North East Forest Alliance Submission to:

Developing a NSW Koala Strategy

Proposed Priorities Action Statement amendment

Draft koala habitat protection SEPP

Dailan Pugh, March 2017

The NSW Parliament's will to safeguard threatened native species dates back to 1918, with this intent unequivocally reaffirmed with the passage of the Endangered Fauna (Interim Protection) Act in 1991. This legislation was specifically in response to the Forestry Commission's logging of a "veritable forest dependent zoo" at Chaelundi, and the judge's finding that an array of endangered species, including the Koala, would be taken, killed, disturbed or injured.

The NSW Parliament has subsequently reaffirmed this desire to protect threatened species on many occasions, most significantly for Koalas with the introduction of State Environmental Planning Policy No. 44 (Koala Habitat Protection) in 1995, which focussed on identifying and zoning core Koala habitat for protection on private lands.

Despite this intent, and the expenditure of millions of dollars of public monies, Koala populations have continued to decline at an accelerating rate with a conservative 26% decline in NSW, and a 50% decline on the North Coast, over the past 15-21 years.

What has gone wrong? This review identifies that the accelerating decline is due to a bureaucratic malaise and often downright hostility to meeting legal obligations for Koala conservation. Across all tenures the intent of the legislation has never been implemented. While Councils fumble and agencies procrastinate, vested interests intervene to maintain their ability to degrade, destroy and clear Koala habitat at their whim.

We have continued to clear and fragment core Koala habitat through land clearing and urban expansion, and have degraded it through logging. And there is no end in sight. As habitat and food trees are cleared and logged the Koala populations are declining and their social systems breaking down. As Koalas attempt to move between the remaining patches of habitat they are suffering increased mortalities due to vehicle collisions and dog attacks. As they become more inbred and stressed they are increasingly vulnerable to diseases.

Declining rainfalls and increasing temperatures due to increasing greenhouse gasses, land clearing and vegetation degradation is compounding these effects by reducing the nutritional quality and moisture content of gum leaves, causing heat stress, aggravating eucalypt dieback, and increasing the frequency and intensity of droughts and bushfires.

It is still possible to stabilise and enhance Koala populations if we stop clearing and degrading their habitat and start repairing it.

If there is a genuine desire to stop the slide of NSWs Koalas into extinction then the primary requirement is for the current NSW Premier to direct her Ministers and their agencies to implement the intent of current legislation. We don't need to reinvent the wheel, we just need to make what we have work better.

She needs to direct that the agencies immediately identify and protect remaining core Koala habitat and habitat linkages across all tenures. This will require the allocation of significant resources to undertake the required mapping of core Koala habitat and to provide financial incentives to private landowners to conserve core Koala habitat in perpetuity. There is also a need to rehabilitate degraded habitat and to replant essential habitat linkages.

Core Koala habitat on public lands should be added to the reserve system.

A precautionary approach requires that potential Koala habitat be protected and that any proposal to clear or log it be subject to independent scrutiny and only approved if it will not result in a significant impact on the local Koala population.

SUMMARY

1. IDENTIFYING CORE KOALA HABITAT

1.1. Tree Species

Tree species are the primary determinant of Koala habitat. It is apparent that Koalas have localised preferences for particular species of eucalypts and that use of a species varies across the landscape. Past attempts to create definitive lists of feed trees for planning and regulation have invariably excluded regionally significant feed trees. Which means that key food resources often remain unrecognised and unprotected. While it is necessary to highlight known feed species, preferably on a regional basis, it is essential to always allow for new species found to be significant feed trees regionally to be added. This must include non-eucalypts in regions where they are known to be significant food sources (i.e. Forest Oak around Coffs Harbour).

It is also important to recognise that Koalas often have requirements for other species, including small understorey trees, for resting, particularly in extreme weather events. These also need to be identified and protected on a regional basis.

1.2. Tree Size

It is apparent that Koalas have a distinct preference for larger trees and this is a key determinant of habitat suitability. While this has been recognised for a long time, unfortunately for political/financial reasons this is often ignored in habitat assessments and planning processes. This has major ramifications for habitat protection as the failure to account for tree size allows suboptimal trees to be retained as feed trees and is likely to be a principal reason for the failure of habitat models to reflect Koala's current distribution. It also has significant ramifications for offsetting as it is often not recognised and accounted for that it takes decades before planted trees become suitable habitat.

1.3. Water

It is apparent that water availability is a key resource limitation for Koalas during dry periods and droughts. While this most apparent in the drier parts of the Koala's range it is likely to be a key factor during prolonged dry periods even in higher rainfall areas. Soil and foliar moisture are thus key determinants of core Koala habitat and climatic refuges that will become increasingly important as climate change progresses and periods of low rainfall become more frequent.

1.4. Climate Change

Climate change is having significant impacts on Koala habitat and that these impacts will be amplified into the future. It is essential that the impacts of climate change be taken into account in identifying the Koala habitat of the future. Key refuge areas need to be identified and provided with the highest level of protection.

1.5. Nutrition

There is evidence that soil and foliar nutrient levels affect Koala distribution though there are claims that observed relationships may be affected by confounding influences such as soil moisture and tree size. Soil and foliar nutrients may establish habitable limits, influence the use of preferred species, have effects on the quality of habitat and the use of individual trees.

1.6. Leaf toxins

There is evidence that leaf toxins are likely to influence Koala's choice of preferred feed trees and affect Koala usage of individual trees, though aside for species preference and rendering some individuals unpalatable, its influence on the distribution of Koalas remains equivocal.

1.7. Identifying Core Koala Habitat

The current planning focus on core Koala habitat for protection is supported. If Koalas are to be given a future it is essential that areas of "land with a resident population of koalas", and high quality habitat with evidence of an historical presence, are given the highest protection. This is evidenced by attributes such as recent sightings OR evidence of Koala presence (i.e. scats, distinctive scratch marks) OR historical records of a population.

As a first step in identification of core Koala habitat it is essential that potential habitat be mapped. Rather than focussing on single Local Government areas there are efficiencies in undertaking habitat mapping on a broader basis, though it is important to limit the scale of each mapping exercise to regions where there are likely to be similar factors affecting Koala distribution in a consistent manner. To improve the accuracy of habitat mapping it is important to improve the compatibility and accuracy of vegetation mapping and to identify and rectify data gaps in Koala records. The need for detailed habitat mapping needs to be balanced with the need to undertake habitat mapping over the Koala's distribution in a reasonable timeframe.

The NSW Government needs to establish a Koala habitat mapping program and commit adequate resources to undertaking the task in a reasonable timeframe. This should focus on undertaking Plant Community Type mapping (where needed) and rapid surveys to identify Koala presence/absence in priority areas and ecosystem types.

Identified potential habitat that is known to be, or likely to be, occupied by Koalas, and high quality habitat considered capable of restoration, should be identified as core Koala habitat.

It is apparent that within potential habitat Koala populations have been affected, and often extirpated, by past disturbances (i.e. logging, fire, drought, predation), disease, social factors or dispersal limitations. Forest structure is a key variable that should be accounted for in identifying currently occupied habitat and the quality of that habitat. Though it needs to be recognised that the recovery of Koalas depends on rehabilitating currently unoccupied high quality habitat and habitat linkages.

Modelling needs to be undertaken to identify key drought refuges and likely future climate change refuges

2. GOVERNMENT THE BIGGEST THREAT TO KOALAS

2.1. Case Studies of Government Mismanagement

2.1.1. Case Study 1: Pine Creek State Forest

In 1995 in response to community concerns NEFA exposed clearfelling by (then) State Forests of NSW of an area of known core Koala habitat in Pine Creek State Forest. A subsequent inspection by NPWS considered *"the evidence of high levels of koala activity is so abundant in the logged compartments that it could not have been missed by anyone genuinely searching for evidence of koalas".* Andrew Smith who had done the fauna assessment for the State Forests' Coffs Harbour Urunga Management Areas EIS, which excluded clearfelling from areas with koalas and koala feed trees under a protocol developed in consultation with the NSW National Parks and Wildlife Service, described it as "*the most destructive and intensive clearfelling that I have ever observed in a State Forest in northern NSW"*. When as part of the 1997 *Pine Creek Koala Plan of Management* Smith put forward management recommendations "*for integration of koala conservation and wood"* in the forest they were attacked and rejected by State Forests.

The Forestry Corporation's refusal to implement agreements with the NPWS, and commitments of their own EIS, to survey for Koalas ahead of clearfelling operations in Pine Creek State Forest in 1995, and the subsequent clearing of Koala habitat, is testimony to the long-term nature of the organisation's contempt for the conservation of Koalas in NSW. Their subsequent refusal in 1997 to accept expert recommendations to modify their logging practices to reduce impacts on Koalas exemplifies the Forestry Corporation's blind obsession with obtaining timber irrespective of the environmental cost.

2.1.2. Case Study 2: Royal Camp State Forest

In 2012 when the Forestry Corporation were two-thirds through logging 3 compartments in Royal Camp State Forest, a limited survey by NEFA identified a Koala High Use Area (HUA) actively being logged, with four others proposed for logging. We forced the logging to stop with both the EPA and Forestry Corporation confirming the Koala HUAs we had identified and the EPA identifying that 61 trees had been logged and 405m of snig tracks constructed within the Koala HUA. Logginf resumed nearby a few days later and NEFA again identified that a Koala HUA had been logged, the EPA confirmed that 7 trees were logged and 230m of snig tracks constructed within this Koala HUA. Logging contined and NEFA again identified a Koala HUA was longed - the EPA failed to investigate. When the Forestry Corpration proposed to start logging another part of the forest where they said there were "nil" Koalas, a brief survey by NEFA identified 2 Koala HUAs in the proposed logging area, finding more on later occasions. Numerous other breaches were reported to the EPA, most of which they refused to investigate. The EPA issued the Forestry Corporation with 3 fines, totalling $900 for just the first Koala HUA.

It is evident that Royal Camp and Carwong State Forests support a breeding population of Koalas with abundant scats clearly showing their presence. The failure of the Forestry Corporation in 2012 to find any Koala scats and identify any Koala High Use Areas in Compartment 15 of Royal Camp SF, despite claiming to have undertaken the legally required searches, clearly demonstrates their

ongoing intentional failure to identify and protect Koalas on State forests. That logging of Koala High Use Areas continued in compartment 16 after NEFA had exposed the problem, and while the EPA were auditing compartment 15, is testimony to the Forestry Corporation's contempt for their legal obligations to protect Koalas. The Forestry Corporation's lack of remorse or contrition, and a refusal to improve their practices, exemplifies a total disregard for Koala conservation.

The evidence now clearly proves that Royal Camp and Carwong State Forests support a State significant population of Koalas that should be protected in their entirety if the NSW Government has any genuine intent to arrest the decline of Koalas in NSW. The proposed Sandy Creek National Park is a litmus test of the NSW Government's commitment to Koala survival.

2.1.3. Case Study 3: Whian Whian private forestry.

The private property at Whian Whian contains a breeding colony of Koalas and is undoubtedly high quality core Koala habitat. In 2013 the Forestry Corporation commenced logging, generating strong community opposition from their heavy handed approach. Where the Forestry Corporation identified two Koala high use trees, NEFA and the community identified 26 Koala high use trees, along with two Endangered species, eight other Vulnerable species and the Endangered Ecological Community Lowland Subtropical Rainforest, most of which required protection under the Private Native Forestry Code of Practice.

The logging operations undertaken by a Government corporation on private land at Whian Whian clearly demonstrate that the PNF Code of Practice provides no meaningful protection for any threatened species, including Koalas, on private land. It also clearly demonstrates the abject refusal of the Forestry Corporation to identify and protect threatened species, including Koalas, even when required to by explicit legal obligations. There is no will to avoid or minimise impacts on threatened species.

