SUBMISSION TO THE SENATE STANDING COMMITTEE ON ENVIRONMENT & COMMUNICATIONS INQUIRY INTO THE STATUS, HEALTH & SUSTAINABILITY OF AUSTRALIA'S KOALA POPULATION.

Conservation Council ACT Region Inc. on behalf of the South East Region Conservation Alliance

Iconic status of koala and history of its management

In the 19th and early 20th century there were 100,000s of koalas living in the red gum forests of the Bega Valley. In fact they were so numerous, that there were reports that "trees in the main street of Bega had koalas in them".

However decades of shooting and trapping (for the export fur trade), coupled with massive clearance of the red gum forests, saw a dramatic decline to near extinction less than 70 years ago *(Pratt 1937)*. To the extent that, by the mid 20th century, koala colonies in the Shire were merely tiny remnants of the original widespread population. Towards the end of the century only two or three pockets remained: Yurammie/Tantawangalo and the stretch of relatively unbroken forest between Tathra and Bermagui (the 'Five Forests'). There were occasional sightings around Eden and further south, but these may have been an outlier of the main Mallacoota population.

While koala populations arguably might have generally recovered across parts of their range, they have suffered severe fragmentation and alienation of their habitat throughout most of eastern Australia *(Hume 1990; Pahl et al. 1990)*. Community interest in their perceived plight and the long-term security of free-ranging populations has resulted in a number of nominations to have koalas listed nationally as a threatened species, initially to the U.S. Fish and Wildlife Service (USFWS) and more recently to the Australian Commonwealth Government under the auspices of the Endangered Species Protection Act 1992. Similarly, enactment of the Threatened Species Conservation Act 1995 in New South Wales resulted in nominations to have some regionally significant populations listed as endangered.

As we move into the 21st Century there were no formal records of koalas in the Shire, although anectdotal records kept occurring especially around Mumbulla and Bermagui. It is believed that continued loss of habitat (including clearfelling and intensive logging of native forests), coupled with predation from dogs and foxes, and losses from an increased fire regime (both in severity and frequency) were causal factors in this decline to near extinction in the Shire.

Ongoing community concern about the conservation status of koalas in the south-east forests has rightly manifested in one or more nominations to have the population listed as endangered for purposes of the *Threatened Species Conservation Act 1995*, a process that has been hindered by disparate views about population size, genetics and management boundaries.

However, this situation was all to change with the sighting, by two Aboriginal youths, of a female with joey, in Mumbulla State Forest in August 2007.

