

Decline of the Koala Coast Koala Population: Population Status in 2008

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Executive summary

The results of the 2008 Koala Coast koala survey estimates a population of 2279 animals. Based on the population estimate of 4611 koalas in 2005-2006, this represents a 51% decline in less than three years and a 64% decline in the 10 years since the original 1996-1999 estimate of 6246 koalas.

The largest declines occurred in bushland areas which showed a 59% reduction in koala numbers compared with a 30% reduction in urban areas. The large reduction of koalas in otherwise secure bushland was found to be a flow on effect from excessive habitat loss and mortality in urban areas.

The reduction in adequate recruitment to these bushland areas, confirms a dynamic process operating between the urban and bushland koala populations. Bushland koalas are not protected from the consequences of the high levels of anthropogenic mortality and habitat loss impacting on the urban koala population. In the absence of conserving a viable urban koala population, adjacent bushland koala populations will continue to decline with consequences for the viability of the entire Koala Coast koala population.

Background information

Threats to the long-term persistence of koalas are considerably higher in heavily developed areas such as South East Queensland (Natrass and Fiedler 1996; Patterson, 1996; Weigler et al. 1987). South East Queensland continues to be Australia's fastest growing region with the addition of an estimated 55,000 new residents per year over the last 20 years (Qld Government 2005). Loss of habitat is recognised as the key threatening process for koala survival, with additional threats from vehicle hits, dog attacks and an increased susceptibility to disease as a consequence of the loss and fragmentation of habitat (ANZECC 1998; Melzer et al. 2000). Unabated clearing of koala habitat for development in South East Queensland is placing a great deal of pressure on the survival of the koala.

The Koala Coast, a region in South East Queensland approximately 20 km southeast of Brisbane, is one of many areas experiencing development pressure. The Koala Coast koala population is 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 recently identified genetic distinction of koalas in this population compared with other koalas in South East Queensland (Lee et al., in press). The Koala Coast has a series of State and local government administered conservation reserves throughout the region, however, like other areas in Australia, the majority of koala habitat occurs on freehold land and consequently is poorly protected (ANZECC 1998; Reed and Lunney 1990; Lunney et al. 2000). Many key koala habitat areas in the Koala Coast are currently being developed or are earmarked for future development.

The Department of Environment and Natural Resources (DERM) has monitored the Koala Coast koala population since 1996, investigating koala distribution, abundance, comparative ecology and population dynamics. Between 1996 and 1999, the Koala Coast koala population was estimated at 6246 animals (Dique et al. 2004). A re-survey of the Koala Coast between 2005 (25 sites) and 2006 (11 sites) indicated that the population had declined by 26% to 4611 animals (EPA 2007). This continues to be the most detailed regional koala study undertaken to date.

In March 2004 the koala was listed as a species 'vulnerable to extinction' in the South East Queensland Bioregion, under the Nature Conservation Act 1992. This listing was in response to significant threatening processes impacting on koala populations in South East Queensland and a perceived decline in the South East Queensland koala population based on mortality data collected by an incidental monitoring program run by the DERM. This decline was confirmed with the results of the 2005-2006 Koala Coast koala survey (EPA 2007) and is likely a reflection of similar declines in other areas of South East Queensland subject to significant development pressures.

This study reports the results of the third comprehensive survey of the Koala Coast koala population in 2008.

Population assessment methodology

Study area

The Koala Coast is located 20 km south-east of Brisbane, Queensland, and covers an area of ~ 375 km² (Figure 1). The Koala Coast 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 Morton Bay to the east – effectively isolating the resident koala population as a geographically independent group.

The Koala Coast is a rapidly urbanising landscape characterised by its semi-rural setting with large areas of relatively contiguous bushland. Increasingly the pressures of human population expansion are impacting on the area with extensive residential, light industrial and commercial development fuelled by high rates of human population growth (Figure 1).