The Forestry Corporation's construction of an illegal road through what should have been 20m exclusion zones for 3 Koala high use trees, 7 endangered Slender Marsdenia, 12 vulnerable Arrow-head Vines, and 8 vulnerable Red Bopple Nuts, most of which had been identified by the Forestry Corporation and the EPA proves that they are willing to intentionally flout threatened species laws. They did not even bother to mark the required buffers in the forest prior to track construction, and the EPA did not ask the Forestry Corporation to meet this legal requirement. The fact that the EPA knew the Forestry Corporation were about to construct an illegal road and did not try to stop them, is indicative of a captured regulator, as are their token last minute fines that expired before they took effect.

2.1.4. Case Study 4: West Byron urban development

To the west of Byron Bay there are patches of core Koala habitat in a matrix of wetlands, urban areas, farmlands and music festival sites. An isolated population totalling some 240 Koalas has a tenuous hold on survival, having to disperse through tourist resorts, past urban areas and across the main road into town in order to access the small patches of habitat essential for maintaining a viable population. In 2009 the NSW Government took over control of a site proposed for the largest single urban development in Byron Shire's history right in the middle of the Koala corridor. The development site contains small patches of occupied core Koala habitat that are vital stepping stones for the dispersal of Koalas to the north and south of Byron Bay.

Bureaucrats in the Department of Planning were entrusted with the survival of Byron Bay's Koalas. They then proceeded to do everything they could to approve the development. They accepted the proponents claims without question, ignoring planning guidelines, expert advice, a draft Comprehensive Koala Plan of Management and strong community opposition. They did not bother to seek independent expert advice, and at one stage were not even proposing that a Koala PoM should be prepared at a later stage. The outcome was to rezone 42% of the 6.9ha of core Koala habitat on the site for housing, another 31% was included in an E3 zone with a long list of allowable uses, and large areas around and up to the edge of the remaining core Koala habitat were zoned for medium density housing. Their draft Development Control Plan also proposed a network of roads and tracks around and through the core Koala habitat. Council is now in the process of finalising the DCP for the site. It is only after this is done that the developer will then be required to prepare their own Koala Plan of Management. There is something very wrong with a process that leaves the preparation of a Koala Plan of Management up to the last step after much of the damage is done by ignorant bureaucrats, and then lets the developer prepare their own.

2.1.5. Case Study 5: Bluesfest

The use of a property known to have a significant Koala population at Tyagarah, near Byron Bay, for holding an annual 5 day Blues Festival for 20,000 people (Bluesfest) was approved in 2009 for a trial period until 2012. A site-specific Koala Plan of Management (IKPoM) was approved with the Department of Planning requiring a further program of koala habitat assessment and monitoring of individual koalas on the site through radio-tracking. The first festival was held in 2010 and the results of Koala monitoring showed at least four of the six koalas showed aversive behaviour (leaving their home ranges or retreating to the edge of their ranges away from the music), and 6 of 11 dying (some from the stress of capture). On the second monitoring in 2012 there was an overall population decline, only one recapture, 4 of 7 Koalas died, and a number of koalas showed aversive movements. On the third monitoring in 2013 there was a further population decline, there were no recaptures, 3 of 6 Koalas died and a number of koalas showed aversive movements.

The evidence is that core habitat has been converted into sink habit with high mortality and a declining population. The first consultant to Bluesfest expressed alarm at the aversive behaviour and high death rate, in part due to the capture process. Subsequent consultants attacked his credibility and ignored their own results by claiming there is no significant or lasting impacts. Despite the concerning results, in 2011 Bluesfest was given permanent approval. In 2014 Bluesfest applied to be allowed to increase their number of festival days from 5 to 20 with an unlimited number of smaller events.

Despite their required monitoring revealing a declining population and high mortalities (in part due to the monitoring), undeterred, in February 2014 DoPI gave approval for a revised KPoM based on a fourfold increase in large events and unlimited smaller events, subject to yet more monitoring, this time aimed at reducing compensatory habitat. Advice to avoid more events in the breeding season, along with other mitigation measures, were ignored.

This is a rare example of monitoring actually being undertaken, though the alarming results appear to have had no effect on outcomes, aside from apparently increasing Koala mortality. While the department was provided with differing interpretations from experts, they appear incapable of undertaking an independent evaluation, instead uncritically adopting the proponents position.

2.1.6. Case Study 6: Coffs Harbour CKPoM core Koala habitat.

in 1999 the NPWS assisted Coffs Harbour City Council to prepare the first Comprehensive Koala Plan of Management in NSW, and the only one to identify core Koala habitat across a Local Government Area in accordance with SEPP 44. The Department of Urban Affairs and Planning assisted with its preparation and apparently ratified it in 2000, and Council incorporated it into their LEP. Some core Koala habitat was subsequently cleared, and it likely that some was logged while NPWS and DLWC turned a blind eye. With the adoption of the PNF Code of Practice in 2007, which expressly prohibited logging in core Koala habitat, DECCW began systematically approving logging of core Koala habitat in the Coffs Harbour LGA, with 2,000 of the 19,000 ha of identified core Koala habitat approved by 2010. When DECCW was publicly challenged in 2011 they said the Coffs Harbour CKPoM was not officially gazetted and *"The only solution would be for either DECCW to change their code of practice or the council to change their Local Environment Plan".*

DECCW approved logging of core Koala habitat in contravention of a CKPoM they (as NPWS) had prepared, and when caught out they claimed their plan was not legal. There was no contrition and apparently no consequences for those responsible.

2.2. Regulating Public Forestry

The Forestry Corporation's basic management response to Koalas used to be that if you see a Koala in a tree, wait for it to move before logging its tree. Over the 25 years since threatened species legislation was implemented to protect the Koala from logging operations there has been no meaningful change, except that Koala populations on State Forests have dramatically declined while the EPA turn a blind eye. It took until 1997 for the first logging prescription for Koalas to be implemented across logging operations, and it was written by the Forestry Corporation. Protection for Koalas was significantly reduced in 1999 with the adoption of the current Threatened Species Licence, which also removed the need to monitor the effectiveness of the prescription. It was left up to NEFA to expose in 2012 at Royal Camp State Forest that for 15 years the Forestry Corporation had not been undertaking adequate searches for Koalas and protecting core Koala habitat. For a few months after this the EPA belatedly attempted to enforce the Koala prescription, though at the behest of the Forestry Corporation they quickly desisted and supported the Forestry Corporation's proposal to remove the need for Koala scat surveys and the protection of Koala High Use Areas. If the Government Agencies are successful, soon they will abandon the pretence that they are doing anything to protect Koalas.

It is self-evident that if the NSW Government has a genuine intention to stop and reverse the ongoing decline of Koalas it needs to initiate a moratorium on any further clearing or logging of potential Koala habitat on both public and private land, while:

1. undertaking rapid systematic surveys for Koalas on a metapopulation basis to identify extant populations, identify likely core habitat, better define regional food preferences, and refine predictive models on a metapopulation basis.
2. only allowing site specific proposals for logging or clearing of potential Koala habitat to occur where they have been subject to surveys by competent professionals applying, at least in part, repeatable methodologies, and reviews by independent experts
3. ensuring core Koala habitat is identified and protected
4. ensuring potential Koala habitat and corridors are identified and subject to retention and restoration of adequate food trees.

2.3. Regulating Private Forestry

The Endangered Fauna (Interim Protection) Act put it beyond doubt in 1991 that Koalas were required to be protected in Private Native Forestry operations, there followed a long period of inaction on behalf of Government agencies while PNF continued unabated. When SEPP 46 was introduced in 1995 it included an exemption for PNF (outside 'protected lands') that was carried over into the Native Vegetation Conservation Act in 1997 and resulted in all PNF operations (outside 'protected lands') being undertaken without any constraints to protect threatened fauna, including Koalas, because DLWC chose to ignore sustainability and threatened species (including Koala) requirements.

In 1998 DLWC developed best management principles for logging, which were replaced with "*Interim Guidelines, A Guide to Managing Private Native Forests in North-east NSW*" in 2000. These made no mention of Koalas and had no requirements to identify or protect Koalas in any way. The application of these was still effectively limited to 'protected lands'. It wasn't until 2007 that PNF Code of Practices that made mention of Koalas were introduced and applied to all PNF logging operations. The Department of Environment and Climate Change was put in charge of the implementation of the Code though the DLWC staff who had been responsible for lax regulation for years were transferred to implement it.

After 16 years of obfuscation and delay since the legal requirement was identified, there was finally some protection for Koalas in PNF operations, though this was mostly theoretical. The prescription established a need for the retention of 15 potential feed trees (30cm dbh) per hectare where there is evidence of Koalas, and set a high threshold (finding 20 scats) for the establishment of exclusion zones around specific trees being used by Koalas. Though, as intended, as there are few existing records of Koalas on private lands and no requirements in the PNF Code to survey for Koalas, the prescription is likely to have achieved very little in practice, as exemplified by the contempt for Koalas displayed by the Forestry Corporation and EPA at Whian Whian. There is still no meaningful protection for Koalas on private lands subject to logging.

As with public forestry, for decades regulatory agencies have refused repeated requests from a diverse range of stakeholders and experts to monitor the effects of PNF on Koalas in order to assess and improve the effectiveness of prescriptions.

The veil of secrecy surrounding private property logging hinders public accountability and encourages lax enforcement by captured regulatory agencies. The glimpses we have had of the regulator's performance since 2007 reveal numerous transgressions including approving thousands of hectares of core Koala habitat identified in a KPoM for logging, wrongly remapping thousands of hectares of oldgrowth for logging, wrongly remapping critically endangered lowland rainforest for roading, and turning a blind eye while a road was pushed through exclusions areas for Koalas and threatened plants.

If the Government is serious about the survival of Koalas then meaningful measures need to be applied to stop the open-season on Koalas on private properties. This must apply a precautionary approach, involving:

- Placing a moratorium on clearing or logging of potential Koala habitat on private land until core Koala habitat and habitat linkages are identified;
- A prohibition on clearing or logging of core Koala habitat;

- Provision of incentives to private property owners who agree to provide permanent protection to core Koala habitat;
- Adoption of precautionary prescriptions in potential Koala habitat and habitat linkages that require the retention and restoration of multi age forests and mature feed trees.
- Subjecting prescriptions to scientific scrutiny and monitoring to assess their effectiveness and identify needed improvements.
- Greater transparency and public scrutiny.

2.4. SEPP 44

There needs to be allowance for flexibility in SEPP 44 to vary the identification of potential and core Koala habitat where this is justified in local Koala habitat studies.

2.4.1. Individual Koala Plans of Management

If the intent of SEPP 44 is to be achieved it is essential that when development is proposed that affects potential or known core Koala habitat or movement corridors that the impact on Koalas is considered and mitigated at the very first step in the planning process (i.e. masterplan and rezoning stage).

The excuse of leaving consideration of Koalas up to a future process, such as a site specific KPoM, has been proven to fail as it allows significant destruction of core Koala habitat and degradation of Koala corridors to occur before the impacts and mitigation measures are considered. Similarly approving a development subject to monitoring of impacts is a furphy as DoPE have proven they ignore the outcomes, though most significantly they are unwilling to limit activities once they are approved irrespective of the results of monitoring. It is also apparent that once a development is approved then often 'development creep' occurs where variations are used to increase the scale and impact of the development. It is the death of a thousand cuts.

It is essential that an independent body with ecological expertise review conflicting advices and expert recommendations. It is apparent that DoPE have neither the will nor the ability to do this. Such a body needs to identify monitoring needs, review outcomes, and make recommendations for improvements.

The need to comply with the aims of SEPP 44 must be expanded to apply to Councils, Planning Panels, Government agencies, Ministers and other approval bodies when making land-use decisions. It is essential that potential and core Koala habitat be required to take in to account when approving any land use or activity that may have a significant detrimental impact on Koalas.

