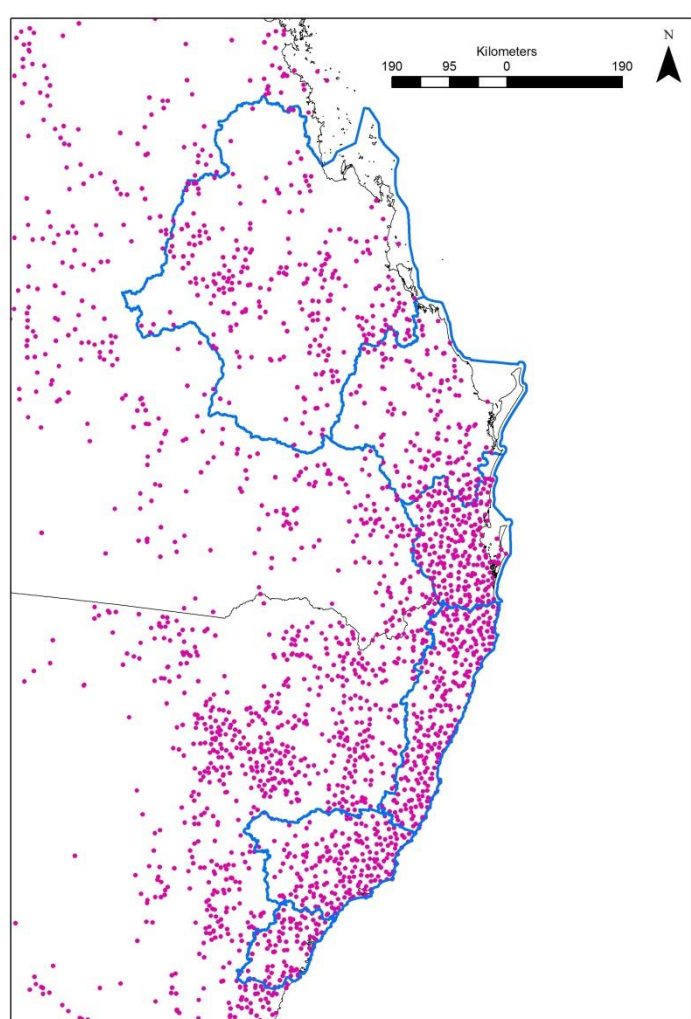# Predicting changes in the distribution of a specialist folivore and its habitat in response to climate change : a koala case study

Background
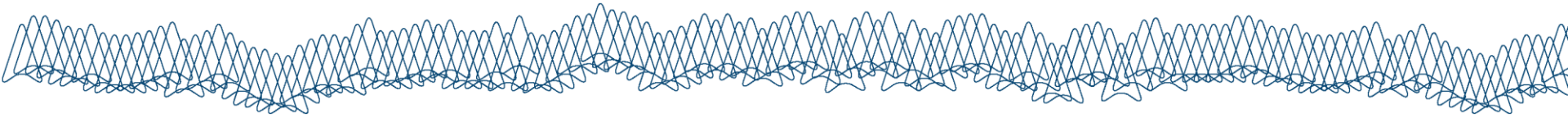
- Australia has suffered the loss of native species due to multiple human impacts. Australia is particularly vulnerable to climate change, with a projected shift to a warmer and more variable climate with major consequences for its rich biodiversity.

- The koala is a specialist folivorous arboreal marsupial that is particularly vulnerable to climate change (*IUCN, 2009*). In response to evidence of significant declines in regional koala populations (*Seabrook et al. 2011; ACEAS 2012*), the koala was listed in May 2012 as vulnerable under Commonwealth law (*EPBC Act 1999*) in Queensland, New South Wales and the Australian Capital Territory (*Australian Government 2012*).

Adams-Hosking et al. (2012) Diversity & Distributions.

