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2017

Current status of the koala in Queensland & New South Wales

A report by Dr Christine Adams-Hosking, Honorary Research Fellow for WWF-Australia, May 2017

This report details the current situation for koalas in Queensland and New South Wales after reviewing recent reports and publications. It summarises these publications and highlights instances of significant declines and local extinctions in both states.

Report to WWF-Australia, May 2017

Dr Christine Adams-Hosking
Honorary Research Fellow, Global Change Institute
The University of Queensland, Brisbane

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BACKGROUND

According to fossil records, various koala species have inhabited broad regions of Australia and nowhere else on the planet for at least 25 million years (Adams-Hosking *et al* (2011a)).

There is now only one remaining member of what was once a diverse family tree and that is *Phascolarctos cinereus*, the koala we see today. Since European settlement, koala populations have been under pressure due to habitat loss, primarily driven by urban development and agriculture. Furthermore, hundreds of thousands of koalas were culled for the fur trade, which finally ceased in the late 1930s. In more recent decades, some inland koala populations in Queensland (QLD) and New South Wales (NSW) have been affected by increasing land-use change - for example resource extraction and agriculture, and also advancing climate change.

The koala is currently listed at the Commonwealth level as vulnerable in QLD, NSW and the ACT under the *Environment Protection and Biodiversity Conservation Act* (1999). At the state level, it is listed as vulnerable in QLD under the *Nature Conservation Act* (1992) and also in NSW under the *Threatened Species Conservation Act* (1995).

KOALA'S GEOGRAPHIC RANGE

Today, the koala's geographic range is restricted to areas of eastern Australia, where it occupies eucalypt forests and woodlands.

Koalas are considered to be sensitive to habitat fragmentation. Tree-clearing can directly and indirectly affect koala populations; directly through the loss of their highly specialised food resources and shelter, and indirectly through the increase in additional threats that accompany tree-clearing, such as vehicle collisions, dog attacks and disease.

Modelling suggests that the koala's range will be increasingly restricted to the eastern seaboard of QLD and NSW as climate change progresses, where temperature and rainfall conditions will remain within its climate envelope (Adams-Hosking *et al* 2011b). This is also where the most intense human population growth and urban development are occurring. Consequently, there are multiple threats that are acting in synergy to detrimentally affect remaining koala populations.



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**MORE THAN 2,030
WILD KOALAS
SUBMITTED TO
WILDLIFE
HOSPITALS**

in southeast QLD over
a period of 13 years



Henning *et al* (2015) found that in southeast QLD 84.1% of fractures were caused by vehicle collisions

Synergistic threats

An example of synergistic threats to koalas is demonstrated in a study of data from more than 2,030 wild koalas submitted to wildlife hospitals in southeast QLD (SEQ) over a period of 13 years. Henning *et al* (2015) found that 84.1% of fractures to the species were caused by vehicle collisions, with 9.1% by dog attacks as the second-largest cause. Furthermore, wild dogs/dingoes were identified as a significant potential threat to fragmented populations of koalas in peri-urban areas (Allen *et al* 2016) and Gonzalez-Astudillo *et al* (2017) found that in SEQ, habitat encroachment due to tree-clearing and urbanisation showed a strong association with road vehicle and dog attack trauma.

McAlpine *et al* (2006) asserted that although habitat loss in the Noosa Shire in SEQ was the major driver of koala population decline, landscape configuration and roads also had an important effect. Rhodes *et al* (2014) also found that in the vast majority of cases, increasing the number of roads elevated koala mortality rates more rapidly than did increasing traffic volume on existing roads.

In a study of ten local government areas (LGAs) in SEQ, McAlpine *et al* (2017) found that urbanisation was associated with an increase in disease, however the effects of urban landscape change and climate variability on chlamydiosis may not manifest until several years later when overt disease impacts the population via effects upon body condition and reproductive success.

KOALA POPULATIONS IN QUEENSLAND

Substantial declines in koala populations throughout QLD were found by McAlpine *et al* (2015).

Furthermore, expert knowledge was used to elicit population trends for the past three generations and the next three generations of koalas and found an estimated average decline for koalas in

QLD of 53% (Adams-Hosking *et al* 2016). A koala generation is defined as '5-8 years' therefore three generations roughly covers 15-20 years.

Coastal koalas

The most rapid declines have been in the high density urban and remnant source populations which are undergoing rapid conversion from agriculture to urban (McAlpine *et al.*, 2006).

Rhodes *et al* (2015) developed maps and reporting on predicted density/likelihood across each of the LGAs and population trends in two southeast QLD LGAs - the Koala Coast and Pine Rivers. They found that koala densities at the survey sites in both these two areas declined between 1996 and 2014, with the greatest declines occurring at the Koala Coast sites. The estimated mean decline in koala density at the Koala Coast sites between 1996 and 2014 was 80.25% with a mean decline in koala density at the Pine Rivers sites between 1996 and 2014 of 54.28%. Furthermore, the estimated declines in koala density in the two LGAs were very rapid, with the rate of this decline increasing. The authors asserted that for an animal that already occurs at relatively low densities, annual population declines of the order of magnitude they estimated are likely to result in local extinctions for some populations within a small number of generations.

