Conserving koalas in rural and regional Australia with particular attention to rural Queensland.

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June 2011

Introduction

In the submission of the *Koala Research Centre of Central Queensland* (KRC) to the Australian Senate's inquiry into the status of the koala and related matters it was argued that the current approach to the koala's conservation and management in Australia required revision. More specifically *the koala conservation issue can be clearly placed in three sets with distinctly different management requirements* (Melzer 2011). These sets included (1) koala populations and habitat that occur in areas of human population growth (mostly the eastern seaboard), infrastructure corridors and resource extraction, (2) koala populations and habitat that occur in rural and regional Australia beyond the future resource interests and infrastructure corridors and (3) aberrant (largely introduced or manipulated) koala populations from Victoria and South Australia. This short paper identifies research priorities and introduces practical research and monitoring activities that can be employed for proactive koala conservation in rural and regional Australia both within and beyond the areas of current and future resource extraction and intensifying infrastructure corridors. This is particularly applicable in Queensland where a very koala-aware state government has established a $60,000,000 crisis response to drastically declining koala populations in south east Queensland, but has no investment program for the rest of the state, wherein lies the bulk of Queensland's koalas.

Finally, there is a brief discussion on the problems with the current scientific approach – especially in relation to the general lack of long-term information on trends in koala population and habitat condition.

Understanding the koala and its habitat to enable conservation

This is foundation knowledge for more subsequent research and conservation management.

Priority research targets:

Understanding the nature of and extent and regional variation in koala habitat across the extent of its current and potential range (including man-made habitat). There is a wealth of data on the range of habitat types that koalas occupy across eastern Australia. We know that koala habitat consists of available food trees and structural elements that allow the koalas to employ strategies for metabolic regulation and avoidance of environmental stress. We also know that many of these habitats are man-made – resulting from plant responses to current and historical land use practice. There have been some attempts to map the extent of koala habitat at a local regional scale. There have been very few attempts to describe the structure of these habitats. The capacity exists to investigate the current state-based vegetation cover mapping (regional ecosystem mapping in Qld) to classify this in terms of koala habitat and then undertake ground truthing and structural descriptions. Such descriptions provide a foundation for considering the state of koala habitat over time using remote sensing tools (satellite and air photography) that are already employed for other land management activities.

Understanding the current distribution and relative abundance of koalas across the species' range.

Some work is required to settle on the best approach to undertake continent-wide audits of a cryptic species. However, a coordinated national census (probably using community sightings) is warranted. Repeating the census every three to five years would provide some relative measure of the contemporary broad distribution and relative abundance of koalas. This would both employ the resources of a broad range of interested groups and empower local change based on quality first hand datasets.

Describing the nature of and delineating the distribution of regional variations in genotype and phenotype and in habitat utilization strategies.

This is critical to effecting conservation programs that encompass the range of diversity within this species. From the few studies that have been undertaken we know that some koala populations have distinct genetic characteristics. Separately we also know that different koala populations employ different habitat utilization strategies. This regional variation probably reflects adaptation to local environmental conditions. They may well provide characteristics that pre-adapt some populations to predicted climate change scenarios. Unless we can recognize the range of variation and local adaptation we are likely to lose elements of koala diversity that, otherwise, contribute to the resilience of the species under environmental pressure.

Conceptualising key environmental drivers in koala population and habitat processes.

Environmental factors are not static but change on a range of scales from very short duration (minutes) to very long duration (decades). Plant communities also change in response to these environmental

factors as well as to species succession within the communities and the influence of human land management practice. Long term monitoring strategies need to reflect an understanding of how and at what scale these factors interact.

Monitoring trends in koala population abundance and "health" as well as habitat "health"

(A) Locating long term koala monitoring stations across the koala's range to follow trends in:

- koala abundance, health and population dynamics,
- habitat health and directions of succession,
- environmental parameters including climate variability and extreme events as well as weather and soil parameters and fluctuations in leaf moisture.

This is the most critical gap in knowledge necessary for monitoring the conservation status of the koala. While some long term monitoring sites do exist they are usually (a) poorly funded and driven by grass root community support, (b) restricted in distribution and (c) often monitored at too low a frequency. The resourcing issues are exacerbated by the tendency for funding to be skewed away from long term routing data collection towards short term highly focused academic projects.

(B) Landscape scale assessment of habitat extent and condition using existing remote sensing tools including drought mapping, fire mapping and various measures of habitat decline. These include assessment of total clearing, changes in canopy cover and structural alterations (especially changes to understorey elements).

These data are already collected by various state and commonwealth agencies. With some adjustment and benchmarking against ground data these tools can be adapted to provide report cards on the annual state of koala habitat.

Conservation Planning

The points below summarise a process for state-wide koala conservation planning.