2.4.2. Comprehensive Koala Plans of Management

The preparation of Comprehensive Koala Plans of Management in accordance with SEPP 44 is the most efficient and effective means of identifying potential Koala habitat and habitat links, identifying core Koala Habitat for protection, and detailing appropriate development controls. It is essential that core Koala habitat be identified up-front in the planning process if there is an intent to protect it.

After initial support in preparing the Coffs Harbour City Comprehensive Koala Plan of Management the NSW Government seems to have done everything they can to frustrate the preparation of further plans and stop them fulfilling the goal of identifying and protecting core Koala habitat. It is an indictment of failed Government policy that after 22 years only 4 CKPoMs have been prepared and

that the only core Koala habitat identified is in the Coffs Harbour LGA, with two small areas near Kempsey.

It is clear that the only way of ensuring protection of core Koala habitat is to firstly identify it and secondly zone it for environment protection. While this was the clear aim of SEPP 44 it appears that NSW Government agencies, after an initial success, have colluded to obstruct the process and undermine the outcomes.

The NSW Government needs to take on the responsibility of identifying and mapping potential and core Koala habitat, provide clear guidelines for the implementation of SEPP 44 and allocate sufficient resources to assist all local government areas to complete the preparation of finalisation of Comprehensive Koala Plans of Management within 5 years.

2.4.3. Zoning core Koala habitat for protection

The five Northern Councils of Tweed, Byron, Ballina, Lismore and Kyogle encompass identified Australian and world Biodiversity Hotspots, have the most threatened species in NSW, and are identified key refuges for Koalas. The councils went through lengthy processes to fulfil policy and strategy requirements to identify high conservation value native vegetation, including Koala habitat, for inclusion in environmental zones, After the proposed zones had been exhibited in 2012 the Government intervened to delete all environmental zones and environmental clauses from the final LEPs. They were classed as deferred matters, meaning the old zones and old LEPs apply to those areas.

After a prolonged process in 2015 DoPE released criteria that only allow land to be included in Environmental Zones if the "*primary use of the land is considered to be environmental conservation".* This, and the detailed environment information required, effectively prohibits core Koala habitat outside pre-existing E zones from being included *within an environmental protection zone* unless a landowner agrees that they already manage it for conservation. This directly contravenes SEPP 44 and effectively prohibits far north coast Councils from including most core Koala habitat in Environmental zones. So far both Kyogle Shire Council and Lismore City Council have totally abandoned environmental zones, while the others are still trying to work out if anything can be protected. The Government now seems intent on rolling this out across NSW.

Ballina Shire Council's attempts to protect Koala habitat from poorly regulated logging by requiring consent in their LEP was rejected by the DoPE, who will not countenance any alternative means of protecting core koala habitat.

The ability to protect core Koala habitat in the Environmental 2 Zone over private lands needs to be urgently reinstated for Far North Coast Councils, irrespective of a landowner's management intent, and the right to protect it in E2 zones maintained elsewhere in NSW.

3. LOCATING KOALAS

3.1. Koala scats

Koala scat surveys, either manually or with a dog, are clearly the most efficient and effective manner to survey for Koalas to identify tree use over time, areas of occupation and ascertain tree preferences (recognising this could be for either feeding or resting). One problem with the current

IFOA requirements to undertake scat searches is that the searches are left up to poorly trained and reluctant foresters who often have no will to implement the required prescriptions.

It is important to recognise that when limiting the search area to one metre around tree bases and limiting search effort, as currently required by the IFOA, it is plainly wrong to require the identification of 20 Koala scats, rather all that can reasonably be expected to be identified is the presence of scats (and even then this is not a reliable indicator that a Koala has not used the tree). The current TSL requirement to identify 20 Koala scats is ecologically indefensible and sets such a high threshold that it appears designed to minimise protection of Koala habitat.

It also needs to be recognised that some areas of degraded forest have dense infestations of lantana that preclude scat searches and that other survey techniques should be applied in such cases. This should include consideration of use of scat-detection dogs, distinctive scratch marks, and sound surveys.

3.2. Finding Koalas when Logging

The inability for the Forestry Corporation to identify the abundance of scats and Koala High Use Areas in Royal Camp State Forest, despite claiming that they had undertaken adequate surveys in their usual manner, proves that they are both unable and unwilling to undertake the thorough scat surveys necessary to trigger the IFOA protections for Koalas. After a brief attempt to make the Forestry Corporation comply with their legal obligations to undertake thorough scat searches the EPA gave in to their strong objections. Despite the EPA's pretence that enforcement of Koala prescriptions is a compliance priority, this is clearly a sham as the EPA are not enforcing the prescription and have become an advocate of the Forestry Corporation position of abandoning scat searches and the identification and protection of Koala High Use Areas. The EPA's alternative of modelling the identification of core Koala habitat has been proven to be a failure. The only way to identify and protect the most important areas for Koalas is through only requiring the presence of a single scat as a trigger and having surveys by experts independently of the Forestry Corporation.

Contents

1. IDENTIFYING CORE KOALA HABITAT

Core Koala habitat is defined simply as an area of land with a resident population of koalas. If the Government was serious about saving the Koala from extinction they would have protected core Koala habitat decades ago, as was the promise of State Environmental Planning Policy (SEPP) 44 in 1995. It is the key requirement and yet very little progress has been made. The issue of how to identify core Koala habitat is thus fundamental for the protection of Koalas in NSW. The act of actually doing it is the litmus test of the Government's resolve to turn over a new leaf.

Januchowski *et. al.* (2008) recommendations for a fragmented landscape around Ballarat are applicable to most heavily cleared landscapes:

> *If koalas are to be effectively conserved in Ballarat, it is critical to (i) protect remaining core areas of high-quality habitat, including regenerating areas; (ii) protect scattered habitat patches which provide connectivity; and (iii) develop and implement habitat restoration programmes to improve habitat connectivity and enhance opportunities for safe koala movement between habitat patches intersected by main roads.*

Stable populations of Koalas have overlapping home ranges, with a dominant male's range encompassing a number of females. Depending on the habitat quality Koalas have can have widely varying home ranges, from less than a hectare to over 100ha (Moore *et. al.* 2004). More typical of high quality forest areas, for his study area in the Brisbane Ranges National Park (west of Melbourne) Hindell (1984) identified home ranges for males with an average size of 3.14ha (1.3-4.34ha) and for females 2.08ha (1.13-3.42ha).

Habitat quality depends on the availability of high quality food resources. There are various thresholds, including food availability, that make vegetation unsuitable as habitat. In habitats with limited high quality food resources animals require larger areas to forage in, spend more time looking for food, and have low reproductive success, meaning that population persistence depends on immigrants from elsewhere (Norton 1987). Where local reproduction is not sufficient to balance local mortality it is termed sink habitat.

Where high quality food resources are plentiful population densities vary with other factors, such as forest structure, the amount of toxic chemicals that trees produce in their foliage, predation and the constraints of social interactions between individuals and groups of animals (Norton 1987, Moore *et. al.* 2004). When habitats are net exporters of individuals they are termed source habitat. Moore *and Foley* (2000) identify that "*areas containing very high quality foliage might be vital as sources of dispersing animals to maintain populations in surrounding area*s".

Because Koalas have few natural predators, do not have specialised requirements for shelter and do not appear to be limited by interspecific competition, it has been proposed that food availability is the primary natural determinant of koala habitat quality (Moore and Foley 2000). Koalas have localised preferences for certain tree species, and preferences for individual trees, often larger trees with relatively more nutritious and less toxic foliage. They prefer areas with a variety of palatable tree species and may vary species on a seasonal basis. Koalas also utilise other species for shade and shelter.

Preferred feed species can be naturally patchy, though due to clearing and logging habitat is becoming increasingly fragmented, meaning that Koalas are having to move increasing distances through unsuitable habitat to find food and maintain social interactions. They are thus more

vulnerable to predation by dingos or dogs, and in more built-up areas vehicle strikes. This also makes them more susceptible to stress and disease. Davies *et. al.* (2014) identify:

> *Wildlife species have a physiological response to changes in habitat resources and environmental conditions, reflected by variations in stress hormone levels ... Sources of stress include biotic factors (predation, competition, social dynamics), extremes in physical factors (temperature, salinity) and climatic factors (drought, storms) ... Stressors can impact on both physical and biotic components of an organism's environment and, depending on their pervasiveness, magnitude and frequency, can profoundly influence the fitness of individuals via costs to health, reproduction and survival ... Ultimately, stressors can affect population viability, distribution and extinction risk.*

Koalas are primarily reliant on moisture they obtain from leaves, which means that they often retreat to areas with higher soil moisture during dry periods and droughts. This makes them particularly vulnerable to climate change and the increasing frequency and severity of droughts and fires. Climate change will also have increasing effects on leaf nutrients and toxins, reducing their palatability, and the distribution of eucalypts themselves. Irrespective of direct human impacts, Koalas are being increasingly vulnerable to indirect impacts.

This section focuses on some of the variables that influence the quality and suitability of Koala habitat. It is not a comprehensive review, but instead tries to focus on some key aspects that often don't receive enough attention, particularly tree size, and the importance of identifying core habitat. Time constraints also limited the thoroughness of this review.

1.1. Tree Species

Koalas and Greater Gliders feed primarily on eucalypts, and for both Common Brush-tail Possum and Common Ringtail Possum eucalypts can comprise the majority of some animal's diets. The Koala feeds almost exclusively on eucalypt leaves from selected individuals of a limited range of species, predominantly from the eucalypt subgenera *Symphyomyrtus*, which contains roughly 500 species (mainly gums, ironbarks and boxes). Their diet has been described as 'seemingly inhospitable', with Cork *et. al.* (1983) commenting:

> *... it is not only low in protein and high in cell-wall (fibre) content but also contains essential oils, which are potentially toxic, and high levels of tannins, which may reduce the availability of other nutrients*

It is well known that Koalas have local preferences for certain species of eucalypts (Hindell and Lee 1987, Phillips 1990, Lunney et. al. 1999, Moore and Foley 2000, Phillips *et. al.* 2000, Smith 2004, Moore *et. al.* 2004b, DeGabriel *et. al.* 2010, Gow-Carey 2012, Davies *et. al.* 2014,). Across their range, koalas have been observed eating or sitting in 120 different eucalypt species (Phillips 1990). Though they have also been recorded feeding extensively on other species (i.e. Brush Box, Forest Oak) at some sites (Lunney *et. al.* 1992, Moore and Foley 2000, Smith 2004).

In the Coffs Harbour area Lunney et. al. (1999) identify:

> *Tallowwood Eucalyptus microcorys was identified as the tree species most preferred by koalas in the Coffs Harbour LGA. ... Tallowwood, however, was not the only tree species contributing to the distribution of koalas and to activity levels at survey sites in the LGA. A number of studies have shown that core koala habitat generally contains a primary tree species supported by 2 or 3 secondary species ... Other tree species identified as preferred*

> *trees were Swamp Mahogany E. robusta, Broad-leaved Paperbark Melaleuca quinquenervia, Flooded Gum E. grandis and Blackbutt E. pilularis.*

The importance of Forest Oak for Koalas near Coffs Harbour led Smith (2004) to state:

> *While koalas are occasionally known to feed on non-eucalypt species (Moore and Foley 2000) the presence of Allocasuarina in more scats than all other eucalypts with the exception of tallowwood is exceptional and may indicate an important dietary preference that should be taken into account in conservation planning.*

Koalas have been found to change their food preferences seasonally (Hindell and Lee 1987, Ellis *et. al.* 1995), and in response to droughts. It has been observed that Koalas eat young leaves before mature leaves, but despite this apparent preference for young foliage koalas still eat large amounts of mature foliage once they have eaten the available young foliage (Hindell 1984).