Consistent with the Rhodes *et al* (2015) study were previous surveys undertaken on the Koala Coast in 2005-2006 and 2008 which found an increasingly rapid decline in the koala population from 26% over 6 years to a 51% decline in 3 years (EHP 2009). Furthermore, this study predicted that, if the current rate of decline continued, there would be less than 500 koalas remaining on the Koala Coast by 2010.

Rural koalas

A study by Seabrook *et al* (2011) in southern inland QLD found an 80% decline in koala numbers, from a mean population of 59,000 in 1995 to 11,600 in 2009. Although this decline was primarily attributed to climate change, the authors also noted that the effect of climate change on trailing edge populations may interact with habitat loss and fragmentation to increase extinction risks, with tree-clearing in the eastern part of the region reducing the ability of koalas to move between habitats.

Smith *et al* (2013) concurred with this study by implying that, as habitat is lost in the semi-arid Mulga Lands Bioregion, koala occupancy declines. In Central QLD, traffic volume was found to be steadily increasing as the mining industry expanded from 2009-2011 and during this time period, 62 koalas were killed on transport corridors surveyed in the region (Tucker and Clifton 2013).

THREE GENERATIONS
ROUGHLY COVERS
15-20 YEARS

LESS THAN
500

if the current rate of decline continued, there would be less than 500 koalas remaining on the Koala Coast by 2010

80% DECLINE
IN KOALA NUMBERS
FOUND IN SOUTHERN
INLAND QUEENSLAND



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KOALA POPULATIONS IN NEW SOUTH WALES

Expert knowledge was used to elicit population trends for the koala and found an estimated average decline for koalas in NSW of 26% over the past three generations and the next three generations of koalas (Adams-Hosking *et al* 2016).

Furthermore, substantial declines in koala populations throughout NSW were found by McAlpine *et al* (2015). An independent review into the decline of koala populations in key areas of NSW found varying results. Some koala populations are remaining stable over time and others are declining gradually or rapidly but overall, koala numbers in NSW are in decline (NSW Chief Scientist and Engineer 2016). A key point made in this review was that more and better quality data are required.

Coastal koalas

It was found that koala populations were stable to gradually declining in the Coffs Harbour LGA (Predavec 2016). A study of koala populations in Eden found that the predicted distributions of koalas for the periods 1985-95, 1995-2005 and 2005-10 showed a rapid contraction of koala distribution in the Eden region (Lunney *et al* 2014). They estimated that the koala probability of occurrence has declined at an average rate of 70% every 10 years. On the south coast's Bega Shire LGA, the reduced population has been affected by habitat loss (Lunney *et al* 2014) and overall, the south coast koala populations are reported to be declining (Predavec 2016).

According to the south-east Lismore Comprehensive Koala Plan of Management (Lismore City Council 2013) the koala population has significantly reduced in the past but has shown signs of recovery in more recent times, possibly due to lack of fire in their habitat and the colonisation of a formerly cleared area of lowland sub-tropical rainforest in the north of the LGA.

IN THE EDEN
REGION THE
PROBABILITY OF
OCCURRENCE HAS
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A study in the Tweed Coast LGA suggests that occupancy by koalas has halved in recent years (Biolink 2011). Across the Byron LGA, the hinterland and coastal vegetation have been largely disconnected through historical large-scale clearing. This has disconnected koala habitat and restricted the movement of koalas between currently isolated population cells (Biolink 2012). In this study, field data provided a broad population estimate of approximately 240 koalas; however it was suggested that coastal populations may be unsustainable in the absence of improved connectivity and an increase in habitat cover.

In the Ballina Shire, population projections showed a gradual decline over 50 years, due to births not being adequate to offset deaths (Ballina Koala Plan 2016).

A koala study in the Port Macquarie-Hastings LGA (Biolink 2013) revealed a population of 2,000 individuals. However, koala habitat has declined and the remaining habitat has become more fragmented. The region's koala hospital admits 200 – 250 koalas annually (NSW Chief Scientist and Engineer 2016).



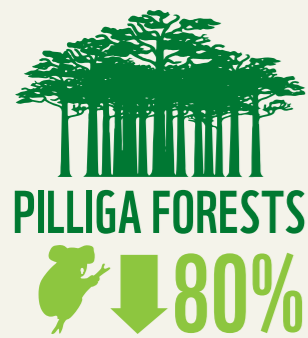
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Rural koalas

Koalas have declined by 80% in the Pilliga Forests in the Narrabri Shire LGA since the 1990s (NSW Chief Scientist and Engineer 2016). Overall, in the central west region, the Pilliga Forests, Liverpool Plains and Gunnedah koala populations are reported to be declining (Predavec 2016).

