koala at David Fleays Wildlife Park. Photo: DERM.

Background information

South East Queensland continues to be one of Australia's fastest growing regions. Loss of habitat is recognised as a key threatening process for koala survival. Additional threats come from vehicular trauma and dog attacks, which are a consequence of urbanisation. An increased prevalence of disease, primarily associated with chlamydial infections, as a secondary effect of the loss and associated fragmentation of habitat is placing even more pressure on the survival of the koala.

The Koala Coast is one of the many koala habitat areas in this region experiencing development pressure. The Koala Coast koala population has been recognised as one of the most significant natural koala populations in Australia, due to the relatively large numbers of koalas living in close proximity to a capital city and the identified genetic distinctiveness of koalas in this population compared with other koalas in South East Queensland (Lee et al., 2010). The Koala Coast has a series of State and local government administered conservation reserves, however, the majority of koala habitat occurs on freehold land.

Climate change has been recognised for its potential to affect the continued survival of many species across their current range and the International Union for Conservation of Nature (IUCN) has recognised that the koala is a species highly vulnerable to climate change. Recent scientific publications have identified the implication of climate change for koala distribution in Queensland and predicted that South East Queensland may become increasingly important to the long-term survival of Queensland's koala population as other parts of Queensland become more hostile to the species' survival (Adams-Hosking et al., 2011).

The Department of Environment and Resource Management (DERM) has monitored the Koala Coast koala population since 1996, investigating koala distribution, abundance, comparative ecology and population dynamics. Population monitoring continues to be the most detailed regional monitoring study of koalas undertaken to date. Between 1996 and 1999, the Koala Coast koala population was estimated at approximately 6000 animals (Dique et al. 2004). A re-survey of the Koala Coast between 2005 and 2006 indicated that the population had declined by 26 per cent to approximately 4600 animals (EPA 2007). In 2008, another round of comprehensive surveys revealed that the population had undergone a steep decline to about 2300 animals, more than 50 per cent population loss in less than three years (DERM 2009).

This study reports the results of the fourth comprehensive survey of the Koala Coast koala population in 2010.



Koala Joey at the Australian Woolshed. Photo:DERM.