In her study area in south-east NSW Gow-Carey (2012) found that Koalas were not using many of the species outlined in the 'Recovery Plan for the Koala (*Phascolarctos cinereus*)' (DECC 2008) were not being utilised by koalas, noting "*The trees that are being utilised differ substantially to those listed as primary feed trees for the region, highlighting the need for localised assessment of habitat requirements in order to create informed plans of management*".

Phillips *et. al.* (2000) found that *E. robusta* and *E. parramattensis* must be considered as major limiting factors affecting the distribution and abundance of koalas in the Port Stephens area. They note that Drooping Red Gum *E. parramattensis,* has been largely overlooked in studies associated with the tree species preferences of koalas, which they consider may be due to their relatively limited geographic range in eastern Australia, and that the significance of Swamp Mahogany *E. robusta* has frequently been reported as a food tree species for koalas, though often downplayed. Phillips *et. al.* (2000) consider that these species "*highlight the confusion that exists concerning the importance of particular tree species to koalas*", noting:

> *... 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.*
>
> *...*
>
> *We conclude by reiterating that the resolution of issues associated with the identification of significant food trees for koalas has long acted as an impediment to effective conservation and management of the species.*

Though plant species are only one of the factors affecting Koala's selection of trees for feeding as many species occur over a broad range of soil types but may only be preferentially utilised on one soil type. Moore *et. al.* (2004) use the example of populations of koalas residing in habitats derived from either shale or sandstone near Campbelltown, southwest of Sydney, where:

> *Not only were there more koalas in habitats derived from shale, but koalas preferred E. punctata and E. agglomerata when they grew on soils derived from shale but not when they grew on substrates derived from sandstone.*

Food tree diversity in an area has been identified as an important influence on Koala presence (Lunney *et. al.* 1992, Lunney et. al. 1999, Smith 2004, EPA 2016). Smith (2004) found "*koala scat abundance peaked in sites with three or more preferred food trees*", and found that "*koala scats and an average of more than four tree species per scat*", commenting:

> *Food tree diversity may be an important factor in forest habitats because it enables koalas to satisfy their nutritional requirements by selecting different tree species for different essential nutrients (water, protein, energy) and to avoid exceeding toxicity thresholds associated with individual tree species. Koalas are known to avoid tree species, individual trees and tree parts (mature leaves) which are high in toxins and to favour tree species, individual trees and tree parts (new leaf, flower) with high available protein and moisture levels*

In their review of variables affecting Koala distribution, the EPA (2016) found:

> *Limited areas of higher koala activity corresponded with; a higher abundance and diversity of local koala feed trees, ... Overall koala numbers, however, were most abundant in habitat areas with greater than 15% local koala feed trees in the canopy.*

While Koalas may prefer certain eucalypt species for feeding, tree size, water availability, site productivity, foliar nutrients, and foliar toxins all contribute to suitability of an individual tree for Koala food.

It is important to recognise that Koalas use trees for a variety of purposes other than food. They have been found to often use different trees for daytime resting and nighttime feeding (Mathews *et al.* 2007, Ellis *et. al.* 2013). Mathews *et al.* (2007) reported that while over half of daytime koala sightings for Port Stephens on the central coast of New South Wales involved either *E. robusta* or Smoothbarked Apple *Angophora costata*, at night time *E. robusta* and *E. parramattensis* were preferred by koalas for feeding purposes. Ellis *et. al.* 2013 identify that in *"Queensland koalas use various non-food species that provide a cooler microclimate and these trees play a key role in the koala's ability to survive extreme temperatures ... so failure to protect these roost trees is likely to compromise the long-term survival of koalas".*

Briscoe et. al. (2014) found that Koalas use tree trunks for thermo-regulation in hot weather, noting "*Our results are consistent with, and may help explain, previous studies of koalas in more northern populations that found seasonal [18] and weather-dependent differences in tree use, with koalas using non-food trees more frequently during hot days*".

From their review of the use of vegetation mapping to identify Koala habitat, the EPA (2016) found the mapping was too coarse to accurately identify the distribution of feed tree species:

> *The effectiveness of a floristic based habitat mapping approach carries the risk of either missing key habitats or koala occupancy. The accuracy of maps is variable and their development would be costly across the Crown forest estate. Based on the findings of this project, it would be cost prohibitive to undertake a mapping program to identify graded habitat quality classes. Further, a product based solely on plant community types or any other vegetation data layer is too unreliable to protect koala populations, owing to the canopy species variation displayed within vegetation types, and the influence of other factors. In the absence of a guaranteed improvement to the protection of koalas, the use of these methods to develop a graded habitat map for use as a surrogate to identify and protect koala populations is not justified.*

Tree species are the primary determinant of Koala habitat. It is apparent that Koalas have localised preferences for particular species of eucalypts and that use of a species varies across the landscape. Past attempts to create definitive lists of feed trees for planning and regulation have invariably excluded regionally significant feed trees. Which means that key food resources often remain unrecognised and unprotected. While it is necessary to

highlight known feed species, preferably on a regional basis, it is essential to always allow for new species found to be significant feed trees regionally to be added. This must include non-eucalypts in regions where they are known to be significant food sources (i.e. Forest Oak around Coffs Harbour).

It is also important to recognise that Koalas often have requirements for other species, including small understorey trees, for resting, particularly in extreme weather events. These also need to be identified and protected on a regional basis.

1.2. Tree Size

Many studies have identified Koalas preference for larger trees (Hindell and Lee 1987, Lunney *et. al.* 1991, Sullivan *et. al.* 2002, Moore *et. al.* 2004b, Smith 2004, Moore and Foley 2005, EPA 2016). While this has been recognised for a long time it is often ignored as a variable in numerous studies. Tree size has been found to be the most significant variable after tree species in a number of studies, though this seems to be often ignored or downplayed for resource and political reasons.

The relationship between tree trunk diameter and foliage weight is logarithmic (Hindell and Lee 1987). From their 10 year study on Phillip Island Moore and Foley (2005) found that koalas used trees that were on average significantly larger than expected, which they considered "*represent larger food patches and account for a greater proportion of the foliar biomass available to koalas*".

From their study near Melbourne, aside from tree species Hindell and Lee (1987*)* only found a significant correlation with the relative proportion of large trees in each species, stating *"Our data also showed that koalas favoured large trees and forest in which large trees were most abundant, and also showed that large trees occurred where the tree density was lowest. This preference for large trees did not change with season and appeared to be independent of species",* and consider:

> *There was a significant correlation between density of koalas and three of the structural components, the most significant of which was the negative relationship with tree density and small trees (7-19 m high). Thus the blocks with the highest densities of Koalas were those characterised by low tree densities and large trees.*

Size class	***Males***	***Females***	***Non-breeding females***	***Breeding females***	***TOTALS***
0-50	*8.0*	*0.5*	*0.6*	*0.0*	*0.6*
51-100	*2.2*	*0.9*	*1.0*	*0.5*	*1.5*
101-150	*5.2*	*5.5*	*5.8*	*3.8*	*5.5*
151-200	*10.8*	*11.5*	*10.7*	*16.0*	*11.1*
201-250	*17.7*	*17.0*	*17.7*	*13.4*	*16.7*
251-300	*21.2*	*26.3*	*25.2*	*32.1*	*24.1*
301-1100	*41.9*	*38.0*	*34.2*	*39.0*	*40.4*

Table 8(b) from Hindell and Lee (1987): Preference indices of Koalas for each size class of tree (expressed in estimated dry weight of foliage, in kilograms) - by sex and female breeding state.

Hindell and Lee (1987) consider:

> *While the leaves of large trees may have different nutritional properties to the leaves of small trees, it seems more likely that large trees are chosen for some other reason. Large trees have more foliage and consequently may reduce the frequency with which koalas need to move between trees. However, koalas generally move two or three times a night, regardless of the size of the trees they are using (M.Hindell, personal observation). Alternatively,.large*

> *trees may provide more shelter and greater security from predators. Koalas have few means of escaping adverse weather but sometimes seek out dense foliage such as clumps of mistletoe, and these are most frequent in large trees.*

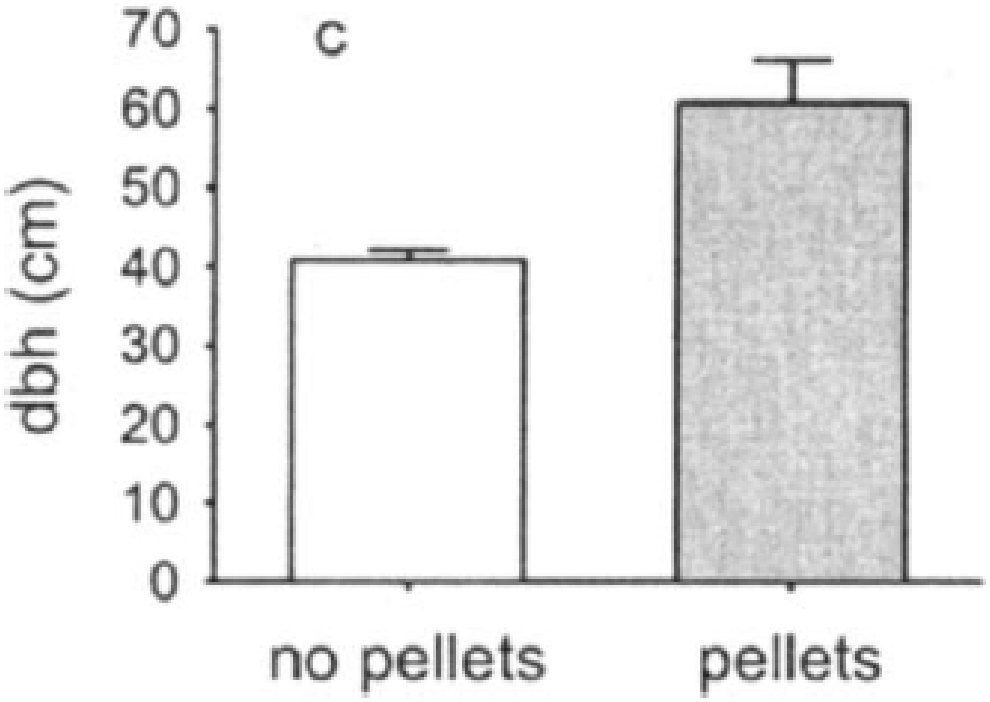
Handasyde and Martin (1991) comment:

> *There is no scientific evidence that Koalas favour disturbed habitat or prefer to feed in eucalypt regrowth forest. The contrary is true. In all of the wild populations we have studied in the past 15 years, the animals have preferred to feed in large mature trees. In our experience koalas rarely feed in saplings or regrowth. When they do, it is usually when mature trees are scarce and the animals are nutritionally stressed.*