(1) State-wide classification of:

- koala regions based on current and predicted anthropogenic drivers, and
- regional subdivisions based on pre-European ecosystems reclassified and ranked on their considered value as potential koala habitat.

(2) Classify the subdivisions in terms of:

- remnant or non-remnant,
- rehabilitation/reconstruction potential, and

- tenure.

(3) Ground-truth to confirm classification and ascertain whether non-remnant subdivisions represent anthropogenic koala habitat or have potential for restoration.

(4) Condense the classification to integrated management units - where possible founded on large reserve systems.

Incentives, management and regulation tailored to koala regions but structured around integrated management units.

In Queensland, beyond south east Queensland, three broad koala regions are anticipated. These are: (1) coastal and peri-urban region, (2) resources and infrastructure region, and (3) rural landscapes region. Some of their characteristics and opportunities are summarized below. Essential things to consider are: (a) rural landholders probably manage the greatest extent of koala habitat nationally. These custodians could be rewarded and enabled to continue and enhance their management of koala habitat; (b) the resource sector is subject to a suite of environmental regulation and has staff and resources to respond to this regulatory environment. These corporations also have mechanisms for contributing to the regional communities. Government could facilitate the application of these mechanisms to regional koala conservation. Industry could provide support to rural landholders in their koala management or habitat reconstruction; (3) Conservation land managers (QPWS) could apply koala sensitive, and habitat sensitive, land management and monitoring programs in national parks.

(1) Coastal and peri-urban

Primary stakeholders	Local government, Main Roads, QRNational, DERM, urban/peri-urban community, developers
Key issues	Loss of habitat as development footprint increases, attrition of population by dogs, vehicles, increasing human population density, increasing infrastructure intensity
Opportunities	Public awareness and support as impacts are highly visible and accessible to large numbers, Translates to political support.
Type of responses	Protection, triage, high value intervention.

(2) Resources and infrastructure

Primary stakeholders	Resource industries, Main Roads, QRNational, DERM, Ports corporations
Key issues	Loss of habitat as industry footprint increases, attrition of population by vehicles and rail, increasing infrastructure intensity along resource corridors
Opportunities	Stakeholders have high quality environmental management systems and very large resource base. Experienced in managing large-scale logistics and major projects. Used to managing under a highly regulated environment, Existing capacity to resource community needs.
Type of responses	Strategic broad acre restoration and rehabilitation associated with offsets. Community facilitation and resourcing.

(3) Rural landscapes

Primary stakeholders	Rural landholders, Local government, Main Roads, QR National, DERM.
Key issues	Rural land management issues (grazing impacts on forest succession etc), financial challenges, logistical constraints, limited access
Opportunities	Community, broad-acre land custodianship
Type of responses	Incentive programs supporting rural koala husbandry, maintenance of anthropogenic koala habitat

Problems with koala science

Modeling

Koala habitat and population models are restricted by the timeline, currency, and nature of inherent assumptions as well as the extent of data underpinning them. With the current data deficits contemporary models should be considered carefully.

Population trends

Conclusions on population dynamics and trends in abundance or extent are constrained by (a) the lack of multiple study sites and the poor representativeness of these sites, and (b) by the short duration of the studies. This situation reflects problems with the nature and distribution of resourcing for koala studies. Funding is usually for relatively short term studies (five years or less). Access to available funds most frequently favours the larger academic groups and disadvantages the smaller research groups, regional bodies and research-active NGO's. This knowledge gap is only likely to be effectively bridged if targeted funding is directed towards community and research groups with a track record and commitment to maintaining long-term data collection.

Focus

With a very few exceptions, koala studies are localized and of relatively short duration (less than a koala lifetime and much less than a single climatic cycle). The subjects of inquiry are usually determined by academic needs and the locations are influenced by the host institution and associated logistical and resource considerations.

Resource allocation

There is not an equitable distribution of resources among the koala active communities. This is a reflection of the larger universities having better track records in attracting competitive grants as well as having a greater resource base in support of such studies. Regional universities and community organizations as well as smaller research groups within sandstone universities are at a disadvantage in attracting funds and support for koala research activities – despite having extensive on-ground experience. This is reflected in the publication in the scientific literature of data from long-term study sites in Queensland where little or no acknowledgement or Government funding is given. This highlights that these studies, recently identified in the Senate Inquiry (into the health and sustainability of Australia's koalas) as key to providing the information required to determine the sustainability of Australia's koala population, are carried out by underfunded groups, and that these studies are not recognized as significant by funding bodies. Given that a range of community, NGO and institutional research groups have maintained long term study sites particularly to provide such data without significant funding, it seems inappropriate to task and fund other bodies with less experience and skill to move such work forward.