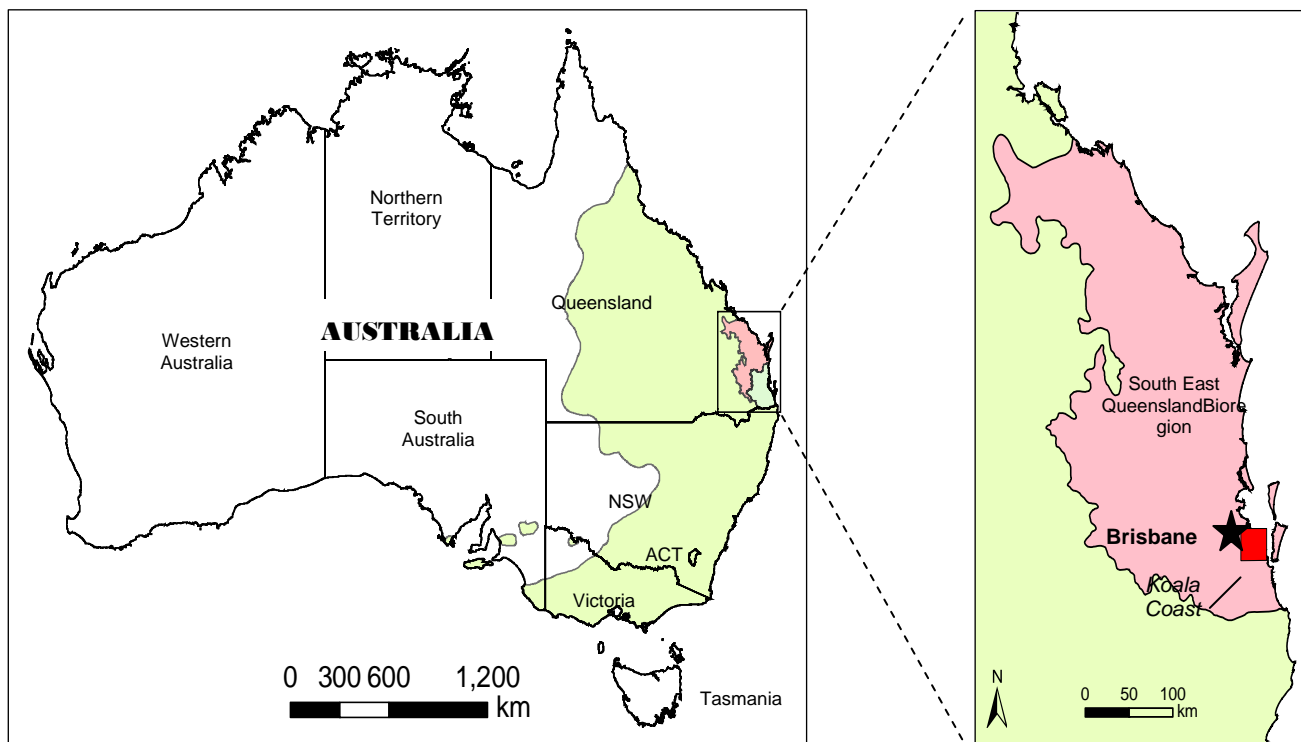
Population assessment methodology

Study area

The Koala Coast is located 20 km south-east of Brisbane, Queensland, which covers an area of 375 km² (Figure 1) and encompasses portions of three local government authorities: the mainland portion of Redland City, the eastern portion of Logan City and the south-eastern portion of Brisbane City. The Koala Coast is delineated by Manly Road and Lota Creek to the north; the Gateway and Pacific Motorways to the west; Logan River to the south; and Moreton Bay to the east—effectively isolating the resident koala population as a geographically independent group.

The Koala Coast landscape has been affected by urban development for many years. Previously characterised by a semi-rural setting with large areas of relatively contiguous bushland; the pressures of human population expansion have impacted the region. Loss and fragmentation of koala habitat has occurred as a result of extensive residential, light industrial and commercial development. Such development was fuelled by high rates of human population growth in South East Queensland in general.

Figure



1. Location of the Koala Coast study area in the South East Queensland bioregion (inset) in relation to the distribution of koalas in Australia (based on Martin 2008).

Stratification of study area and survey site selection

The Koala Coast was stratified using the same approach described previously for the 1996–1999, 2005–2006 and 2008 abundance estimates (Dique et al. 2004, EPA 2007, DERM 2009, respectively). Koala habitat was initially derived from a four class (forest, urban, grass and non-habitat) landcover classification using Landsat imagery. Fragmentation patch analysis was then used to evaluate the landscape and allocate forest patches to the appropriate stratum according to their size (Table 1).

Based on this classification, three main koala habitat strata (bushland; remnant bushland and urban) were identified. Bushland and remnant bushland types were further divided into sub-strata based in accordance with Dique et al. (2004). Areas of 'Other/Non Habitat' were not included in the survey.

Table 1. Description of koala habitat strata.

Habitat Strata	Description	Sub-strata
Urban Habitat	Urban landcover including small-lot residential development, schools and small parks, grass landcover and forest patches less than 10 ha in the urban zone	N/A
Remnant Bushland Habitat	Isolated forest landcover patches greater than 10 ha in the urban zone or isolated forest landcover patches between 10 ha and 100 ha in the non-urban zone. The large majority of this stratum occurs within the urban zone	High Density Remnant Bushland Low Density Remnant Bushland
Bushland Habitat	Forest landcover patches larger than 100 ha in the non-urban zone	High Density Bushland Low Density Bushland
Other/Non Habitat	Isolated forest landcover patches smaller than 10 ha, grass landcover and non-habitat landcover in the non-urban zone or non-habitat landcover in the urban zone, water bodies, bare earth, mangroves and sugar cane	N/A

Survey method

Estimates of koala density in 2010 were obtained from nearly all the same sites surveyed during the 1996–1999, 2005–2006 and 2008 survey periods. Surveys were conducted at 29 sites, consisting of 14 bushland; 8 remnant bushland; and 7 urban sites, between October 2010 and February 2011. Nearly all sites were surveyed before the end of December 2010; however, due to a significant period of wet weather from December to January, one remaining urban site was surveyed in early February 2011. The survey method utilised systematic searches of strip transects in bushland and remnant bushland sites; and total counts in smaller (<50 ha) remnant bushland sites and urban sites. The survey method remained consistent between survey periods and followed the same approach implemented during previous survey periods from 1996 to 2008, as described by Dique et al. (2004), EPA (2007) and DERM (2009).