They are stable or increasing in the Campbelltown LGA and the Bega Valley Shire LGA has a small and increasing population, possibly in response to improved environmental conditions following earlier drought or the increased time since the major impacts of fire and logging have occurred in the habitat (Predavec 2016).

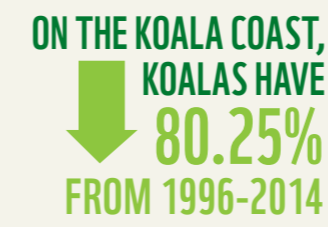
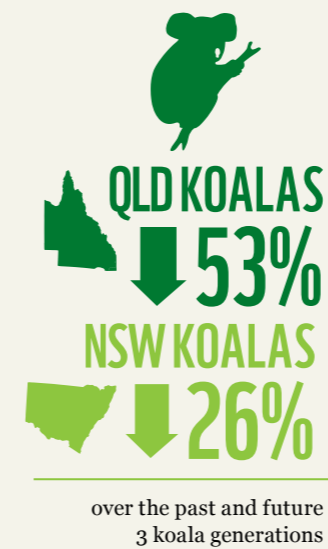
Santika *et al* (2014) predicted extinction risk to be higher in western NSW than in the east and that this risk may increase under future scenarios of climate and land-use change. The authors also found that extinction risk (the metric of dominant concern for species conservation) depended most strongly on *Eucalyptus* forest cover and its interaction with housing density.



Koalas have declined by 80% in the Pilliga Forests in the Narrabri Shire LGA since the 1990s

KEY FINDINGS

Habitat loss continues to be the key threatening process to the long-term survival of the koala and is being compounded by numerous other threats that are acting synergistically.



- Most koala populations in QLD and NSW have declined
- There are many areas where koalas are rapidly declining
- Koalas are currently persisting in increasingly fragmented pockets of habitat
- In QLD, koalas have declined by 53% over the past and future three koala generations
- In NSW, koalas have declined by 26% over the past and future three koala generations
- On the Koala Coast, koalas have declined by 80.25% from 1996-2014
- On the Koala Coast, koalas declined by 51% from 2006-2008
- In Pine Rivers, koalas declined by 54.28% from 1996-2014
- In southwest QLD, koalas declined by 80% between 1995-2009
- In the Pilliga Forests of western NSW, koalas have declined by 80%
- In Coffs Harbour, koala populations are stable to gradually declining
- In the Campbelltown LGA, koala populations are stable or increasing
- In the Eden region, koala probability of occurrence has declined at an average rate of 70% every 10 years
- The Port Macquarie-Hastings LGA has an estimated 2,000 koalas, with 200 – 250 koalas admitted annually to its hospital
- On the Tweed Coast, occupancy by koalas has halved in recent years
- In Lismore, there has been an average range contraction of about 30% over the last three koala generations
- In the Byron region, existing coastal populations may be unsustainable in the absence of improved connectivity and decreasing habitat cover
- In Ballina, the koala population has high mortality and low breeding success which will inevitably lead to its extinction
- New threats such as climate change and mining continue, while the long-standing threats to koalas remain
- In arid and semi-arid regions of QLD and NSW, habitats that may have once provided refugia during times of drought are now highly disturbed and are unlikely to provide the required level of protection for the koala



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ENDNOTE

Adams-Hosking, C., Moss, P.T., Rhodes, J.R., Grantham, H.S. and Clive McAlpine, C.A. (2011a) Modelling the potential range of the koala at the Last Glacial Maximum: future conservation implications *Australian Zoologist* 35, 983-990.

Adams-Hosking, C., Grantham, H.S., Rhodes, J.R., McAlpine, C., and Moss, P.T. (2011b) Modelling climate-change-induced shifts in the distribution of the koala *Wildlife Research* 38, 122-130.

Adams-Hosking, C., McBride, M.F., Baxter, G., Burgman, M., de Villiers, D., Kavanagh, R., Lawler, I., Lunney, D., Melzer, A., Menkhorst, P., Molsher, R., Moore, B.D., Phalen, D., Rhodes, J.R., Todd, C., Whisson, D. and McAlpine, C.A. (2016) Use of expert knowledge to elicit population trends for the koala (*Phascolarctos cinereus*) *Diversity and Distributions* 22, 249-262.

Allen, B.L., Carmelito, E., Amos, M., Goulet, M.S., Allen, L.R., Speed, J., Gentle, M., and Leung, L.K.-P (2016) Diet of dingoes and other wild dogs in peri-urban areas of north-eastern Australia *Scientific Reports*, 6,23028, DOI: 10.1038/srep23028.