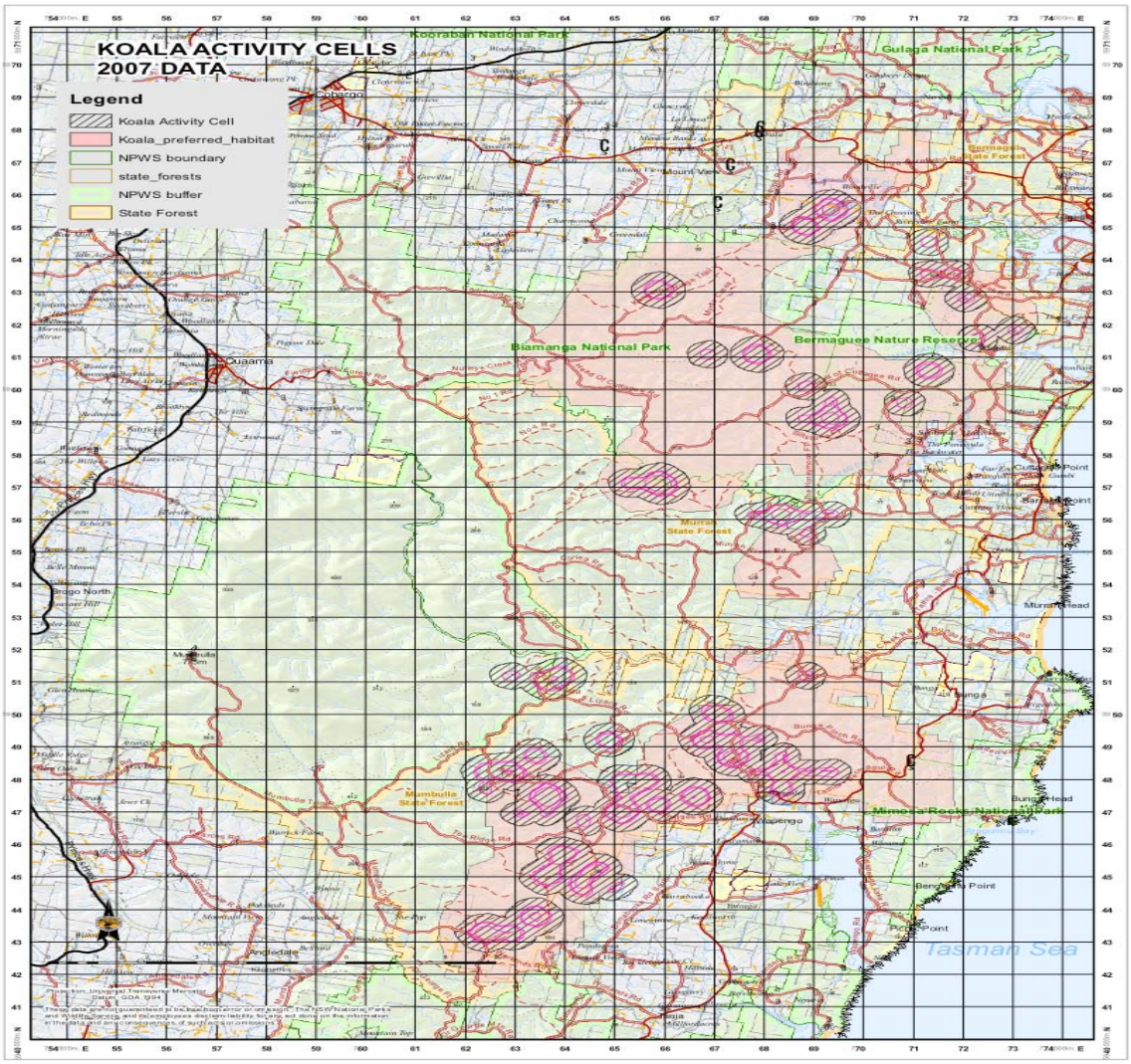
Estimates of koala populations and adequacy of counting methods

A critical issue affecting the long-term management of koalas is their perceived conservation status. Koalas still occur in many areas throughout their historical range, but the numbers of animals in disjunct populations are estimated to vary from <50 to over 100,000. Complex factors limit free-ranging koala populations, including food tree preferences, history of disturbance, and *Chlamydia* infection, all of which make longer-term population trends of many populations difficult to predict. Lack of consensus regarding the size and viability of remaining populations and regarding the extent of and reasons for decline, or even overabundance in some instances, hinders the conservation task. A reappraisal of population trends suggests that, notwithstanding localized management issues in Victoria and South Australia, overall the species is "vulnerable" on the basis of current World Conservation Union criteria. Recommendations for more effective conservation of koalas include (1) acknowledging the legitimacy of differing perspectives, (2) recognizing the uncertainty and assumptions inherent in population estimates and trends, (3) applying greater rigor and developing better standards for monitoring population trends, and (4) being cautious in assigning conservation status to national, state, and regional populations.

The abovementioned recent sightings, coupled with uncertainty over the status of Far South Coast koala populations, led to a survey of the lower elevations in Mumbulla State Forest. These surveys were co-ordinated by NSW National Parks and Wildlife Service (NPWS) officers, and involved participation by the community, the Wapengo Watershed Association, staff of Forests NSW and local Aboriginal people, the latter for whom Koalas form an important part of the spiritual and cultural life and are central to many Dreamtime stories.