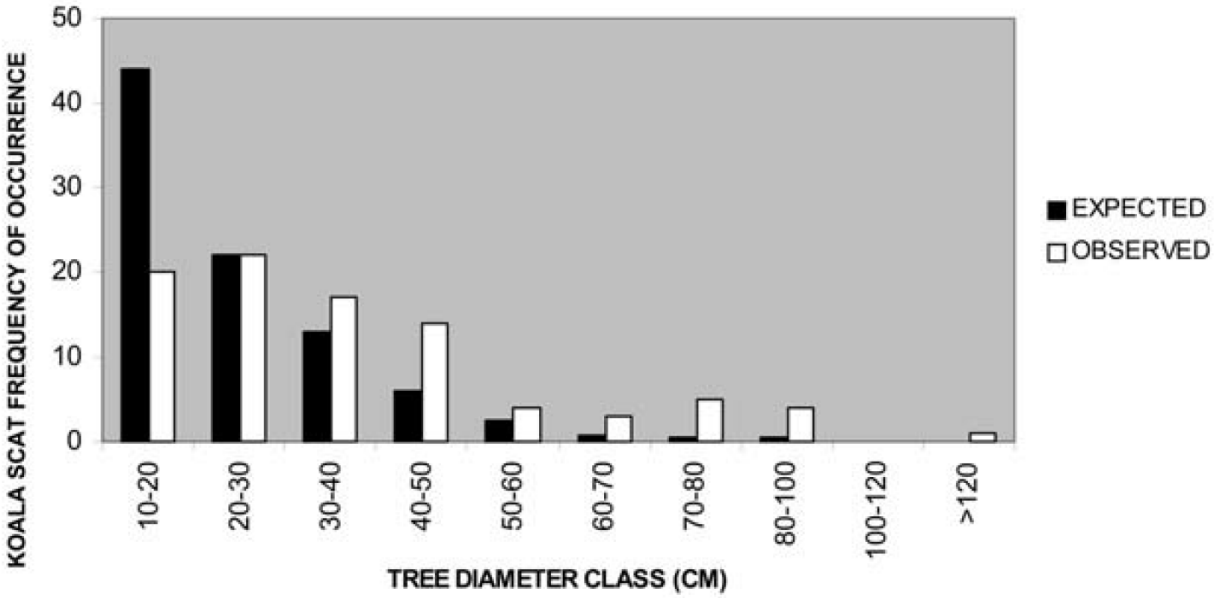
In 1999 the Comprehensive Regional Assessment, undertaken jointly between the Commonwealth and NSW Governments in north-east NSW (Environment Australia 1999), expert workshops unanimously identified a significant threat to Koalas as *"Logging that fails to retain stems in the 30-80 DBH size class".*

Sullivan *et. al.* (2002) note "*Our data suggest that about 100 m^2 (Table 4) is a threshold above which tree use by koalas changes in comparison to trees with smaller canopy areas. On average, the length of tree visitation increases with an increase in tree girth, and this might be an attempt to reduce the energetic cost of moving between trees*"

From their study of Tallowwood in north-east NSW, Moore *et. al.* (2004b) found that tree diameter at breast height (dbh) was one of the best explanatory variables for the presence of koala pellets at a site, finding "*koala pellets were more common under larger, less chemically defended trees*" and noting "*It is well known that free-ranging koalas prefer larger trees*".



Extract from Fig. 12 in Moore *et. al.* (2004b) mean dbh for trees with and without koala pellets.



In his investigations of Koalas in Pine Creek State Forest near Coffs Harbour, Smith (2004) "*identified forest structure to be a key predictor of koala scat density after food tree species and diversity*", noting:

> *Scat abundance differed most significantly (t test p= 0.003) between the structurally uniform regrowth groups (1-3) with a mean of 0.3 trees with scats/site and uneven-aged structurally diverse groups (4-6) with a mean of 1.3 trees with scats/site.,,*
>
> *... The number of trees with scats was significantly correlated with the number of stems in the medium to large size classes (50-60 cm, 60-70 cm and 70-80 cm, Table 2).*
>
> *There were no significant correlations with the number of stems in tree size classes less than 40 cm dbh or greater than 80 cm dbh.*
>
> *Scats occurred more than expected at the base of trees over 30 cm dbh. Significant discrepancies (Chi-square test P< 0.05) were apparent in the 40-50 cm and 10-20 cm dbh classes with the larger stems favoured and the smaller stems avoided. Stems of 60-70, 70-80 and 80-100 were also associated with scats more than expected but these differences could not be statistically validated because of small samples sizes.*
>
> *... There was, however, a highly significant difference between the mean number of trees with scats in non plantation sites (average=1.23 trees per plot) and sites in plantations (average = 0.15 trees per plot*

Figure 3.from Smith (2004): Observed frequency of occurrence of koala scats under trees of different sizes compared with expected frequency assuming that trees are selected in direct proportion to numbers present in the forest. It is worth noting that while Smith found no significant relationship with the largest trees because of their low numbers, there is an apparent increasing usage with size.

Smith (2004) conjectured that this preference for larger trees "*may be at least partially related to the energetics of climbing ...koalas can be expected to select individual trees which are either easy to climb or closely spaced within jumping reach. Koalas may also prefer larger trees because they provide larger branches or forks for day and night time sleeping*". He concludes:

> *I suggest that dense uneven-aged forest structure enhances foraging efficiency by providing greater access to eucalypt foliage. Koalas are unable to support themselves on the fine*

> *outer branches of trees because of their large body mass and they must reach out and pull small, outer branches toward them while seated on a nearby larger branch or trunk. This mode of feeding should be favoured in uneven aged forests with a complex structure and multiple foliage layers between the ground and canopy levels. Plantations with small diameter trunks, fine outer branches and a single exterior foliage canopy layer, and recently logged forests with a low basal area offer the least efficient foraging structure.*

The NSW Recovery Plan for the Koala (DECCW 2008) identifies that Koalas have been found to have a preference for larger mature trees of specific species, stating:

> *Smith and Andrews (1997) found that koala activity was greater in structurally diverse forest with the majority of trees 50–80 cm diameter at breast height (dbh). White (1999) found that koalas preferentially utilise trees between 25.5–80 cm dbh, with under-utilisation of trees less than 25.5 cm dbh. Lunney et al. (2000a) found that the koalas in the Coffs Harbour area favoured trees of 50–60 cm dbh and greater than 120 cm dbh".*

As part of a project to map Koala habitat, the EPA (2016) assessed the relationship between Koalas and key variables in 4 State Forests in north-east NSW known to have significant Koala populations. The found usage of preferred species increasing linearly with tree size, noting "*the data demonstrates a strong positive relationship between size class and activity, with highest activity in the largest size class*", concluding that for Koalas:

> *Limited areas of higher koala activity corresponded with; a higher abundance and diversity of local koala feed trees, trees and forest structure of a more mature size class (>30 centimetres and mature forest structure), and areas of least disturbance.*

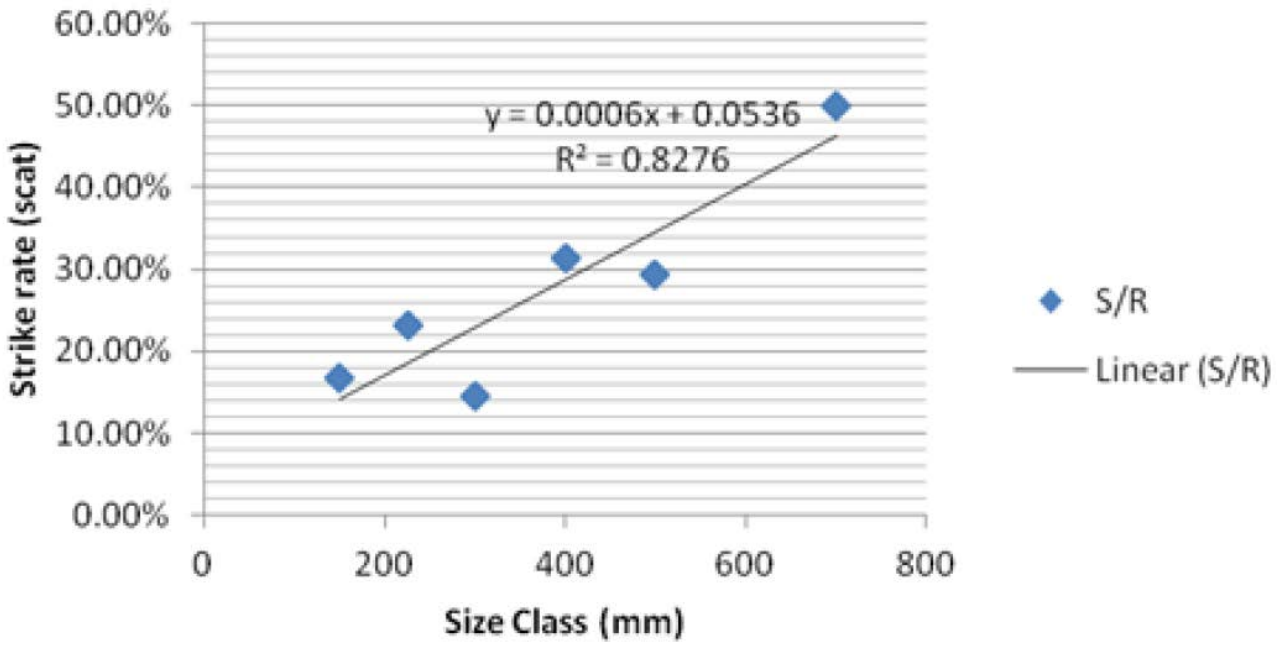


Figure 4 from EPA 2016: Size class of small-fruited grey gum versus scat strike rate