Ballina Koala Plan (2016) Koala Population Viability Analysis of the proposed Pacific Highway Upgrade near Wardell, NSW. Niche Environment and Heritage, Parramatta, NSW.

Biolink (2011) Tweed Coast Koala Habitat Study, Report to Tweed Shire Council
January 2011. Biolink Ecological Consultants.

Biolink (2012) Byron Coast Koala Habitat Study, Report to Byron Shire Council
March 2012. Biolink Ecological Consultants.

Biolink (2013) Port Macquarie Hastings Koala Habitat & Population Assessment.
Final Report to Port Macquarie Hastings Council. Biolink Ecological Consultants.

EHP (2009) Decline of the Koala Coast Koala Population: Population Status in 2008, Department of Environment and Resource Management, Brisbane.

Gonzalez-Astudillo, V., Allavena, R., McKinnon, A., Larkin, R., and Henning, J. (2017) Decline causes of Koalas in South East Queensland, Australia: a 17-year retrospective study of mortality and morbidity *Scientific Reports*, 7, 42587 DOI: 10.1038/srep42587.

Henning, J., Hannon, C., McKinnon, A., Larkin, R. and Allavena, R. (2015) The causes and prognoses of different types of fractures in wild koalas submitted to wildlife hospitals, *Preventive Veterinary Medicine* 122, 371-378.

Lismore City Council (2013) Comprehensive Koala Plan of Management for south-east Lismore. Lismore City Council, Lismore, NSW.

Lunney, D., Stalenberg, E., Santika, T., and Rhodes, J. R. (2014) Extinction in Eden: identifying the role of climate change in the decline of the koala in south-eastern NSW, *Wildlife Research* 41, 22-34.

McAlpine, C. A., Rhodes, J. R., Callaghan, J. G., Bowen, M. E., Lunney, D., Mitchell, D. L., Pullar, D. V., and Possingham, H. P. (2006) The importance of forest area and configuration relative to local habitat factors for conserving forest mammals: a case study of koalas in Queensland, Australia, *Biological Conservation* 132, 153-165.

McAlpine, C., Lunney, D., Melzer, A., Menkhorst, P., Phillips, S., Phalen, D., Ellis, W., Foley, W., Baxter, G., de Villiers, D., Kavanagh, R., Adams-Hosking, C., Todd, C., Whisson, D., Molsher, R., Walter, M., Lawler, I., and Close, R. (2015) Conserving koalas: A review of the contrasting regional trends, outlooks and policy challenges, *Biological Conservation* 192, 226-236.

McAlpine, C., Brearley, G., Rhodes, J., Bradley, A., Baxter, G., Seabrook, L., Lunney, D., Liu, Y., Cottin, M., Smith, A.G. and Timms, P. (2017) Time-delayed influence of urban landscape change on the susceptibility of koalas to chlamydiosis, *Landscape Ecology* 32, 663-679.

NSW Chief Scientist & Engineer (2016) Report of the Independent Review into the Decline of Koala Populations in Key Areas of NSW, New South Wales Government.

Predavec, M. (2016) NSW koala population case studies. Prepared for the Independent Review into the Decline of Koala Populations in Key Areas of NSW.

Rhodes, J.R., Lunney, D., Callaghan, J. and McAlpine, C.A. (2014) A Few Large Roads or Many Small Ones? How to Accommodate Growth in Vehicle Numbers to Minimise Impacts on Wildlife. *PLoS ONE* 9(3): e91093.

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

Santika, T., McAlpine, C.A., Lunney, D., Wilson, K.A. and Rhodes, J.R. (2014) Modelling species distributional shifts across broad spatial extents by linking dynamic occupancy models with public-based surveys, *Diversity and Distributions* 20, 786-796.

Seabrook, L., McAlpine, C., Baxter, G., Rhodes, J., Bradley, A., and Lunney, D. (2011) Drought driven change in wildlife distribution and numbers: a case study of koalas in south west Queensland. *Wildlife Research* 38, 509-524.

Smith, A.G., McAlpine, C.A., Rhodes, J., Seabrook, L., Lunney, D. and Baxter, G. (2013) Are there habitat thresholds in koala occupancy in the semiarid landscapes of the Mulglands Bioregion? *Wildlife Research* 40, 413-426.

Tucker, G. and Clifton, D. (2013) What do we know about CQ koalas near rolling infrastructure? In: Nicole Flint and Alistair Melzer (Eds), *Conserving Central Queensland's Koalas*. Koala Research Centre of Central Queensland CQUniversity Australia Rockhampton, Queensland, Australia, pp. 111-115.

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WWF-Australia National Office

Level 1/1 Smail Street,
Ultimo NSW 2007
GPO Box 528
Sydney NSW 2001

Tel: +1800 032 551
enquiries@wwf.org.au
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