Using the random RGBSAT survey technique developed by Biolink (Phillips, 2007; and Phillips & Callaghan, 2007) at a 350 metre interval, Koala evidence was found at 66 of the 589 sites assessed, giving an overall occupancy rate of nearly 12%. The highest concentrations were found in the lower elevations of Mumbulla State Forest. The survey results indicate a recovering and breeding koala population of between 20-50 individuals. It is clear that this methodology, although originally designed for high-density koala poulations of the north coast of NSW, is equally efficacious in the lower population densities of the South Coast and also probably in the Tablelands. [*Recent advice from DECCW indicated that the RGBSAT technique will be applied to the forthcoming Southern Tablelands koala survey*].

The map overleaf indicates the results of the combined DECCW/community RGBSAT surveys and analysis undertaken by DECCW and confirmed by Prof. Ross Cunningham, ANU.



Map 1 Koala Activity Cells derived from RGBSAT survey data 2007

During the extensive survey period (2007-2010), consultants were employed by DECCW to review existing information and to devise a draft management strategy for koalas on the Far South Coast. Their report (Ecological, 2006) is attached to this submission even though not all of their recommendations are fully endorsed by the Conservation Council ACT Region. More recently, NSW DECCW commissioned work which resulted in a Far South Coast Koala Management Framework (FSCKMF). Consultative in approach, the aim of the FSCKMF (EcoLogical 2006) was essentially to synthesise available knowledge, establish management and conservation protocols, and promulgate a series of time-related management actions intended to assist koala recovery and management efforts in the southeast forests.

The agreed view from the scientific workshop EcoLogical held in 2008 was:

> "*The Far South Coast koala population has declined to very low levels and requires immediate, assertive actions to improve and maintain koala numbers in the area and avoid localised extinctions.*

- *It is very difficult to statistically determine the level of the current population and trends over the last 30 years (due to an absence of benchmark numbers).*
- *Anecdotal and scientific evidence suggests a significant decline and a lack of recovery."* (Ecological 2008)

More recent surveys (DECCW *pers. com*. 2010) found no evidence of koalas currently residing in the areas of the previous populations in the Yurammie/Tantawangalo area, although continuing anecdotal records might indicate persistence of a very small remnant population.

Clearly, Koala numbers have declined in the northern parts of Bega Valley Shire in recent decades. This decline, as mentioned above, is probably associated with a range of impacts including clearing for agriculture, rural-residential development, intensive forest harvesting, wildfire events and possibly inappropriate fire regimes in some areas. However, there is now evidence that Koalas in the southern part of DECCW's study area may be entering a recovery phase. This evidence, together with the DNA analysis results (at Sydney University) showing that the levels of genetic diversity within the population are still high, suggests the potential for Koala numbers to recover to a population size that is viable in the long-term. This recovery may be significantly influenced by the management decisions made for coastal forests and the effectiveness of their implementation.

Knowledge of koala habitat

Mitchell (1990) has noted that large home range sizes could be associated with areas where the preferred tree species were more sparsely distributed, despite the presence of a variety of other eucalypt species (e.g. as in the Far South Coast population). Such observations are crucial in terms of determining the importance of a given vegetation community for koalas. Cork *et al* (1990) considered that the key to the mapping of koala habitat was consideration of tree communities rather than individual tree species. As the results of this and the above studies suggest however, individual tree species, where they can be shown to be the subject of significant levels of utilisation by koalas, are likely to be a critical consideration in terms of carrying capacity. Moreover, we would suggest that an understanding of which tree species are important and which are not clearly increases the likelihood of finding koalas or evidence thereof, while also permitting the relative worth of the vegetation communities being utilised by koalas to be ascertained with a greater degree of confidence than that currently being practised.

However, Moore and Foley (2005) found that tree selection by free-ranging koalas in low carrying capacity landscapes will invariably involve some complex, edaphic-influenced leaf chemistry processes. In view of this, it is pertinent to note that a landscape-based approach to the assessment of koalas and their habitat has been recently developed and submitted for peer-review (Phillips, S., Hopkins, M. and Warnken, J.)