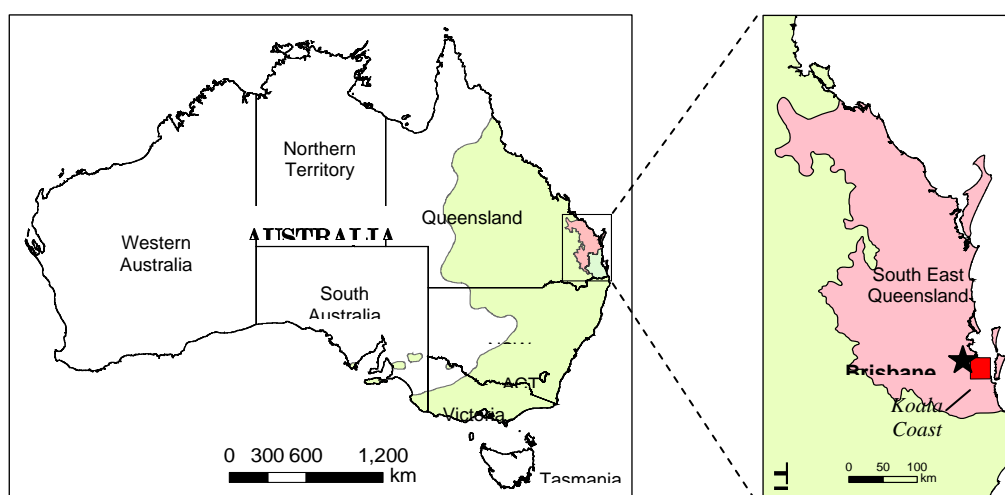


Figure 1. Distribution of koalas in Australia (main box); and location of the Koala Coast study area (inset) showing the South East Queensland (SEQ) planning region and the South East Queensland Bioregion. Distribution based on Martin (1995).

Stratification of study area and survey site selection

The Koala Coast was stratified using the same approach described previously for the 1996-1999 and 2005-2006 abundance estimates (Dique et al. 2004, EPA 2007). The region was first stratified into four broad koala habitat strata (bushland; remnant bushland; urban and other), then further post stratified into six strata. This was achieved by dividing the bushland and remnant bushland strata into high or low koala density sub-strata.

Koala habitat was derived from a four class (forest, urban, grass and non-habitat) landcover classification produced from Landsat satellite imagery acquired in 2008. Fragmentation patch analysis was used to spatially evaluate the landscape and allocate forest patches according to their size to the appropriate stratum (Table 1).

Table 1. Description of koala habitat strata.

Habitat Strata	Description	Further stratification of strata based on koala density (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 strata 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	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	N/A

Survey method

Estimates of koala density in 2008 were obtained from the same sites that were surveyed during the 1996-1999 and 2005-2006 survey periods. In addition to these sites, further sites were surveyed in the Urban Habitat stratum to gain a more accurate assessment of koala numbers in urban areas. Surveys were conducted at 29 sites, consisting of 14 bushland; 8 remnant bushland; and 7 urban sites, between August and December. 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 was consistent between survey periods and followed the same approach implemented during the 1996-1999 and 2005-2006 surveys, as described by Dique et al. (2004) and EPA (2007).

Results

Koala surveys

There were 181 koalas sighted in 1900 ha of bushland, remnant bushland and urban areas during the 2008 survey period. Density estimates at sites ranged from 0 – 0.55 koalas ha⁻¹, however, the site that recorded a density of 0 koalas ha⁻¹ showed recent evidence of koala use. There has been a marked reduction in the range of densities: 1.42 koalas ha⁻¹ in 1996-1999; 0.81 koalas ha⁻¹ in 2005-2006; and 0.55 koalas ha⁻¹ in 2008. Koalas, or signs of koalas, were detected at all sites, therefore there is no evidence that there has been a change in the distribution of koalas in the Koala Coast.

More than three-quarters (77%) of sites that had been surveyed previously have declined in koala density. Bushland areas have experienced the greatest decline – of the 86% of bushland sites that have shown a decline in koala density, nearly a third (64%) declined by more than 40% (Table 2). Two bushland sites with large declines in koala density were DERM protected area estate – Venman Bushland National Park declined by 76% and Daisy Hill Conservation Park declined by 64%. While fewer sites in the remnant bushland and urban strata experienced a decline, where a decline was detected it was less pronounced, with the majority of sites declining by less than 40%.