Koala habitat assessment methodology

The four landcover classes derived from Landsat imagery were used to delineate the habitat strata—bushland, remnant bushland, urban and other, based on a similar process used in stratifying the areas for surveying koala populations (as per Dique et al (2004). The area of each habitat strata was ascertained for each survey period (Figure 2) and the significance of any trends determined.

Results

Koala surveys

There were 123 koalas sighted in 1751 ha of bushland, remnant bushland and urban areas during the 2010 survey period. Site density estimates ranged from 0–0.27 koalas ha⁻¹, in contrast to 0–1.42 koalas ha⁻¹ in the original 1996–1999 survey. Two sites were recorded with an absence of koalas. Absence of koalas had previously been recorded in three of seven surveys of one of these sites; whilst the other site had been recorded as being occupied by koalas in previous surveys. However, indirect signs of recent koala activity were observed at both these sites in the 2010 survey.

Koala habitat

The analysis of koala habitat showed only small changes in the four habitat strata which were not considered significant. There appeared to be noticeable forest greening between 2008–2010, which is believed to have been the result of a substantial amount of rain and a subsequent increase in canopy density.

The 12-year trends are outlined in Figure 2 below.

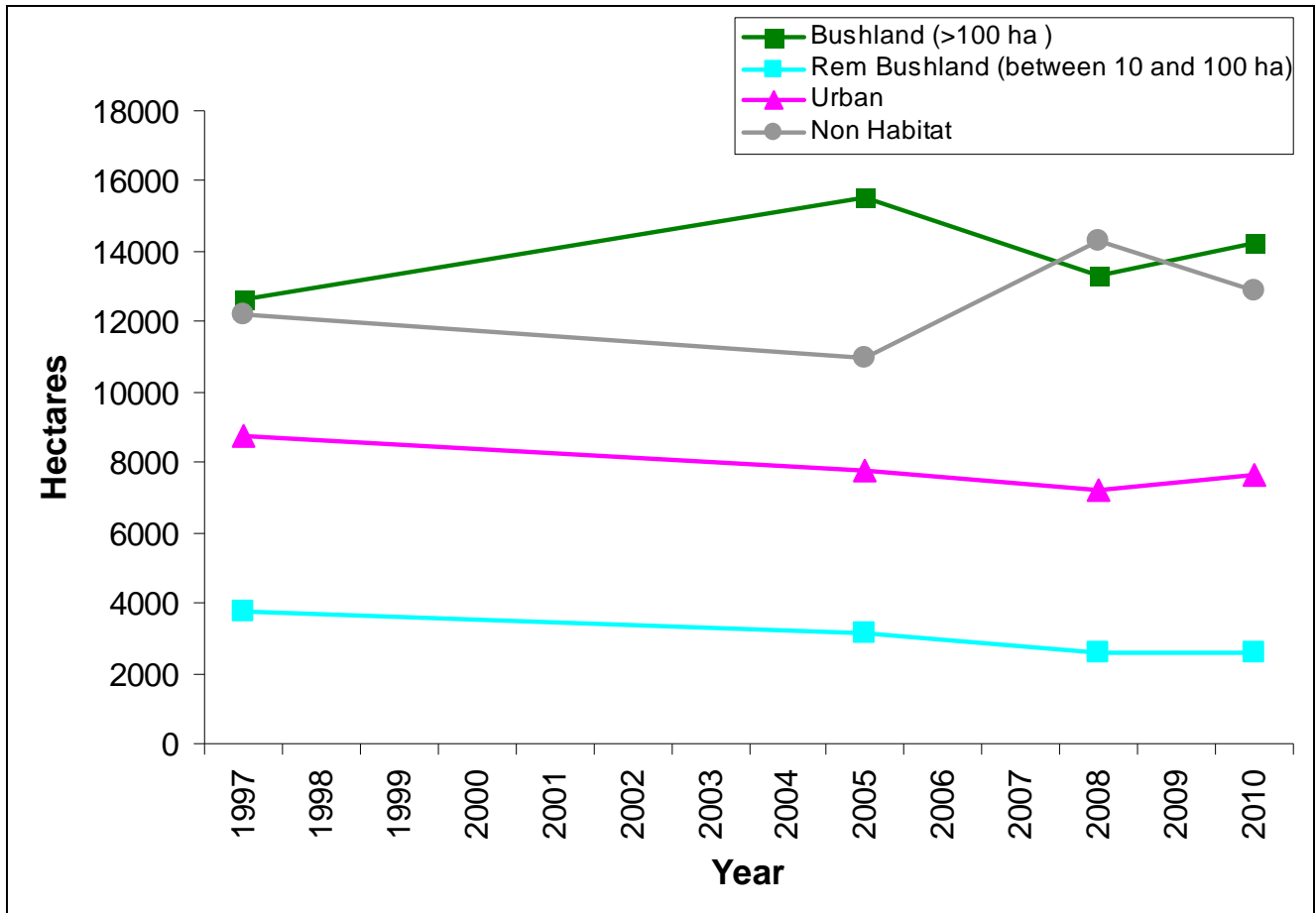


Figure 2. Total habitat in each habitat stratum for survey periods.

Current population estimate

The overall estimate was derived from the results of the 2010 koala surveys and a GIS based assessment of the amount of koala habitat in 2010.

The current estimate of the koala population in the Koala Coast in 2010 is 1991 ± 488 animals (standard error) and is outlined in Table 2 by stratum. The 2010 population estimate was compared with the 2008 estimate of around 2300 animals using a paired t test. No significant difference was found between the two population estimates ($t = 0.646$, $df = 4$, $p\text{-value} = 0.5535$), which means that it cannot be determined if there was a change in the abundance of the population between the last survey periods.