Of particular relevance to the understanding of Koalas relationship to their environment is the recent honours research undertaken by Eleanor Stalenberg in 2010 at ANU. Below is a verbatim extract from her research summary.

[Extract from Stalenberg, 2010 (attached)].

Koalas need a minimum amount of nutrients, energy and water to stay healthy, but must also avoid being poisoned by a myriad of leaf toxins. Koalas will only eat leaves of certain *Eucalyptus* and will even shy away from individual trees of a favoured species. Leaf chemistry varies between species, and can also be surprisingly variable between neighbouring trees of the same species within a small area. Leaf chemistry will influence which trees koalas use and their movements across a landscape, and may ultimately determine if the forest can sustain koalas in the long-term. Poor habitat quality is frequently cited as the reason that these small koala populations have failed to thrive.

But the koala is a shrewd food critic. Koalas do not just eat any *Eucalyptus* leaves, but are actually quite strategic and discerning and will choose one tree over a nearby tree of the same species based on leaf chemistry. Our Koalas chose to visit trees of "higher quality" which contained higher concentrations of available nutrients and lower toxins when compared with nearby trees of the same species. They visited eight different eucalypt species.

All the *Eucalyptus* species had highly variable chemistries and two neighbouring trees of the same species were often encountered that had such different leaf chemistry that, to a koala, one might have had leaves that tasted like chocolate and the other like cardboard. Koalas did not necessarily choose to visit the highest quality trees. This suggests that koalas are able to meet their nutritional requirements by eating the more common moderate quality trees and do not need to waste time and energy finding the very best quality trees available. Although koalas visited species with lower average nutrient concentrations, like silver-top ash, the individual trees that koalas chose to visit had leaves that had much higher nutrient concentrations than the average for that species.

This difference suggests that when koalas eat these lower quality species, they must seek out individual trees with exceptionally high quality foliage in order to meet their minimum nutrient requirements. Plots that koalas did and did not visit contained trees with a similar range of nutrient levels. Thus the plots that koalas currently occupy are not necessarily special feeding areas because the unoccupied plots also carried trees of acceptable nutritional quality. As the unoccupied plots were adjacent to occupied areas, they may simply be areas that the population have not yet colonised. If the population increases we may well see these areas becoming occupied in the future. To find out if there are parts of the forest further afield that provide suitable or unsuitable nutritional habitat, we will need to understand more about how leaf chemistry varies across the landscape.

The nutritional quality of trees may also change over longer periods of time due to changes in the environment. Accordingly, human-induced climate change could have long-term negative effects on the suitability of leaves for koalas. My study suggests that koalas need a diversity of tree species with varied quality foliage so they can pick and choose their foods. This need for diversity may become even more important with climate change as a choice of trees will provide koalas with the capacity to alter their feeding patterns to respond to changing leaf chemistry and maintain a balanced diet over time.

The Bermagui-Mumbulla area has historically been considered a low or moderate quality forest habitat on soils of low fertility that is capable of supporting only low-density koala populations. The data does not lend support to this assumption. So the mystery remains: why are koalas at such low numbers in the Bermagui-Mumbulla forests? The answer potentially lies with the impacts from

historical and ongoing disturbances from land clearing and fragmentation, forestry activities and fire. Additionally, the region has experienced prolonged drought which can suppress leaf flushing, decrease leaf water content and lead to tree die back; thereby reducing the availability of higher quality foliage.