Table 2. Declines in koala density at sites in each habitat stratum.

Habitat stratum	Sites (n)*	% sites with decline	% sites decline >40%
Urban	5	60	20
Remnant bushland	7	70	29
Bushland	14	86	64

*those sites with previous density estimates

Current population estimate

The current estimate of the koala population in the Koala Coast in 2008 is 2279 animals (Table 3), based on 2008 survey results and the amount of koala habitat available in 2008. Considering the 2005-2006 estimate of 4611 koalas (EPA 2007), this represents a 51% decline in abundance of the regional koala population in three years. As all sites were surveyed in 2005 and a proportion of these sites were resurveyed in 2006, the 2005-2006 estimate was primarily based on 2005 data, three years prior to this survey. In less than 10 years the Koala Coast koala population has declined by 64%, based on DERM's original estimate of 6246 koalas (Dique et al. 2004).

In 2005-2006, urban and remnant bushland strata accounted for 100% of the loss of koalas, in contrast to the 2008 survey which saw the bushland strata contributing to 80% of the loss, indicating a time lag effect in the decline. The bushland stratum now contains less than half the number of koalas (1288) present three years ago (3168). The high density bushland stratum declined by 62% (1391) and the low density bushland stratum declined by 51% (489) koalas since the 2005-2006 survey. The largest proportion (57%) of the koala population continues to persist in the bushland stratum despite these significant losses.

Table 3. Estimated koala abundance per stratum for 1996-1999; 2005-2006; and 2008 survey periods.

Stratum	Koala abundance 1996-1999 (a)	Koala abundance 2005-2006 (b)	Koala abundance 2008 (c)	% Loss between a and b	% Loss between b and c	Overall% Loss between a and c
Urban	1493	778	547	48	30	63
High density remnant bush	988	474	309	52	35	69
Low density remnant bush	626	191	135	70	29	78
High density bushland	2328	2282	891	2	61	62
Low density bushland	811	886	397	-	55	51
Other	0	0	0	-	-	-
Total	6246	4611	2279	26	51	64

Incidental monitoring data

This survey indicates that there has been an estimated loss of 2332 koalas from the Koala Coast koala population in approximately three years. This loss is partially validated by reports of approximately 1100 dead koalas from the Koala Coast between January 2006 and December 2008. The majority of these animals came from developed areas where koalas are readily observed and reported by members of the public. Bushland areas have historically had fewer reports of sick, injured, orphaned or dead koalas, therefore these areas are likely to be under-reported. Threatening processes have continued to impact on koalas in the region and while dog attacks and car hits are more frequent than drownings, train hits and falls from trees, a large proportion (~60%) of this mortality was a consequence of disease.

Local Government regions

Of the 2332 koalas lost from the population, 62% were lost from Redland (1437 koalas), 21% from Logan (501 koalas) and 17% from Brisbane (393 koalas) (Figure 2). The Redland koala population declined by 49%, Logan by 53% and Brisbane by 55%. The large decline in Brisbane koala numbers is the result of the Brisbane portion of the Koala Coast having proportionally more bushland (44%) than Logan (34%) and Redland (32%). The loss of more than half of the bushland koalas was the primary cause of the decline in abundance of the Koala Coast koala population during the last 3 years.