Background

Fig. 1 Koala's range (pink) with East Coast Cluster NRM regions defined in blue.
Adapted from: Adams-Hosking et al. (2012)

The major underlying cause of these declines is the clearing of eucalypt forests for the agricultural development of inland regions (*Melzer & Houston 2001,*) and continuing growth of human settlements along the forested eastern seaboard (*Reed & Lunney 1990, DERM, 2009*) (Fig. 1).

Aim

To inform decisions about where, under climate change, to protect and restore critical food and habitat resources for the koala.

Methods

We developed species distribution models for the koala and five of its key eucalypt food trees using MaxEnt *(Phillips et al. 2006)* to predict the probability of an area as suitable for koalas using a range of future A1FI climate scenarios *(CSIRO 2014)* and identified areas with a higher probability of occurrence. We calculated where the koala and its food trees may co-occur under future climate change. We incorporated the following variables:
mean maximum summer temperature and mean annual rainfall, soil subdivisions, elevation and distance to water.

Adams-Hosking et al. (2012) Diversity & Distributions.

Results

The highest probabilities of overlap between koalas and their food trees were in patchy coastal and southern regions of the koala's current range (Fig. 2)
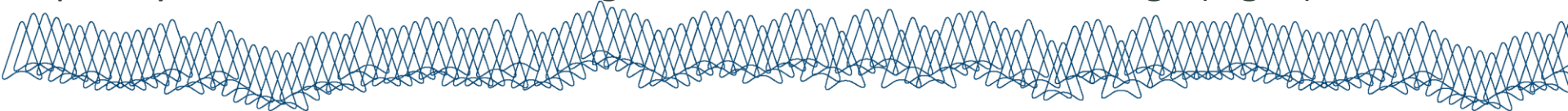
- This case study identified future areas of potential overlap between koalas and their critical food and habitat provided by a selection of key eucalypt species.
- It indicates that regions where they overlap will become increasingly contracted and fragmented under the high emission scenarios used in this study.

Implications for NRM conservation planning

- Proactively conserving and supplementing koala habitat are essential strategies for the long-term persistence of koalas.
- A similar approach can be used to identify areas to best prioritise and invest in conservation efforts for the future survival of vulnerable species that are under increasing threats from climate change.
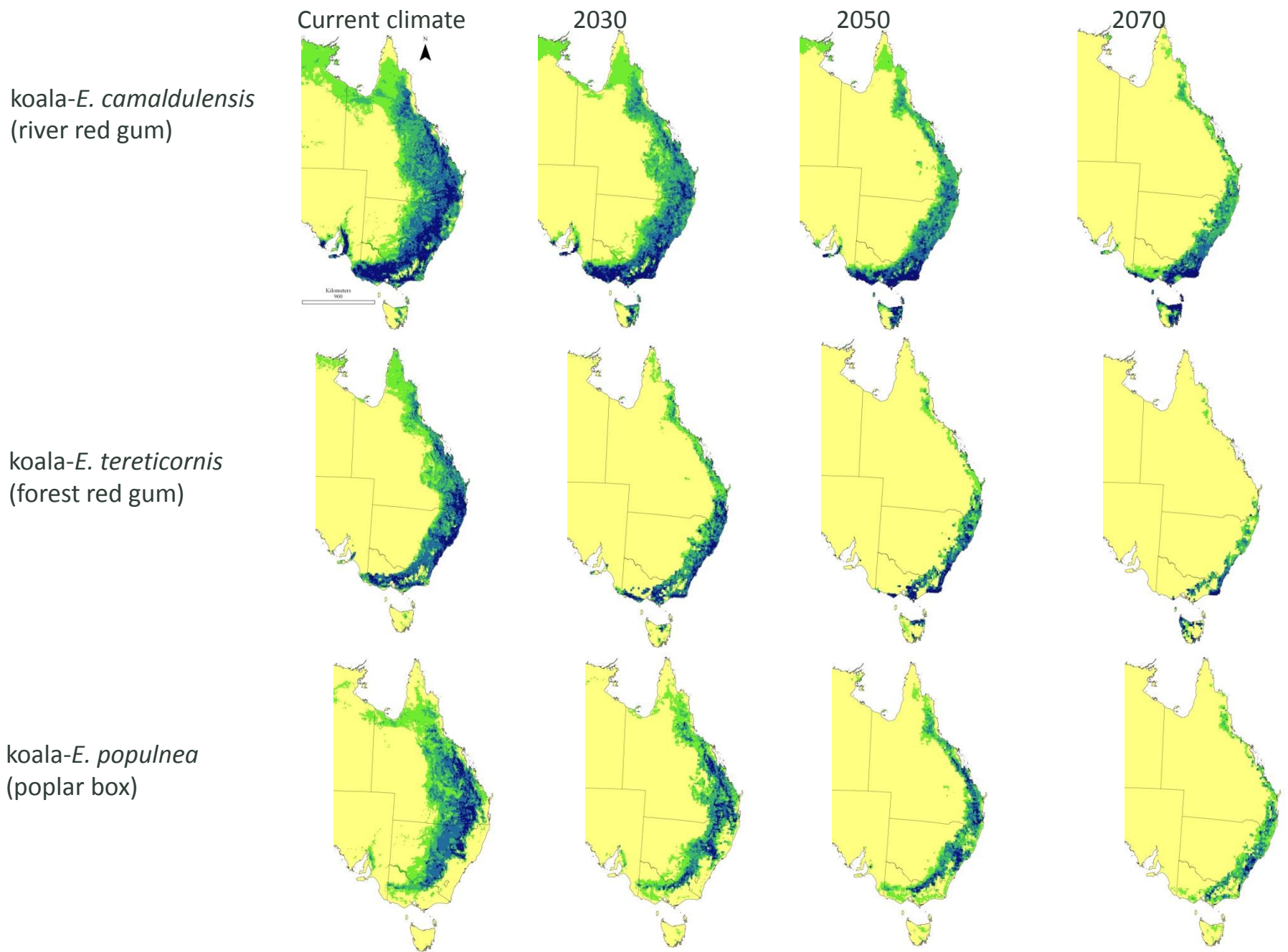
Adams-Hosking et al. (2012) Diversity & Distributions.

