

Conserving Koalas in the 21st Century: synthesising the dynamics of Australia's Koala populations

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Project Objectives

The Working Group aimed to provide robust science to inform sustainable koala conservation and management. The group consisted of key koala researchers from all states in eastern Australia where koalas occur. The objective was to share data and knowledge on regional koala population estimates and current and emerging trends in those populations. Over the course of two workshops (February and June 2012), these data and expert knowledge were synthesised to answer the following questions:

- (i) what are the population trends in koalas and how do these vary regionally?
- (ii) what are the drivers of these trends and how do these drivers interact spatially and temporally? and
- (iii) what actions will be the most effective in dealing with data integration and population decline issues identified in (i) and (ii)?

The outcome of the two workshops was a bioregional synthesis of the distribution and abundance of koalas, population declines over three generations (for the past 15-21 years and the next 15-21 years) and a summary of major threats to koalas. This followed the IUCN Red List criteria (IUCN 2001).

WORKSHOP 1

Methods

The 18 workshop participants scoped the issues and developed the methods for synthesising the available data and expert knowledge. This allowed, for the first time, a unified examination and synthesis of what data were available, where there were gaps in knowledge, what existing analyses have shown, and the opportunity to re-examine data in a new light.

Prior to the workshop, available data on koala numbers and trends held by koala researchers, and government agencies from the various biogeographic regions where koalas occur were identified and assembled. The outcome of this activity was a systematic evaluation of the regional trends in koala abundance and the factors influencing koala population decline or increase.

Major Findings

It was found that New South Wales and Queensland have natural koala populations, while central and western Victoria and South Australia have introduced populations (Figure 1). The south Gippsland population of Victoria is a natural population with high genetic diversity, and requires a different management approach. The introduced populations are considered stable, although several are overabundant (e.g. Mt Eccles and Kangaroo Island) and subject to managed declines. The prognosis for introduced populations was for continued stability, but becoming increasing vulnerable to land use pressures and extreme events such as droughts and bushfires.

The evidence presented indicated that koala populations of coastal and western Queensland are mostly declining, although some low density populations (e.g. Oakey, eastern Darling Downs) are relatively stable. The most pronounced population declines are in southeast Queensland, where urban development has destroyed and fragmented large areas of high quality koala habitat, with resulting increases in mortality from vehicle collisions, dog attacks and disease. In the past 20 years, there have been substantial population declines in the Mulglunds of southwest Queensland and in central Queensland due to drought, heat waves and land clearing. These populations are particularly vulnerable to projected changes in climate. In central and southern inland Queensland, habitat loss and infrastructure development from escalating resource extraction poses a new additional threat. The long-term prognosis for Queensland is for contracting populations in western regions and urbanising coastal regions, with some low-density sub-coastal rural populations remaining relatively stable.

New South Wales populations are subject to similar trends and threats. Populations in coastal regions are declining, with some populations (e.g. Eden and Iluka) declining towards local extinction. However, there are several populations (e.g. Lismore, Campbelltown, Southern Highlands) which appear to be relatively stable. In northwest New South Wales, the Pilliga forest population has experienced a sharp decline in the past decade due to drought and wildfire, while the Gunnedah population declined sharply in 2009 due to drought and heat wave. Both populations also face new pressures from increasing resource extraction. It was found that more information is needed on the status of populations in protected areas in New South Wales.

PARTICIPANT'S INSTITUTIONS

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WORKSHOP 2

Methods

Workshop 2 built on Workshop 1 and involved 15 of primarily the same experts. The workshop aimed to fill the gaps in the empirical data from Workshop 1 using novel expert elicitation methods*. Expert elicitation methods have been demonstrated to effectively capture experts' opinions, particularly within an expert's region of knowledge (Martin *et al.* 2005; Murray *et al.* 2009). Both the Australian Centre for Ecological Analysis and Synthesis (ACEAS) and the ACERA Elicitation process (ACERA 2010) was used to facilitate this activity. A modified version of the IUCN Red List criteria (IUCN 2001) was developed to form the questionnaire for the 15 koala experts participating in the elicitation, following on the approach applied in McBride *et al.* (2012).