Although forests may appear uniform and harmonious to us, the koala sees a forest of patchy nutritional quality and diverse food types which can even be toxic to eat. To survive in this hostile and variable environment, koalas need to be vigilant and perceptive. Koalas in these low-fertility forests have particularly complex feeding strategies that are not solely based on tree species, but rather on the concentrations of particular chemicals in the leaves of individual trees. Leaf chemistry can vary even between trees of the same species and only some trees of each species will be suitable food. Koalas in this area visited a high diversity of eucalypts to maximise nutrient intake and manage the high and variable toxicities in their foliage. This suggests that effective management of these low-density populations is not just about retaining one or two tree species, but preserving this diversity. The challenge now is to pursue methods that can recognise which trees are nutritionally suitable without the need to collect leaves and analyse them in the laboratory. A new and exciting method of remote sensing is currently being explored to analyse leaf chemistry more efficiently. This method will allow managers to create a map of the nutritional quality of eucalypt forests from high-resolution aerial photography.
[Extract ends].

Clearly, management of the tree resource in areas being utilised by low-density koala populations will not be a matter of simply ensuring that adequate numbers of preferred food tree species are retained. Martin (1985) also stressed that loss of key food resources can have profound effects on the population viability and survival of koalas.

The Conservation Council believes that the potential for koala recovery across the landscape is better now as a result of increases in the area of the conservation reserve system, the implementation of more extensive wild dog/fox control programs, increased community awareness, voluntary conservation agreements on private properties, habitat restoration initiatives on the forest fringes, and the potential for a more integrated and effective approach to fire management. Provided impacts on habitat can be minimised, forest rehabilitation initiatives encouraged, and koala numbers do not fall below a critical mass, we may be at the beginning of a recovery phase for koalas in at least the Wapengo forests, where breeding koalas appear to be surviving.

The identification of forests used by, and suitable for, breeding koalas, can help guide koala recovery activities such as prescription burn and wildfire management, local government environmental plans, forest rehabilitation initiatives, and koala survey and monitoring priorities. The data gained through the RGBSAT surveys would indicate that all of Mumbulla State Forest is potential koala habitat, in both providing a food resource for the existing population and in providing suitable habitat for juvenile koalas to extend the range of the colony. Given that individual sightings of koalas have been reported in the forests between Mumbulla and Bermangui, it would seem prudent to ensure that koala-friendly forest management practices be extended to all the public lands between Tathra and Bermagui, and between the twin mountains sacred to the Yuin people: Gulahga and Mumbulla.