Table 2. Estimate of koala abundance per stratum

Stratum	Koala abundance 1996–1999 (a)	Koala abundance 2005–2006 (b)	Koala abundance 2008 (c)	Koala abundance 2010 (d)	Calculated % Loss between c and d	Overall calculated % Loss between a and d
Urban	1493	778	547	448	18	70
High Density Rem Bush	988	474	309	160	48	84
Low Density Rem Bush	626	191	135	86	36	86
High Density Bushland	2328	2282	891	652	27	72
Low Density Bushland	811	886	397	645	-62 (gain)	20
Other/Non Habitat	0	0	0	0	-	-
Total (\pm SE)	6246 ± 558	4611 ± 707	2279 ± 412	1991 ± 488	13	68

The estimated 62 per cent increase in koalas in Low Density Bushland Habitat between 2008 and 2010 has no clear explanation. However, one site contributed disproportionately to the result. This site was calculated to have four extra koalas over 2008 numbers. This influenced the estimated density of this stratum considerably, increasing it from 0.05 koalas ha⁻¹ to 0.07 koalas ha⁻¹ as a result of low density animal populations and movement of animals in the landscape. This is typical of the sensitivity of low density factors to small random changes and resulted in the overall Koala Coast abundance estimate being increased over what it would have been if the values for this site were not included.

The estimated increase at this site applied over the full area of the Low Density Bushland Stratum resulted in the overall Koala Coast abundance estimate being increased by approximately 270 animals over what it would have been without this particular component.

Koala Coast population trend

The overall population trend from 1996–1999 to 2010 is downward and the population has declined at a significant rate ($R^2 = 0.9628$ $F_{1, 2} = 51.75$ $p < 0.018$). This has led to an estimated decline of 68 per cent over the four survey periods (Figure 3).