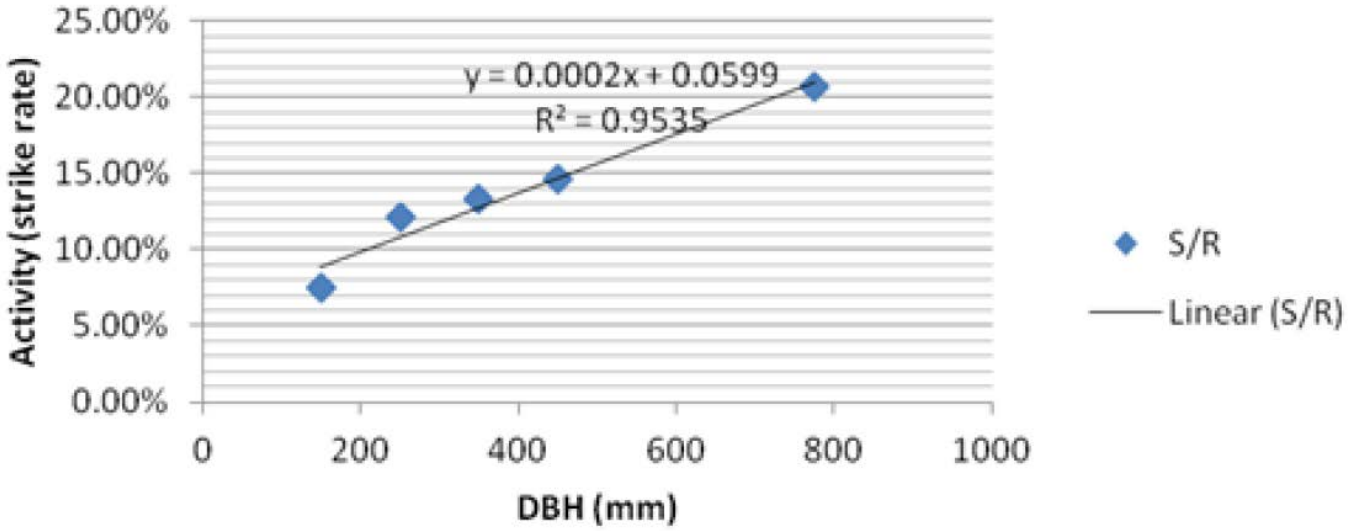


Figure 5 from EPA 2016: Size class of grey box versus scat strike rate

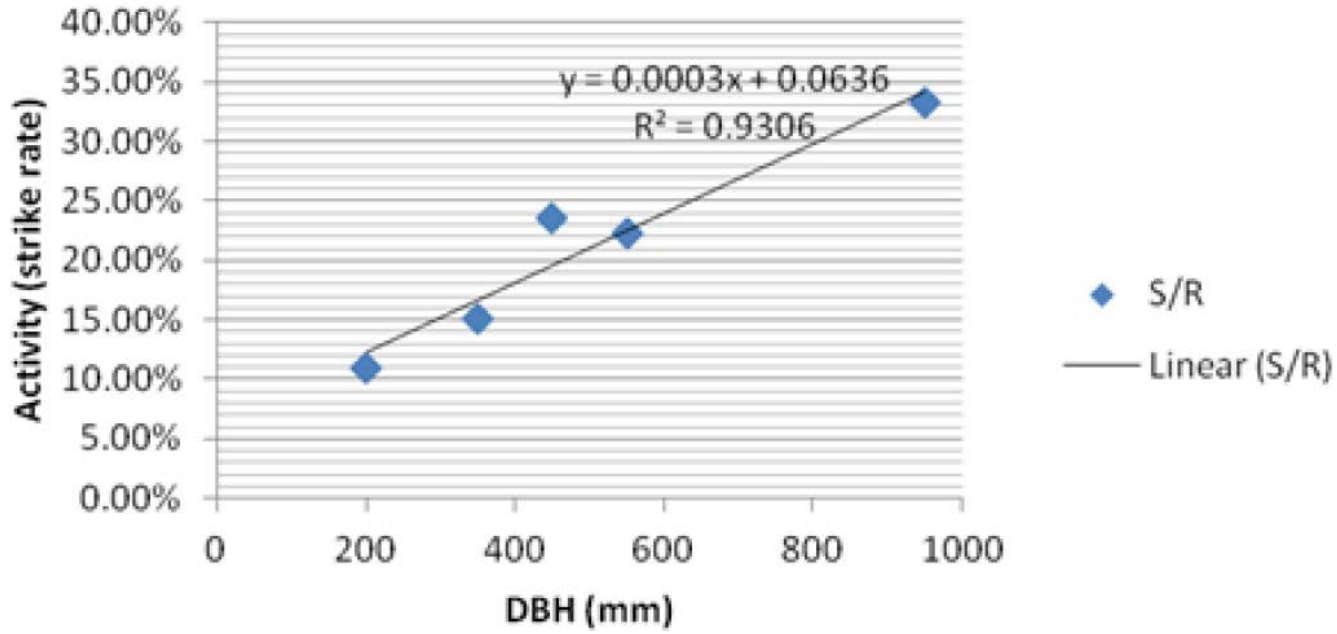


Figure 65 from EPA 2016: Size class of tallowwood versus scat strike rate

The fact that Koalas preferentially select larger trees despite their having increased leaf toxins emphasises that size does matter. Moore and Foley (2005) predicted that trees with high concentrations of the plant secondary metabolite 'formylated phloroglucinol compounds' (FPC) would receive low rates of koala visitation. They found that both Koalas and FPC concentration was positively correlated with tree size, stating "*so by biasing their visits towards larger-than-average trees, koalas were limiting their dietary choices to a subset of trees with higher-than-average FPC concentrations*".

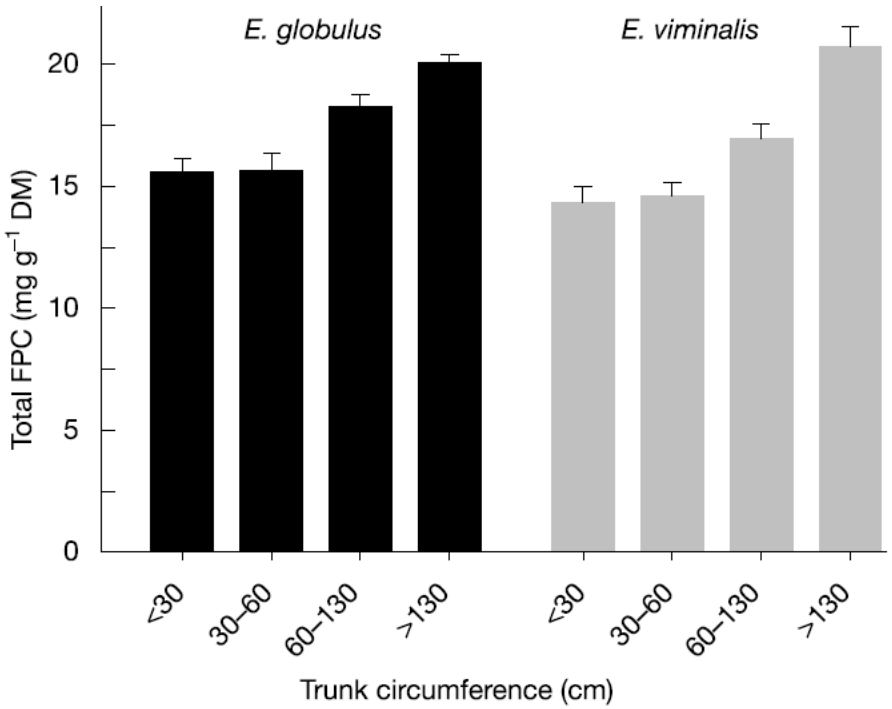


Figure 1 from Moore and Foley (2005): 'formylated phloroglucinol compounds' (FPC) concentrations in four tree size classes. Mean FPC concentrations (with one standard error) in each of four size classes of tree, for E. globulus (black bars) and E. viminalis (grey). DM, dry matter basis.

Briscoe et. al. (2014) found that in hot weather Koalas use tree trunks to cool down, an effect that will be enhanced by tree size, particularly as the effect is related to the extent that the body is in contact with the tree surface, stating "*During hot weather, animals adopted postures with higher surface area exposed ... were more frequently observed with all limbs outstretched and oriented themselves so that they appeared to be hugging the trunks or large lower branches of trees*". They note:

> *During hot weather, koalas enhanced conductive heat loss by seeking out and resting against tree trunks that were substantially cooler than ambient air temperature. Using a biophysical model of heat exchange, we show that this behaviour greatly reduces the amount of heat that must be lost via evaporative cooling, potentially increasing koala survival during extreme heat events. ... Our results highlight the important role of tree trunks as aboveground 'heat sinks', providing cool local microenvironments not only for koalas, but also for all tree-dwelling species.*

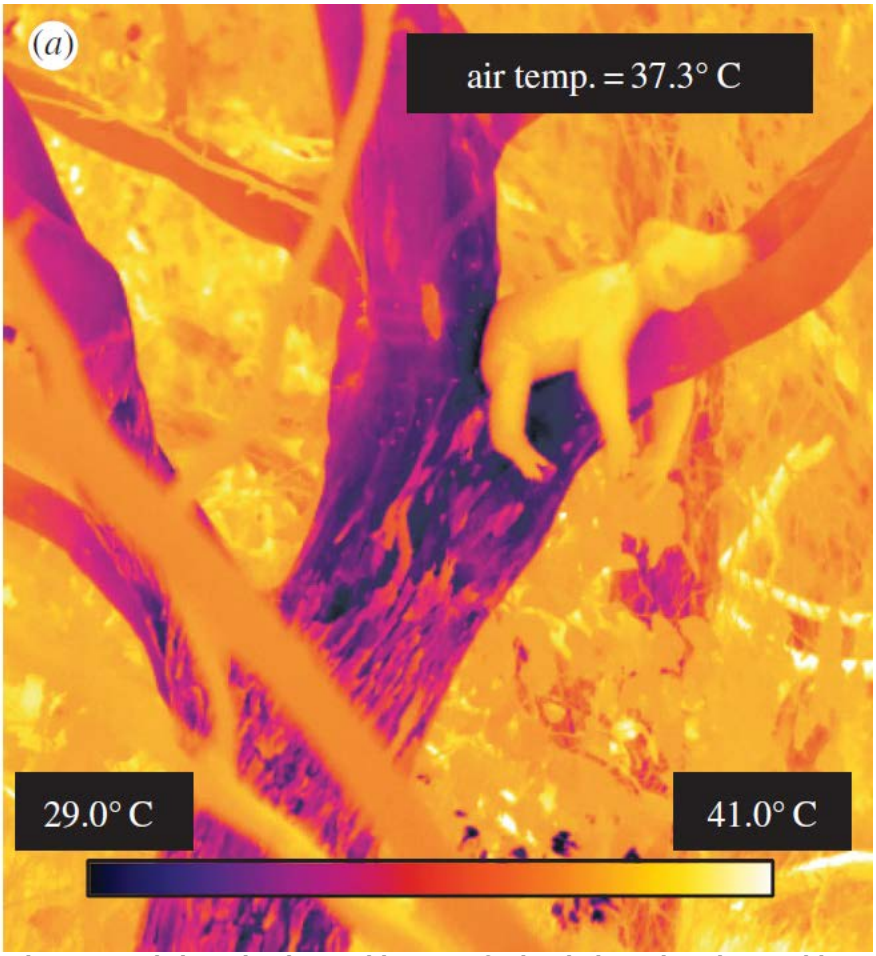


Figure 2(a) from Briscoe et. al. (2014): Thermal image of a koala hugging the cool lower limb of a tree, illustrating a posture typically observed during hot weather

The EPA (2016) also found Koalas had a clear preference for areas with >50% mature and over mature trees in vicinity (p.62) "*Seventy-four per cent (74%) of all activity resides in the high class of structural maturity*". This reinforces Koalas need for larger trees.

Table 30: Koala activity by structure

Row labels	Mature and over mature (>50% of polygon)	Mixed (50:50)	Regeneration (>50% of polygon)	Unassigned	Total
High activity	9	1		1	11
Normal activity	17	5	4	1	27
Low activity	17	2	1		20
Total	43	8	5	2	58
As a percentage	74%	14%	9%		

The EPA (2016) note (p85):

> *The structural component of a forest comprises trees of different size classes, and both size and structural diversity of forests correlates with higher koala occupancy (Lunney et al. 1996; Phillips' 2013; Smith 2004). This study found koala activity correlated with larger tree size classes and mapped mature forest components of the pilot areas. Smith (2004) found forest structure to be a key predictor of koala scat density after food tree species diversity and abundance, where scat abundance was greatest under trees with a diameter at breast height (dbh) of 40–80 centimetres. Phillips' (2013) reports similar preferencing for trees >30 centimetres in low fertility areas.*

As part of a project to map Koala habitat the EPA (2016) assessed the relationship between Koalas and key variables in 4 State Forests in north-east NSW known to have significant Koala populations. They identify that logging has had a significant impact on Koalas, noting for Carwong State Forest (p86):

> *In relative terms, Carwong appeared to be the least disturbed by logging and fire. Having both wildfire and multiple recent logging events absent for approximately 20 years, appears to correlate with overall highest occupancy compared with other pilot areas that have experienced multiple, more recent silviculture treatments. This result aligns with Smith's (2004) findings that koala prefer areas of least disturbance.*

Clouds Creek State Forest was selected as a test area by the EPA because it had the most extensive area of potential high quality habitat, - though it was also found to have been severely degraded by logging, resulting in the finding that "*Clouds Creek State Forest has the lowest overall occupancy with only four resident sites and 21 sites where koalas were present, giving an overall occupancy of just 27%"*. While Koalas are still present, logging appears to have had a significant impact, the EPA noting:

> *From a field based perspective, Clouds Creek appeared to be the most disturbed from logging and fire and the most recently affected. ... The impacts of disturbance events are reflected in the activity data for Clouds Creek, against the context of perceived high quality habitat and potential for moderate to high density population.* (p86)
>
> *Given the SAT results for Clouds Creek and to a lesser extent, Maria River SF, in combination with the degree of habitat disturbance (logging and fire) identified in the field, it would be reasonable to conclude that the high activity areas were sink habitats, as less than 30% total habitat utilisation was recorded, in addition to <5% of resident habitat area recorded.* (p82)

The consultant's report for Cloud's Creek SF *'Koala SAT Pilot Survey and Summary Report– Maria River and Clouds Creek State Forest'* (Fauna Sonics 2015) observed:

> *Discussion with other long term locals within this area and off Blue Rock road indicate anecdotal evidence that koala sightings were much more prevalent 20 years ago and have slowly decreased over that time. ...*
>
> *Having spent considerable time in these State Forests looking for koala activity and trying to access the designated sites; increased management activities that is logging, roading and intensive fire activities appear to be having an effect on koala numbers. ...*
>
> *These logging events not only has an immediate impact on koala habitat but an ongoing and prolonged effect through the regeneration phase of the forest until this can stabilise. A stable state however may not be reached under current forest logging activity which has been on increasing shorter logging cycles as industry pressure on supply continues.*

When NEFA went public with the EPA's findings, claiming they found higher koala activity is "*positively correlated with greater abundance and diversity of local koala feed trees, trees and forest structure of a more mature size class, and areas of least disturbance*", the EPA were reported to have "*categorically denied the statements made by the North Eastern Forestry Alliance (NEFA) about the effects of logging on koalas*", claiming "*there was some misleading information in your stories about koala mapping published last week*" (Bellingen Courier Sun 22 September 2016). When NEFA asked the EPA to identify anything we said that was misleading they were unable to. This contrasts with the Forestry Corporations frequent public lies about the nature and seriousness of offences being investigated by the EPA (ie see Case Study 2 - Royal Camp SF), which the EPA never respond to.