Threats to koala habitat

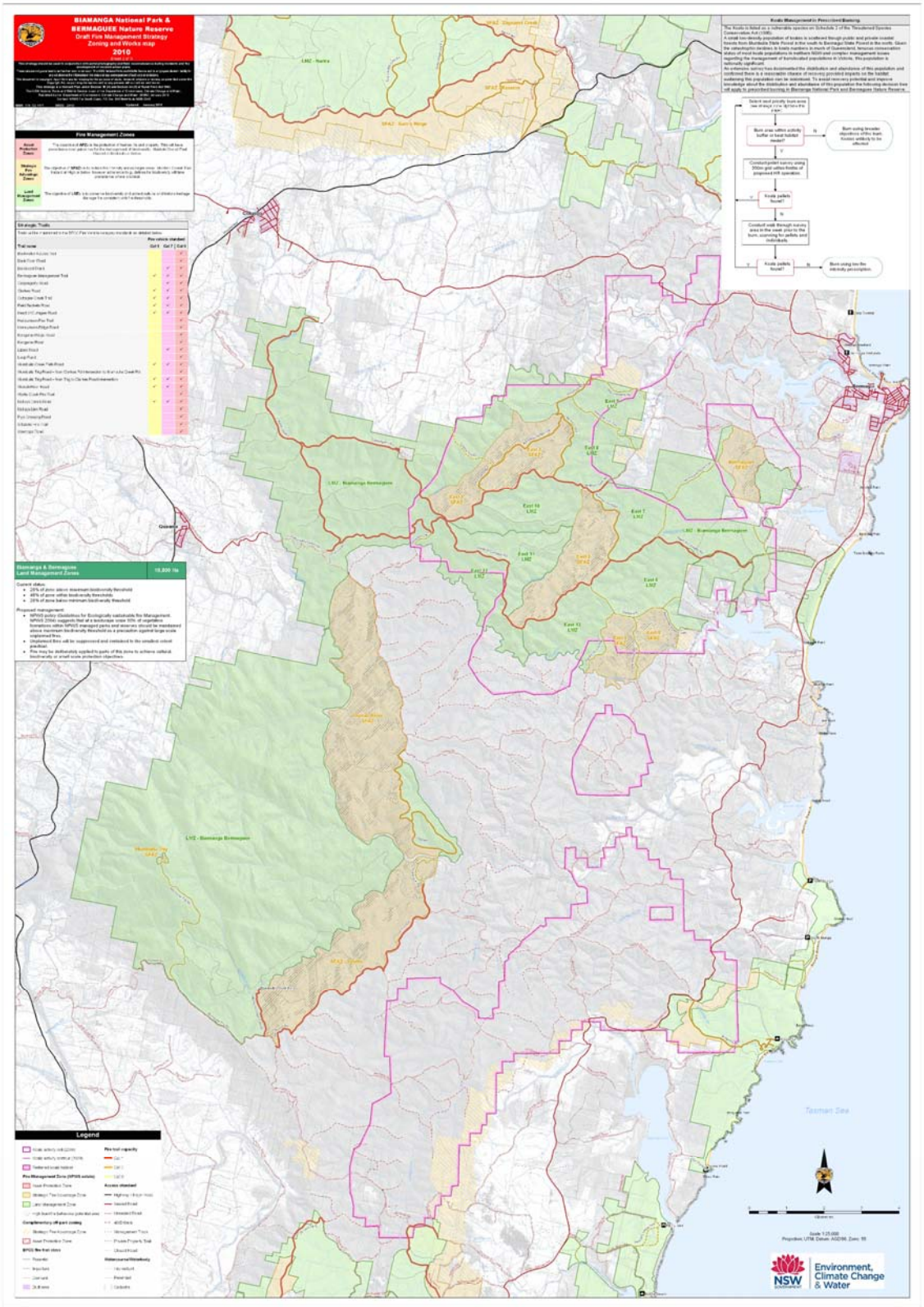
Logging: The continuation of intensive logging activities (primarily for woodchips) on state forest lands in this area poses the single greatest threat to the survival of this particular population of koalas. Industrial level logging causes great destruction of forest habitat and it is unlikely that many koalas would survive in logging coupes. The level of logging activity is also likely to have some impact upon any koalas in adjacent unlogged coupes, through noise and human presence. Both 'core' and 'expansion' areas for this population of koalas is targeted for logging in 2012 – thus the threat is great, and immediate.

However, Phillips (*2007*) recommends that silvicultural practices such as timber harvesting for woodchip and/or sawlogs and/or thinning operations should not be undertaken within koala population cells nor associated buffer and habitat linkage areas.

Briggs (*1999*) concluded that the magnitude of the decline in koala numbers in State Forests in the South-east of NSW was difficult to ascertain because of uncertainty about short and long term effects of various types of logging on koala habitats. The Conservation Council therefore postulates that the precautionary principle should apply.

Fire: Wildfire has always been a major threat to koalas due to their slow movement response to such a threat. Changing climate in the region is likely to lead to more frequent severe fire events with subsequent impacts on koala populations. Agencies need to incorporate the location of koala population cells into fire management planning so as to be capable of mounting a strategic defense of known activity areas in the event that they are threatened by wildfire (*Phillips 2007*). It is therefore most pleasing to note (see Map 2 below) that NPWS has undertaken specific hazard-mitigation measures in the adjoining Biamanga National Park to protect this koala colony from fires (especially those originating from the north-west)(*pers.comm. DECCW*). However, the continuing practice of post-logging burns after forestry activities (*pers.comm. Forests NSW*) is likely to pose a severe and imminent threat to the remnant koala population in Mumbulla, Murrah and Bermagui State Forests. Phillips (2007) has recommended that fire management practices including the use of low intensity burns for the purposes of hazard reduction should not be undertaken within areas of known koala activity.

It is disappointing to note that such eventualities are not acknowledged as a threat in the National Koala Conservation Management Strategy section 6.1.