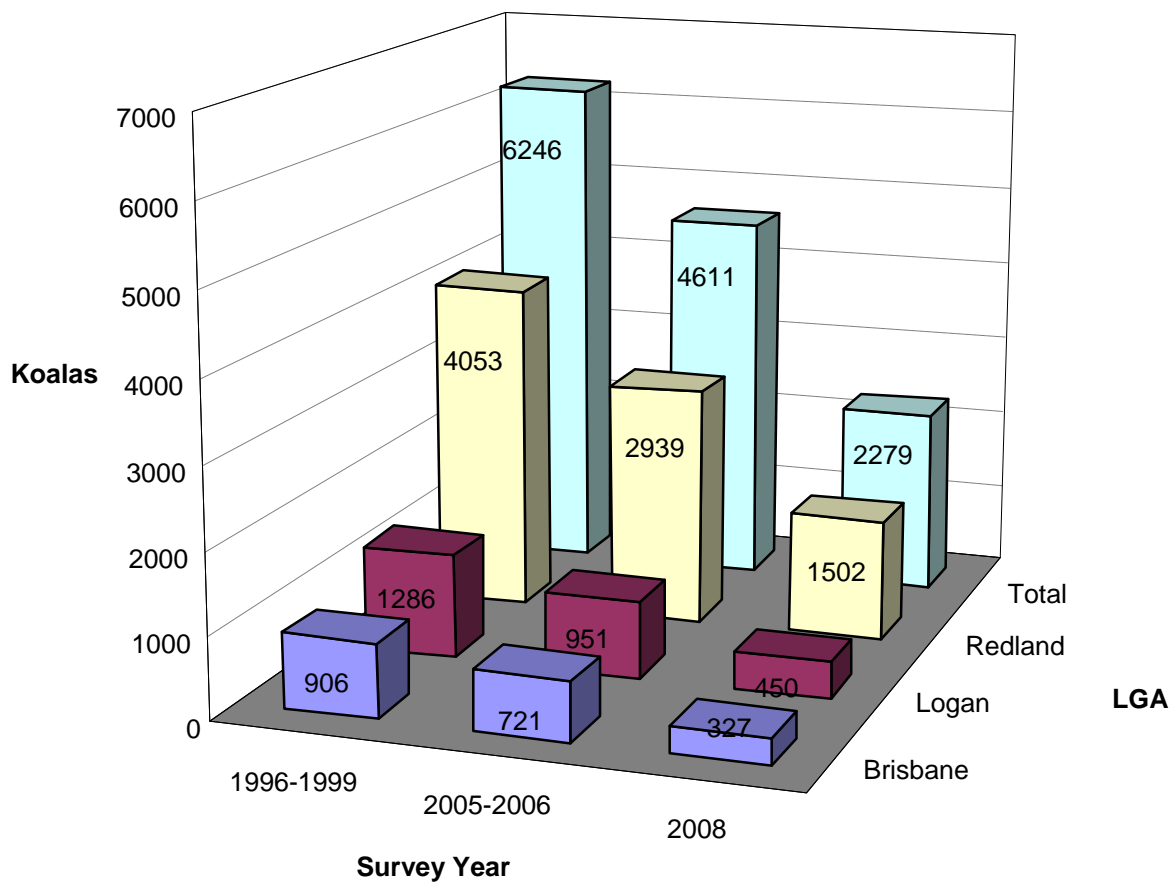


Figure 2. Change in koala abundance in each Local Government Area.

Future population estimate

Survey results indicate a continued declining trend in the population based on 3 comprehensive survey periods. The decline in the koala population is becoming increasingly rapid, from a 26% decline over 6 years to a 51% decline in 3 years. A polynomial model of the population predicts that, if the current rate of decline continues, there will be less than 500 koalas remaining in the Koala Coast by 2010 (Figure 3).