It is apparent that Koalas have a distinct preference for larger trees and this is a key determinant of habitat suitability. While this has been recognised for a long time, unfortunately for political/financial reasons this is often ignored in habitat assessments and planning processes. This has major ramifications for habitat protection as the failure to account for tree size allows suboptimal trees to be retained as feed trees and is likely to be a principal reason for the failure of habitat models to reflect Koala's current distribution. It also has significant ramifications for offsetting as it is often not recognised and accounted for that it takes decades before planted trees become suitable habitat.

1.3. Water

It is evident that foliar moisture availability is important to Koalas in drier areas, and is likely to be a significant influence on Koala's habitat preferences during drought periods in better watered areas.

In arid and semi-arid environments the distribution, density, habitat preferences, home range sizes and physiological stress of koalas are affected either by water availability (including leaf moisture) and/or rainfall with populations declining and contracting to riparian habitats during droughts and heatwaves (Ellis et. al. 1995, Wu *et. al.* 2012, Davies et. al. 2014). Davies *et. al.* (2014) found that Koala's diet "*changed between drought and post-flood conditions, with diets during drought being mainly composed of species with high leaf-moisture content*".

In southwestern Queensland Davies *et. al.* (2014) identify riparian habitats as the primary resource used by koalas "*with evidence of populations declining and contracting to riparian habitats during droughts and heatwaves*", with "*protection and enhancement of riparian and drainage line habitats are vital to the ongoing stability of the population*". Davies *et. al.* (2014) state:

> *Foliar moisture supplies most of the koala's water requirements and it has been proposed that in dry environments, or during drought, water rather than leaf nutrients influences tree selection by koalas ... during drought the dietary composition of the koalas of southwestern Queensland consists of tree species that grow mainly in riparian or drainage line habitats that are known to have high leaf moisture river red gum and coolabah). During post-flood conditions, when the moisture content of tree species in secondary habitat increases, koalas start expanding into secondary habitat and their diet changes to include species that now have higher nutritional value (lower total pheonlics and higher total nitrogen content) (poplar box and possibly ironbark). ... These results support the findings of Smith et al. (2013) that, within a landscape, conservation of both primary and secondary habitat is important for koala populations.*

Davies *et. al.* (2014) found that reduced rainfall (drought) can affect the consumption of some eucalypt species by Koalas.

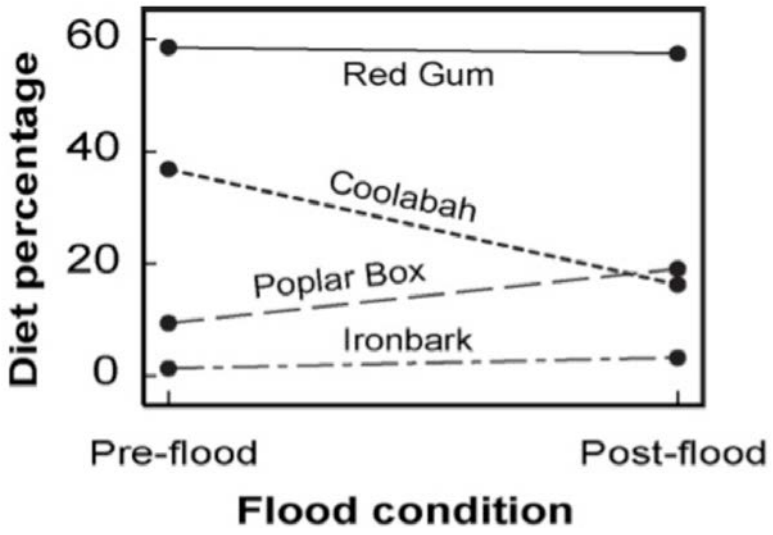


Figure 3 from Davies *et. al.* (2014): The diet percentage as a function of flood condition (pre-flood or post-flood), adjusted for tree composition. All the differences between the pre-flood and post-flood conditions are statistically significant, except for *E. camaldulensis* (Red Gum).

From their study in south-west Queensland Wu *et. al.* (2012) found:

> *Only leaf moisture was significantly correlated with koala food tree species preference. The presence of surface water appears to be a crucial characteristic of suitable koala habitat while riparian habitats dominant by E. camaldulensis are critical for conserving the koala populations in southwest Queensland.*

From their study in central Queensland, Ellis *et. al.* (1995) found "*seasonal changes in diet selection by male koalas reflect increased energy requirements in winter and increased water requirements in summer*", commenting:

> *Leaf-moisture analysis for the selected trees in the present study indicates that koalas do select different tree species between seasons, and that this corresponds with seasonal changes in water flux. ... The leaf moisture analysis undertaken in this study indicates that the characteristics of an individual tree at a particular time of year may be of greater importance to its selection by a koala than its species.*

Moore *et. al.* (2004) consider:

> *The association between dense koala populations and eucalypts growing on fertile soils and gentle topography, especially drainage lines, may be driven as much by water availability as it is by nutrients... In many environments, it may be the case that forests cannot support permanent koala populations without adequate water availability.*

It is apparent that water availability is a key resource limitation for Koalas during dry periods and droughts. While this most apparent in the drier parts of the Koala's range it is likely to be a key factor during prolonged dry periods even in higher rainfall areas. Soil and foliar moisture are thus key determinants of core Koala habitat and climatic refuges that will become increasingly important as climate change progresses and periods of low rainfall become more frequent.

1.4. Climate Change

It is apparent that climate change due to increasing greenhouse gasses, land clearing and degradation of vegetation is already having a significant effect on the distribution of Koalas and that these changes will be amplified in the future.

Davies *et. al.* (2014) consider:

> *Species, particularly folivores, at the trailing edge of their geographical range are likely to be most vulnerable to climate change, through physiological stress and the decline in the nutrient richness of their food sources ...Individuals within such environments probably survive at the limit of their physiological capacity to endure drought and heat. The frequency, intensity and duration of extreme temperatures, drought and humidity may determine survivorship of a species directly, or change habitat quality and resource availability*

DeGabriel *et. al.* (2010) identify that climate change can have significant effects on leaf nutrients and toxins, identifying that "*the body of evidence suggests that foliar N will decline as atmospheric CO2 rises*", commenting:

> *... given the effects of the interaction of foliar nitrogen and tannin concentrations on marsupial reproductive success, predicted climate change could have cascading impacts on the population ecology of marsupial folivores and may ultimately limit their persistence in particular habitats.*

Moore *et. al.* (2004) consider:

> *In the long term, the more pertinent issue of climate change is not so much how it influences leaf chemistry but how it affects the distribution of eucalypt species ... the effect of climate change, especially increasing temperature, fluctuating rainfall and fire, on local habitats may determine the future distribution of eucalypt species and the animals that rely on them.*

Adams-Hosking et. al. (2012) identify the "*likely impacts of climate change will compound the existing threats to koalas of habitat loss and fragmentation that are causing population declines*". From their modelling of the impacts of climate change on Koalas Adams-Hosking et. al. (2012) "*found that mean maximum summer temperature, mean annual rainfall, and distance to water were the most important variables for all the models, with distance to water important in four of the five models*", concluding:

> *The koala and its food trees experienced significant range contractions as climate change progressed, sometimes to regions outside their current distributions. The inland species Eucalyptus camaldulensis and Eucalyptus coolabah contracted from the more arid interior, which is outside the koala range, but persisted in the eastern regions of the koala's range, while Eucalyptus viminalis, Eucalyptus populnea and Eucalyptus tereticornis contracted eastwards and southwards, with a fragmented distribution. The highest probabilities of overlap between koalas and their food trees were identified in fragmented coastal and southern regions of the koala's current range.*

Climate change is having significant impacts on Koala habitat and that these impacts will be amplified into the future. It is essential that the impacts of climate change be taken into account in identifying the Koala habitat of the future. Key refuge areas need to be identified and provided with the highest level of protection.

1.5. Nutrition

Nutrient availability and food quality have been considered to be a primary constraint on the distribution and reproductive success of arboreal marsupials (Braithwaite 1983, Braithwaite *et. al.* 1983, Norton 1987, Moore *et. al.* 2004). From records of 950 animals (no Koalas) observed or collected by logging crews clearfelling forests in the Eden area, Braithwaite (1983) found that abundant populations of arboreal marsupials occurred only on sites with relatively fertile soils, with 63% of the arboreal marsupials occurring in only 9% of the forest area, and none sighted in 52% of the surveyed forest. Braithwaite *et. al.* (1983) summarise *"that the arboreal marsupial fauna responds to a gradient in foliage nutrients, and the maximum densities and diversity of fauna occur in those sections of the Eden forests characterised by eucalypt species with a high concentration of foliage nutrients*". Using benign survey methods for Greater Gliders, Norton (1987) found that within suitable habitat population density was not related to site productivity, but reproductive success was.

Moore *et. al.* (2004) observe that "*it seems widely accepted that "good koala habitat" occurs on fertile soils supporting particular favoured food species*", though identify *" Koala populations of varying density occur on soil types ranging widely in fertility*", partially because "*adaptation in eucalypts can disrupt the link between soil nutrients and koala nutrition*", emphasising "*the conservation of nutrients through nutrient recycling,..allows productive plant communities to exist on soils with very low nutrient concentrations*". They note:

> *parent materials and soil nutrient concentrations affect the growth and distribution of some eucalypt species, but there is ample evidence that climate, elevation and the availability of water are often more important factors*

For his study area Hindell (1984) found no relationship "*between any of the nutritional parameters examined and koala species preferences*".

Foliar nitrogen has been considered the major limiting influence on the abundance of the Koala, though others consider that the concentration of nitrogen itself in most eucalypt foliage should not pose major problems (Moore and Foley 2000). Moore et. al. (2004b) assessed the nitrogen concentration of Tallowwood leaves on sites of different fertilities throughout north-east NSW and found *"that tallowwood trees at low quality sites were not nutrient deficient. Although they possessed lower N concentrations, N content per leaf and per unit leaf area differed only slightly from those at high quality sites*", noting:

> *... populations of trees are less likely to be N-deficient than are individuals. This is because species and provenances of eucalypts possess numerous adaptations to the soils on which they have evolved, matching their nutrient demands to availability. Those that grow on naturally depauperate soils are more efficient in acquiring soil nutrients ..., recycle nutrients more efficiently .., and have genetically constrained low maximal growth rates.*

There have been various studies that have concluded that foliar nitrogen limited Koala populations, yet the evidence is that in many places their preferred feed trees are low in nitrogen (Moore *et. al.* 2004). Moore *et. al.* (2004) state:

> *The conclusion drawn from a substantial body of literature is that concentrations neither of foliar nitrogen nor any other nutrient have ever provided a simple explanation for feeding decisions by marsupial folivores.*

There is evidence that soil and foliar nutrient levels affect Koala distribution though there are claims that observed relationships may be affected by confounding influences such as soil

moisture and tree size. Soil and foliar nutrients may establish habitable limits, influence the use of preferred species, have effects on the quality of habitat and the use of individual trees.