koala-*E. camaldulensis* (river red gum)

koala-*E. tereticornis* (forest red gum)

koala-*E. populnea* (poplar box)

Current climate   2030   2050   2070

Fig. 2 Koala and three of the modelled food trees. Highest probability of overlap between the koala and the food tree shown in dark blue and lowest in yellow. Source: Adams-Hosking *et al.* (2012).

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Contacts
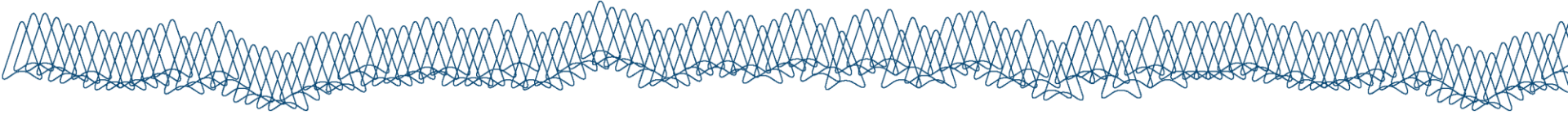
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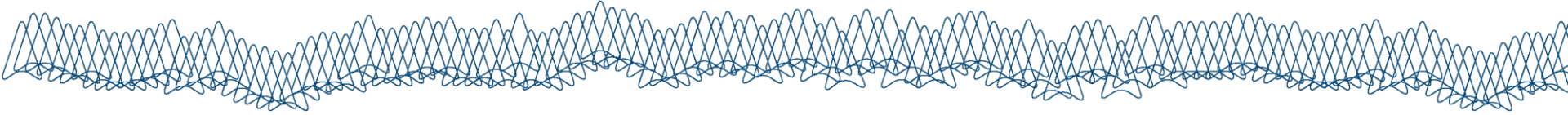Global Change Institute
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Thank you
From the East Coast Cluster