The Working Group elicitation process took place in the context of a facilitated Risk Analysis Workshop using a modified version of the DELPHI process for structured group decision-making (Burgman 2005, 2011). This approach allowed the group to address the gaps in knowledge regarding national koala populations with the robustness of collective judgment. For each variable of interest, the four steps of the elicitation question method asked for an upper estimate, a lower estimate, a best guess and a percentage confidence interval (in the range 50-100%). Prior to the commencement of the workshop, the participants were required to individually complete the first round of the questionnaire. These results were then re-evaluated as a group during the workshop and a second round of elicitation was conducted.

*Facilitated by Prof. Mark Burgman and assistant facilitator Marissa McBride from the University of Melbourne. Observed by Jean Cochrane of the US Department of Fisheries and Mr Alistair Cockburn of DSEWPac.

Major Findings

Using the sliding time window of the past three generations and the future three generations of koala (15-21 years), the pooled opinion from the 15 experts estimated an aggregated mean decline of 53% across Queensland's bioregions. The estimated decline for the Mulgalands population is 73% and Southeast Queensland is 51%. Koala populations in New South Wales were estimated to have declined by an aggregated mean of 26.1%, with the NSW North Coast declining by 50%. In nearly all other New South Wales bioregions, koalas were estimated to have declined by levels ranging 4% - 50%, with the exception of the New England Tableland, which increased by 6%. In Victoria and South Australia, aggregated mean koala population declines were estimated to be 14.3% and 2.9% respectively although in the Lofty Block bioregion (Mt Lofty Ranges area) the population increased by 16%.

The mean koala population aggregated from the bioregions for Queensland was estimated to be 78,000, with a range of approximately 35,000–150,000. For New South Wales/ACT, the aggregated mean population was estimated to be 36,350 (range approx. 20,000–75,000). For Victoria, the aggregated mean was 182,504 (range approx. 75,000–325,000) and in South Australia the aggregated mean population size was 33,320 (range approx. 19,000–52,000).

The outcomes of the workshops highlighted regional variations in population trends, with some regions having higher densities of koalas than others (Figure 2). The disparity between koala population demographics in the northern states compared with the southern states is apparent, as are locations where koalas were historically culled for the fur trade but were then reintroduced/ introduced into 'island' habitats and increased in numbers. The more abundant southern koala populations however, are not necessarily secure due to problems with over-browsing, low genetic diversity, habitat loss, and in more recent times, disease.

WORKSHOP 1 (continued)

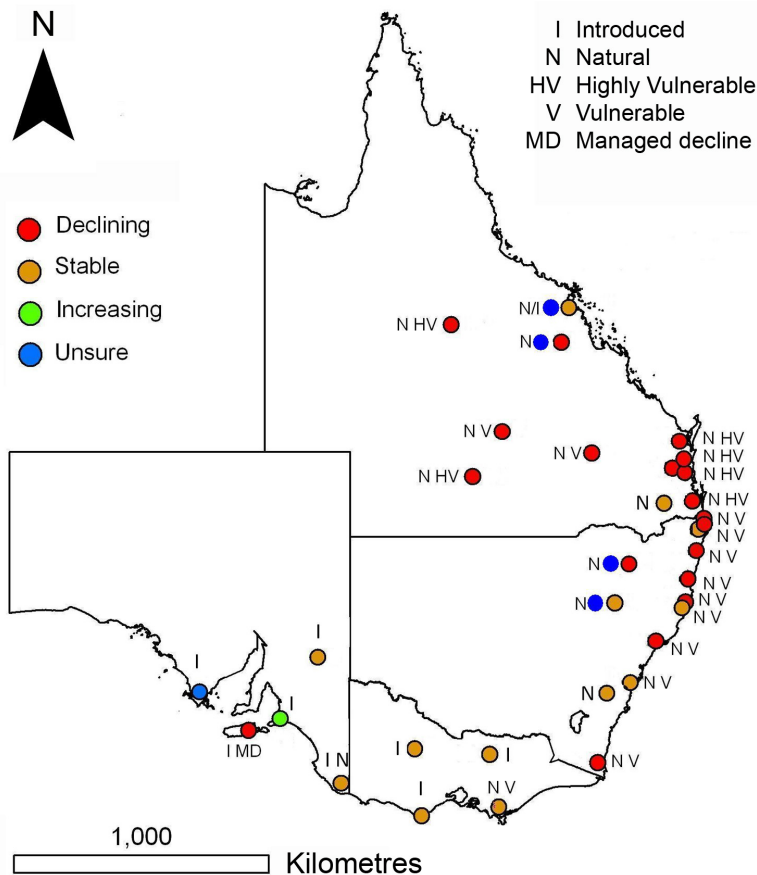


Figure 1. Workshop 1 outcomes showing the prognoses and status of koalas throughout their range.