Map 2 NPWS Draft Fire Management Strategy 2010 – depicting Koala Habitat Fire Suppression Zones

Climate Change: This is likely to be a critical factor in the survival of koala populations (identified in section 6.7 of the NKCMS), and needs more attention especially regarding the design and implementation of management strategies to facilitate cross-landscape movement of koalas.
Drought: Drought is clearly a factor in the growth or decline of koala populations, as it can substantially affect the level of foliar nutrients available. However, it is a factor over which we have no control, unlike many of the other potential threats. The only way the potential affects of drought can be effectively mitigated is to provide suitable landscape-scale movement corridors for koalas consisting of a range of tree species with high foliar nutrient leaves.
Hunting: Hunting is now permitted in State Forests in New South Wales, including those in the Tathra-Bermagui area. Despite the regulation that protected native fauna must not be hunted or taken, there is no guarantee that inadvertent killing of koalas may arise from hunting activities. Furthermore, the use of dogs in such pursuits, may well have negative impacts upon koala colonies. This issue is not mentioned in Chapter 6 of the NKCMS.
Dogs: Evidence of excessive dog and/or fox activity within designated koala activity area should be followed up with a targeted control program (*Phillips 2007*).

The listing of the koala under EPBC

There was unanimous agreement among biologists contributing to the most recent assessment of the status of koalas *(Maxwell et al. 1996)* that the area historically occupied by the species had declined by 25-74%, a figure that appears to satisfy IUCN criterion 1(c) for vulnerable, albeit over a greater time period. Although workshop participants believed that this conclusion supported a classification of koalas as lower risk (near threatened), it assumes the population is stable *(World Conservation Union Species Survival Commission 1994)*. Application of IUCN criteria to the population trends described above suggests a measure of population instability across the species' range.

We believe that there is a need for EPBC Listings to vary by specific areas and /or disjunct populations – and not just be based upon a single national determination.

Adequacy of the National Koala Conservation and Management Strategy

In general terms, the Strategy is well balanced, however its implementation leaves much to be desired, especially actions 1.01-1.04.

Action 1.06 Standard Monitoring/Habitat Assessment Protocols
We would strongly urge the wide adoption of the RGBSAT survey techniques (Phillips, 2007) which have (at least in NSW) been amply demonstrated to work well in both low and high-density koala populations.

Action 1.08 Continue Survey and Monitoring Programmes
We support the ongoing allocation of resources by NSW NPWS (DECCW) to koala survey in the south-east. This programme has been particularly successful in facilitating multiple agency and

community group (including Aboriginal custodians) participation. We would also strongly support regular monitoring of any populations discovered on at least a 5-yearly basis.

Action 1.09 Incorporate Causes of Habitat Loss or Degradation into Planning for Koala Habitat Conservation.

We believe that the range of threatening processes is much wider than just those identified in the NKCMS and should also include forest management practices (especially logging) and hunting. The impact of climate change needs to be assessed in a regional context in terms of its impact upon suitable habitat permitting koalas to move across the landscape.

Action 4.03 Community Involvement in Koala Conservation

In southern NSW this is patently not working very well, apart form the effort of a few dedicated persons in NPWS. However, other land managers appear to have no programmes, or commitment, to engage with the community on koala conservation issues.

Action 6.02 Identify and Prioritise Knowledge Gaps

We believe that a major gap – in identifying the key drivers of koala food preferences – is just beginning to be tackled through the innovative research of scientists such as Stalenberg at ANU. Research funds should be allocated to continue and expand this research.

Action 6.03 Identify Directions for Research on Effects of Climate Change

This work has lagged behind and needs urgently addressing. In particular, research needs to focus on how koalas can move across the landscape to refugia and alternative food resources when faced with degraded habitat (whether through drought, fire or other climate change induced events). Another area of research could profitably focus on how habitat restoration/rehabilitation could be most economically effected (e.g. how do we ensure rehabilitation plantings will guarantee high foliar nutrient food resources for koalas?).