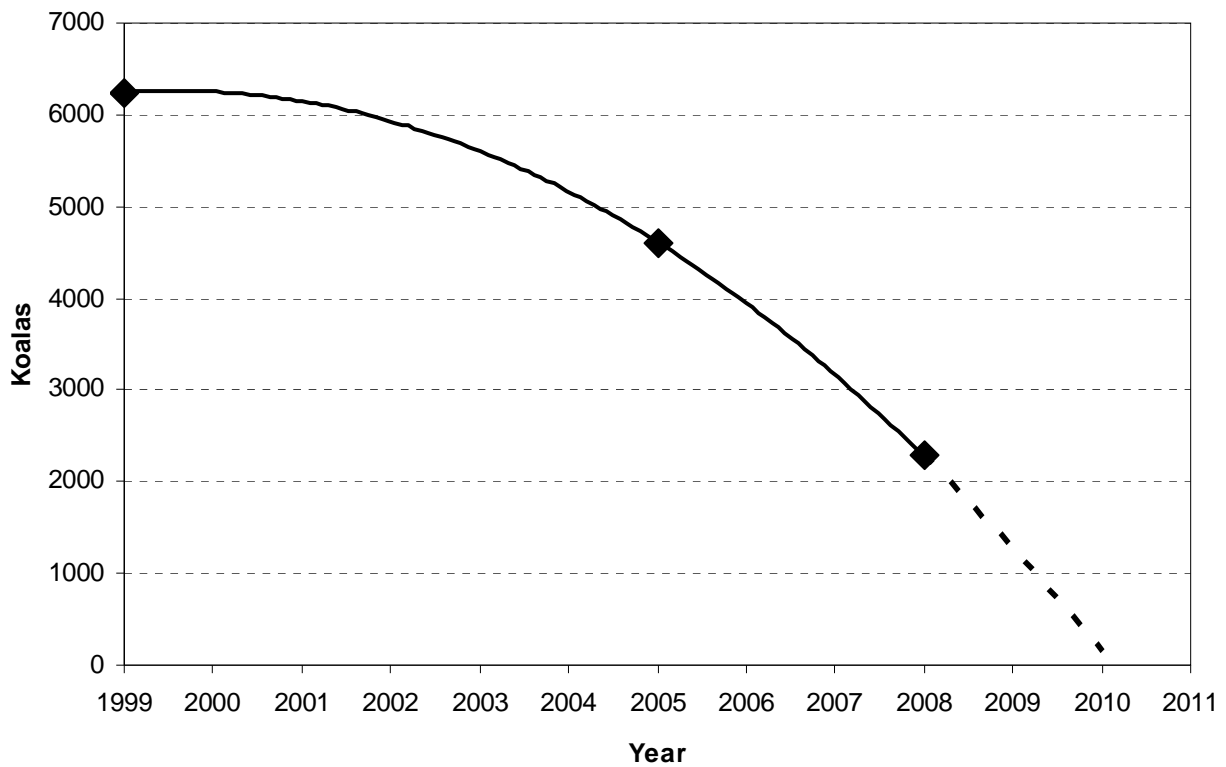


Figure 3. Koala Coast koala population decline (solid line shows actual observed decline; dotted line shows predicted population decline).

Discussion

Nature of the decline

The previous 2005-2006 survey detected the greatest decline in koala numbers in strata associated with the urban region of the Koala Coast (EPA 2007). This was attributable to the ongoing urban development and excessively high levels of anthropogenic mortality (EPA 2007; Preece 2007). While most bushland sites remained stable, the downward trends in densities at some bushland sites were discussed in terms of a dynamic process operating between the urban and bushland koala populations (EPA 2007). Population modelling and genetic analysis by Thompson (2006) demonstrated that bushland sites rely on immigration of koalas to maintain their viability and it was proposed that bushland koalas would not be able to persist without the urban koala population. The suggestion that high levels of anthropogenic mortality in urban areas would have a flow on effect by reducing the number of koala recruits to bushland has been confirmed in the 2008 surveys with the greatest population decline (59% or 1880 koalas) occurring in the otherwise secure bushland areas.

The importance of the urban koala population in bolstering the bushland population has previously been underestimated. This has now been confirmed with the detection of a significant decline in koalas at bushland sites that have not experienced any loss or visible changes to habitat or habitat quality or an increase in anthropogenic influences.

It has previously been thought that bushland reserves (including DERM protected area estate such as Venman Bushland National Park and Daisy Hill Conservation Park) and large relatively intact areas of bush would 'secure' koala populations in the long term; however the results of this survey have indicated that these bushland areas are not protected from the consequences of the threatening processes affecting other koalas in the region.

The research results indicate that there is a time lag between the impacts on the urban koala population and the flow on effects in adjacent bushland areas. While the urban koala population directly impacted by urban development and anthropogenic mortality quickly declined (with a 48% reduction in abundance detected in the 2005-2006 surveys), the bushland areas initially remained unchanged. However, less than three years later, the flow on effects of the loss of a large portion of the urban population were detected in bushland areas, including those with the highest level of protection (such as national parks). In the absence of conserving a viable urban koala population, adjacent bushland koala populations will continue to decline with consequences for the viability of the entire Koala Coast koala population.

Acknowledgements

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