Outputs and Products

Workshop 1 Peer reviewed manuscript: Koalas facing regional extinction (in prep).

Workshop 2 Peer reviewed manuscript: Using expert knowledge for a threatened species: a national elicitation to inform population trends (in prep).

Further manuscripts under development: Climate change and koala refugia; Bioregional threats to koalas; Drought impacts and refugia; Top 100 Questions.

How will this affect Australian ecosystem science & management?

Since the commencement of the workshops, the Australian government has listed the koala as Vulnerable under the Environment Protection Biodiversity Act (EPBC Act 1999). This development placed additional importance on the results of the workshops because the outcomes were viewed as providing critical information that had been lacking regarding national-scale koala population demographics.

This work has resulted in greater certainty for policy formulation and decision-making at all levels of government, through the provision of up to date scientific data and knowledge. It will help facilitate the identification of appropriate management actions and priorities, to assist government and land managers in ensuring that viable koala populations persist across their natural range. These actions will often require the conservation and restoration of eucalypt ecosystems where koalas occur.

The eucalypt forests and woodlands that koalas occupy support many other native species of flora and fauna. The information resulting from the workshops has proven instrumental in facilitating heightened protection for koalas and their habitats (Australian Government 2012). Therefore, other species and ecosystems sharing koala habitats will also benefit from this protection.

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WORKSHOP 2 (continued)

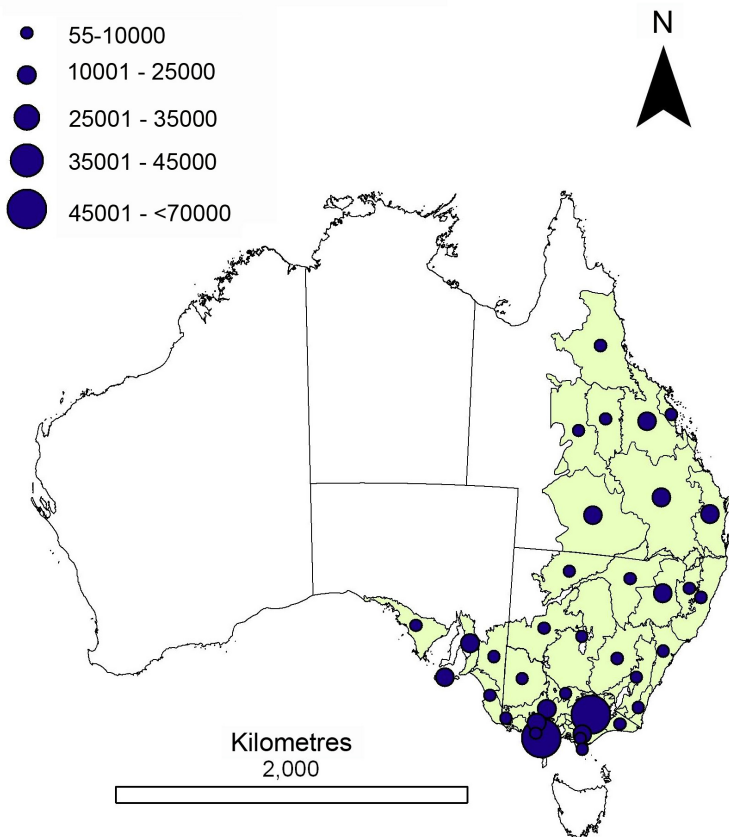


Figure 2: Workshop 2 outcomes showing mean koala populations smoothed across bioregions.

The workshops showed that threats to koalas also vary regionally. For example, in eastern Queensland and coastal New South Wales, land clearing and the impacts of urbanisation are the greatest threats, while in western regions, land clearing, the impacts of extractive industries and climate change pose greater threats to koalas. Disease is also a major intrinsic threat to koalas. In Victoria, fire is generally a greater threat than in Queensland.