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Although NGOs are the Wapengo Watershed Association (the local NGO group involved in koala surveys and habitat restoration activities). There is no evidence of any public outputs from the 'Implementation Team' or the 'Advisory Group' (NKCMS 2.1).

Where is the reporting that would "be made public" (2.3), or information on the "annual evaluation" by external reviewers?

The Queensland Government responses to the Strategy (section 4.3) seem to be of a higher level of commitment than most other jurisdictions. It would be valuable for the Commonwealth to review Queensland's successes and promote and implement same in New South Wales.

Appropriate future regulation for the protection of koala habitat

A recurring theme in the literature which deals with the management of free ranging koala populations (e.g. *Lunney et al, 1990*; *Gordon, 1996*) is a perception that habitat destruction represents the greatest threat to long term conservation of the species. From this perspective, and from our knowledge of the Far South Coast population, it is clear that all existing and potential habitat must be conserved. Recurring debate over exactly what constitutes koala habitat and which are the most preferred tree species in a given area tends to both overshadow and undermine the more pressing need to effectively conserve it, an issue which is exacerbated by the absence of a scientifically credible approach to habitat assessments in the first instance (*Phillips, 2007*).

However, we also argue that Stelberg's research clearly indicates that leaf foliar status must be a critical component of koala habitat assessment. The Conservation Council ACT Region urges federal and State Governments to prohibit and regulate (with compliance enforced) development or land management practices likely to be injurious to all threatened or endangered species, including koalas. Our recommendations below provide more detail.

Where recovering koala populations occur with small numbers of individuals, every effort should be made to be conservative in designing protection and management strategies in order to provide a wide expanse of forest for potential colony expansion. Solely restricting protection to specific areas where visible signs (eg scats) of koala activity have been found will unnecessarily restrict the potential for such small populations to improve their viability through population growth. In addition. key corridors of remnant vegetation need identification and protection at a landscape scale.

Interaction of state and federal laws and regulations

There is an urgent need for Federal protection of threatened and endangered species (and regulation of injurious activities and processes) to over-ride the Regional Forest Agreements. For example, while the koala is listed as Vulnerable, the enforcement of the NSW Threatened Species Act is 'turned off' by the provisions of the RFA Act and associated legislation. There is no mention of this situation in the NKCMS.

Furthermore, there is a need for detailed RGBSAT surveys to be undertaken prior to the approval of any areas for logging, coupled with associated redesign of coupe boundaries to avoid logging & revised fire management strategies if any evidence of threatened or endangered species is found.

Any other related matters

The main additional matter that we wish to stress is the clearly demonstrated need (as expressed in Guiding Principle 2 of the National Koala Conservation Management Strategy) to apply the precautionary principle to the protection and management of koala populations (especially those which are disjunct).

RECOMMENDATIONS

Given management of the tree resource in areas being utilised by low-density koala populations will not be a matter of simply ensuring that adequate numbers of preferred food tree species are retained,

1. ***Even if the Koala is not nationally listed, the disjunct but recovering koala colony centred upon Mumbulla State Forest should be listed as a Threatened Population as (a) the southernmost koala colony in New South Wales, (b) the last remaining example of the previously widespread heartland koala populations of the Bega Valley, and (c) under immediate and great threat.***
2. ***Public forest lands between Tathra and Bermagui not currently within the national reserve system should either be added to that conservation estate, or have their management regimes sufficiently modified to ensure ongoing recovery and expansion of the koala population to a self-sustaining viable level.***
3. ***No hazard reduction or post-logging burning should take place in, or adjacent, to known koala habitat, except in as much as may be designed specifically for the protection and conservation of koalas and other threatened species.***
4. ***In the design of koala habitat protection areas or zones, attention must be given to the provision of suitable areas for the expansion of populations, and for refugia in case of climate induced habitat change, wildfire etc.***
5. ***No hunting should be permitted on public lands within the general area of known koala (or other threatened mammal species') habitat.***

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