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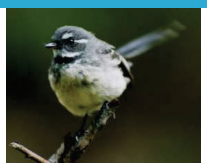


ADAPTATION CASE STUDY SERIES

Climate Change Adaptation Strategies for the Koala
by Christine Adams-Hosking

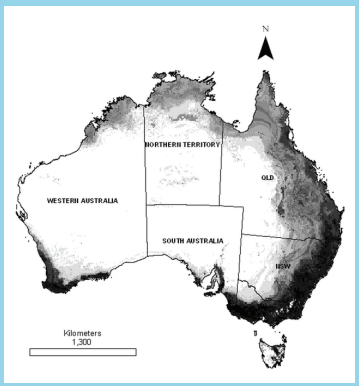
Study Summary

My research investigated the potential impacts of climate change on the geographic distribution of the koala (*Phascolarctos cinereus*), an endemic Australian arboreal marsupial with specialised food and habitat requirements. The IUCN lists the koala as one of 10 species globally that are most vulnerable to climate change because of their limited capacity to adapt to rapid environmental changes.

It is therefore important to understand the potential for future range shifts in koalas, so that conservation planning actions, in particular climate change adaptation strategies, can be implemented in appropriate regions.

Using CSIRO A1FI climate change scenarios, we found that **by 2030-2070, the distribution of climatically suitable koala habitat will shift in an eastwards and southwards direction (see maps).** The implications of these findings are that koala habitat protection and restoration investment will be most effective in areas identified as future 'climate change refuge' regions.

Focusing on Queensland, we also applied climate change distribution models for the koala and five of its essential eucalypt food trees to a conservation prioritisation framework ('Zonation'), to determine which Queensland local government areas (LGAs) were the highest priority for koala conservation and adaptation.

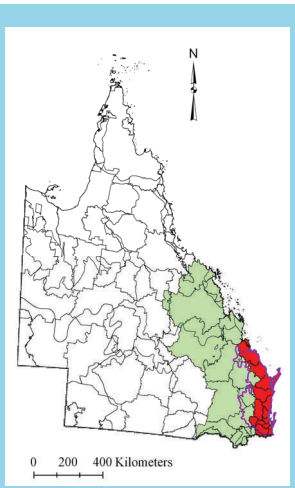


Modelled koala climatic habitat now

Koala habitat distribution in 2070, based on A1F1 climate change scenario.

Recommendations for Adaptation Management

Our results indicate that koala climatic distribution is likely to shift and contract, particularly from the western inland range limits in Queensland and New South Wales. Using the priority Queensland LGAs as an example, we recommend the following adaptation strategies to ensure adequate refuge regions for koalas are secured:



Priority LGAs: Green - all scenarios; Red - >50% priority by 2050. The southeast Queensland bioregion is outlined in purple.

- Investigate high priority LGAs at a finer scale to develop strategies that incorporate existing koala habitat, potential restoration areas, and threats to koalas such as roads and urban areas.
- Implement strategies to establish koala habitat corridors that link identified climate change priority refuge regions. Many priority regions will incorporate both private and public land and will pose significant conservation planning challenges.
- At the broader scale, ensure that national and regional koala conservation policies reflect these climate change adaptation strategies and synergistic threats to koalas.
- Consider managed relocation to novel and potentially suitable climate change priority refuge regions.
- Establish long-term monitoring and adaptive management to ensure that climate change adaptation measures for koalas are facilitating the ongoing survival of this species across its natural range.

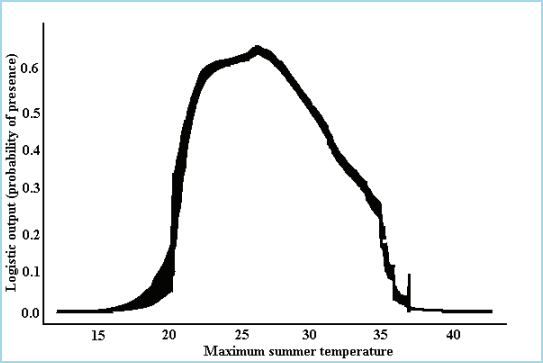
Research Overview

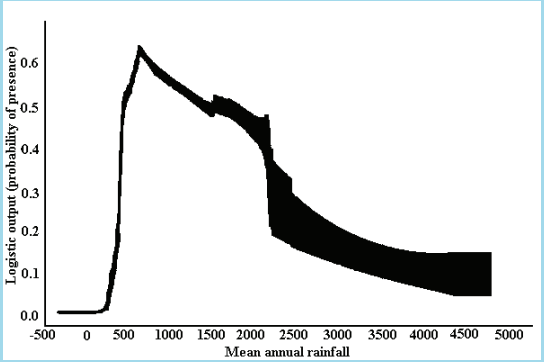
Koalas currently occur throughout eastern Australia in fragmented habitats, where they are under pressure from land-clearing, dogs, cars and disease. Inland and coastal koala populations have experienced significant declines due to drought, heatwaves and threats associated with urbanisation. Rapid climate change will compound these stressors and cause their range to contract to many regions where these threats are amplified by intensified urbanisation.

This research aimed to predict the likely shifts in the climate envelope of the koala under various climate change scenarios, and identify potential future refuge regions. We used Maxent, a widely accepted species distribution decision support tool to form our predictions by modelling koala habitat distribution, and distribution of food trees, under the current baseline and future predicted climates. We then applied these models to a reserve prioritisation algorithm to determine priority LGA's for adaptation action in Queensland. These findings can inform climate change adaptation strategies and management, so that proactive measures can be taken to protect this species in the wild.

Results and Conclusions

The highest probability of koala presence occurred at a mean maximum summer temperature of approximately 27°C and a mean annual rainfall of approximately 700 mm (Figure 1 and 2). Under climate change, the models showed a significant progressive eastward and southward contraction in the koala's current climatic range (see maps). With a future hotter and drier climate, koala habitat may shift toward regions where their populations are declining due to high human population densities and the associated threats. In arid and semiarid regions, such as the Mulgalands of south-western Queensland, climate change is likely to compound the threats to koalas from land clearing. Our Queensland study also shows that by 2050, there are increased proportions of priority areas for koala conservation in eastern and coastal LGA's. We recommend that these identified areas should be the focus of proactive conservation investment for climate change adaptation for this species if we are to ensure its survival in the wild.





Figures 1 and 2: The projected impact of (1) changes in maximum summer temperatures, and (2) mean annual rainfall, on the occurrence of koalas. At temperatures higher than 27 °C, koala occurrence is predicted to decline rapidly with increasing temperature. A decline, albeit more gradual, is also predicted if mean annual rainfall exceeds around 700 mm.

This PhD research was conducted by Christine Adams-Hosking of the Landscape Ecology and Conservation Group, School of Geography, Planning and Environmental Management, The University of Queensland. Her co-authors and advisors were Dr. Patrick Moss, Associate Professor Clive McAlpine, Dr. Jonathan Rhodes and Dr. Hedley Grantham.

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Read more about this research:

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

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