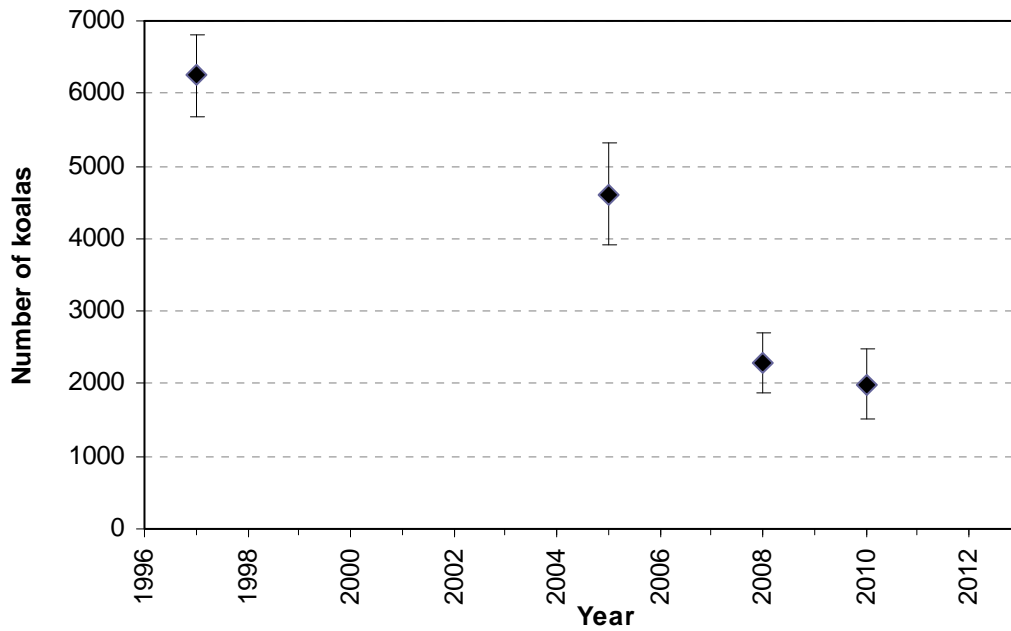


Figure 3. Koala Coast koala population 1996-2010.

Discussion and conclusions

While the overall trend in the data from 1996 to 2010 indicates a significant decline over that period of around 68 per cent, no significant change in the koala population was found between 2008 and 2010

At face value, this suggests that large declines in the population; such as the greater than 50 per cent decline in numbers estimated between 2006 and 2008; were not observed in the 2008–2010 period. It should be noted that all previous changes between survey periods were found to be statistically significant.

The habitat composition of the Koala Coast appears to be relatively stable since the last survey, with minimal changes to urban and bushland habitat strata. Higher than average levels of rainfall may have contributed to the increases in canopy cover.

Population estimate measures were not sensitive enough to definitively determine if koala population decline had stabilised. Future surveys will be required to establish whether the lack of change in the population over the last two years represents a lasting change in the trend overall.



Koala at David Fleays Wildlife Park. Photo:DERM.

References

- Adams-Hosking C, Grantham H, Rhodes J, McAlpine C, and Moss P (2011), *Modelling climate –change-induced shifts in the distribution of the koala*. Wildlife Research. 38, 122-130
- Dique, D.S., Preece, H.J., Thompson, J. and de Villiers D.L. (2004), *Determining the distribution and abundance of a regional koala population in south-east Queensland for conservation management*, Wildlife Research 31, 109-117.
- EPA (2007), *Report on Koala Coast koala surveys 2005-2006*, Environmental Protection Agency, Brisbane.
- DERM (2009), *Decline of the Koala Coast Koala Population:Population Status in 2008*, Department of Environment and Resource Management, Brisbane.
- Lee, K.E., Seddon, J.M., Corley, S., Ellis, W.A.H., Johnston, S.D., de Villiers, D.L., Preece, H.J. and Carrick, F.N. (2010), *Genetic variation and structuring in the threatened koala populations of Southeast Queensland reveals a genetically distinct population in the Koala Coast*. Conservation Genetics 11:2091-2103.
- Martin, R. W. (2008). Koala. In *The Mammals of Australia: the National Photographic Index of Australian Wildlife*,(Ed. R. Strahan and S Van Dyke) (Reed New Holland: Chatswood, NSW.)