1.6. Leaf toxins

Koalas need to balance nutrient and water intake against plant secondary metabolites. Animals feeding on leaves (folivores) are exposed to wide variation in concentrations and structural diversity of plant secondary metabolites (PSMs). PSMs are chemicals produced by plants that do not play a role in their essential, or primary metabolic processes. Some PSMs in eucalypts act as toxins or anti-feedants which reduce the number of trees that are available for animals to eat, or limit the volume of leaves that can be consumed, whereas others, such as tannins, reduce the availability of nutrients (Moore *et. al.* 2004, DeGabriel *et. al.* 2010). Thus, the nutrient properties of foliage as food is modified by the types and amounts of PSMs in foliage. PSMs can force animals to feed selectively so as to avoid or regulate their intake of these compounds (Moore *et. al.* 2004b).

Terpenes are constituents of essential oils, their strong smell and toxicity to other animals would suggest that they would be toxic to Koalas though this has not been confirmed. At least 30 eucalypt species contain the cyanogenic glycoside, prunasin, which turns into sugar and the potent respiratory toxin hydrogen cyanide when chewed, and has been found to be toxic to Koalas. Phenolics is a large and diverse class of compounds, including tannins, that can comprise over 20% of eucalypt leaves. These include formylated phloroglucinol compounds (FPCs) which Moore *et. al.* (2004) consider "*are arguably the most important PSMs in the interaction between eucalypts and marsupial folivores*".

Folivores rely on general feedback processes to recognise the effects of a huge range of secondary compound structures that are encountered and modify their feeding behaviour accordingly (DeGabriel *et. al.* 2010). Amongst Eucalyptus folivores, there is strong evidence that at least some secondary compounds initiate nausea, leading to reductions in food intake, and likely aversive feeding behaviour using smell and taste cues (DeGabriel *et. al.* 2010). This allows avoidance of individual plants that present a risk of intoxication which will result in lower rates of feeding and a greater risk of death (DeGabriel *et. al.* 2010).

Species of folivores vary in their tolerances to various toxins, and within species populations can have different tolerances (DeGabriel *et. al.* 2010). DeGabriel *et. al.* (2010) identify that the species of marsupials that feed on eucalypt leaves have variable sensitivity to different classes of PSMs which likely "*enables some degree of niche partitioning within the same forest and may potentially influence biodiversity at broader scales*".

Not all individuals of a tree species are equal (Hindell 1984). The concentration of toxins within a species can vary between individuals and significantly affect their palability (Lawler *et. al.* 2000, Moore et. al. 2004, DeGabriel et. al. 2010, Davies et. al. 2014). Moore *et. al.* (2004) identify that one study found a 6-fold range in the concentration of FPCs in the foliage of individual trees within a single eucalypt species. Lawler et. al. (2000) "*observed a* severe *decline in a population of ringtail possums after defoliation resulted in the deaths of suitable individual trees, even though healthy, nutritionally adequate (and strongly herbivore-deterrent) conspecifics remained*". In relation to the toxic 'formylated phloroglucinol compounds', Moore *et. al.* (2004) note:

> *Some individual trees produce foliage with almost no FPCs and are readily eaten by animals. Others resist herbivory by producing foliage with high concentrations of FPCs, while in between is the full spectrum of FPC concentrations.*

Moore *et. al.* (2004) note "*studies with captive animals, and some field studies too, failed to provide evidence that total phenolics affect feeding"*

Moore and Foley (2005) identify that the eucalypt foliage that koalas eat in captivity is inversely related to the plant secondary metabolite 'formylated phloroglucinol compounds' (FPC) concentration, which Moore *et. al.* (2004b) consider the primary determinant of the amount of foliage that marsupials eat from many species", and Moore *et. al.* (2004b) identify as "*arguably the most important PSMs in the interaction between eucalypts and marsupial folivores*". Sideroxylonal is a FPC that can cause nausea in some mammals; and thus can be a highly effective antifeedant. Moore *et. al.* (2004) identify that captive koalas "*still ate some foliage even when it contained up to 50 mg of sideroxylonal per g (equivalent to 5%) of dry matter"*.

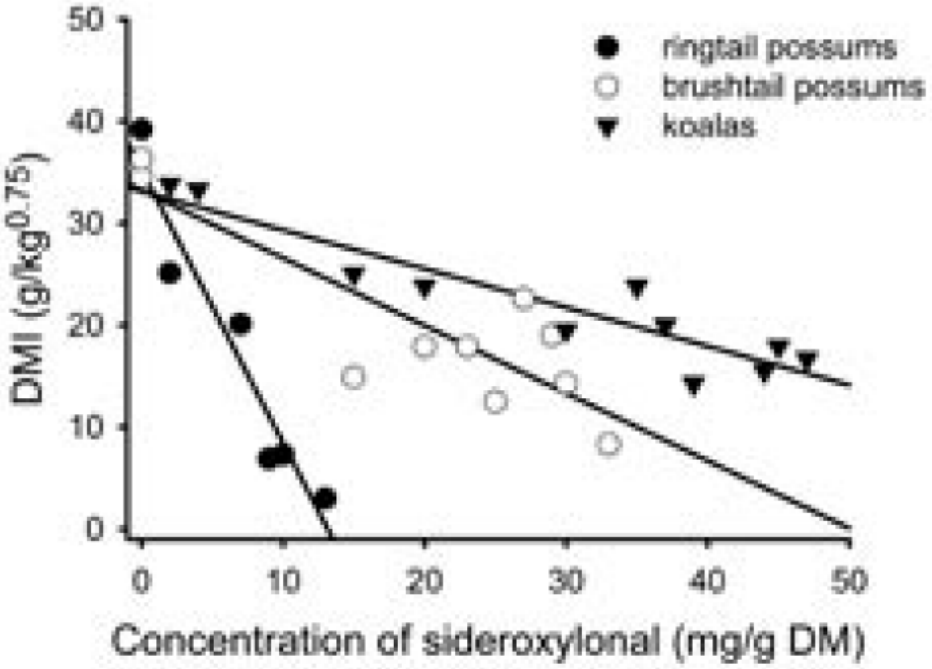


Figure 2 from Moore *et. al.* (2004): The relationship between the dry matter intake (DMI) of *E. melliodora* foliage and its sideroxylonal concentration for koalas, common brushtail possums and common ringtail possums. Body masses (mean ± 1 s.e.): koalas = 6.8 ± 0.9 kg, brushtail possums = 2.0 ± 0.2 kg, ringtail possums = 0.9 ± 0.1 kg. Ringtail possum data from Wiggins and Marsh (unpubl.); brushtail possum data from Wallis *et al.* (2002); koala data from Moore *et al.* (submitted-b).

Moore *et. al.* (2004) report that sideroxylonal concentrations in tallowwood *Eucalyptus microcorys* foliage at 42 sites on the north coast of NSW increased with site productivity, while other PSMs were not affected by this gradient, considering "*sideroxylonal concentrations increased along with the apparent nutritional quality of the foliage, possibly to provide defense against higher rates of herbivory*". Though they note that other investigations have reached variable conclusions, stating "*there is no doubt that the ways in which PSM concentrations vary among eucalypt species and among trees across the environment are many and varied*".

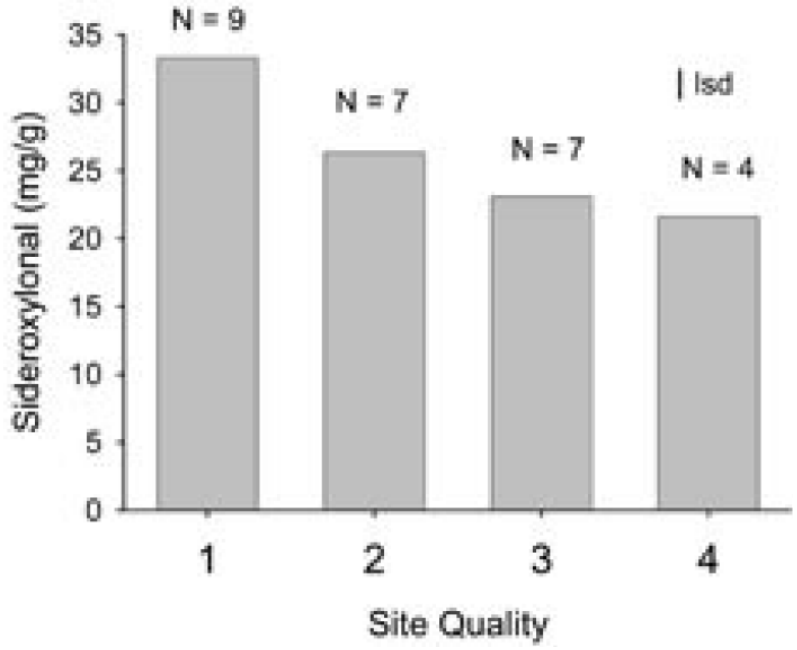


Figure 3. Predicted sideroxylonal concentrations in tallowwood *Eucalyptus microcorys* foliage from a linear mixed model for trees on the north coast of NSW growing at different site quality levels. Site quality is a measure of overall suitability for plant growth, where 1 is the highest quality and 4 the lowest. N = number of sites, lsd = least significant difference. Originally published in Moore *et al.* (submitted-a).

In their study of Tallowwoods in north-east NSW Moore *et. al.* (2004b) found "*those trees with koala faecal pellets at their base were larger than trees without pellets, had significantly lower concentrations of cineole* [eucalyptus oil] *and tended to have lower concentrations of sideroxylonal*". From their long-term field study, Moore and Foley (2005) found that the plant secondary metabolites 'formylated phloroglucinol compounds' (FPC) "*were only effective in reducing koalas' use of the most highly defended trees*".

In their assessment of Tallowwoods throughout north-east NSW Moore *et. al.* (2004b) identified significant variations with tree size and plant secondary metabolites, recommending:

> *... the significant differences that we found in the nutritional quality and level of chemical defense of foliage within a single species must influence habitat quality, and should be incorporated into future habitat models.*

There is evidence that leaf toxins are likely to influence Koala's choice of preferred feed trees and affect Koala usage of individual trees, though aside for species preference and rendering some individuals unpalatable, its influence on the distribution of Koalas remains equivocal.

1.7. Identifying Core Koala Habitat

The identification and protection of occupied core Koala habitat across all land tenures has to be the highest priority if the ongoing decline in Koalas is to be halted. In order to reverse the decline then it is essential that protection be extended to previously occupied high quality habitat, habitat linkages between core habitat, and present and future climate refuges.

SEPP 44 identifies two classes of Koala habitat:

> **"core koala habitat"** means an area of land with a resident population of koalas, evidenced by attributes such as breeding females (that is, females with young) and recent sightings of and historical records of a population.
>
> **"potential koala habitat"** means areas of native vegetation where the trees of the types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component.

The EPA (2014b) told the General Purpose Standing Committee No. 5 'Inquiry into the performance of the NSW Environment Protection Authority' that their intent was to identify and map core koal habitat across public and private lands, stating:

> ***Core koala habitat mapping***
> *The EPA is mapping core koala habitat so that it can be protected at the landscape level. This is intended to replace the existing presence/absence triggers and is a far more effective way of ensuring koalas and their habitat are protected.*
> ***Regulatory improvements to ensure koala protection***
> *As part of the proposed consolidated Coastal IFOA, the EPA and Forestry Corporation have committed to moving to regional koala habitat mapping. As noted above, the EPA has commenced broad-scale mapping of koala habitat. The outcome of this mapping project will be used to inform appropriate conditions, including exclusion zones, the protection of feed trees and other alternative provisions in the consolidated Coastal IFOA.*

Maps of predicted Koala habitat largely rely on forest type mapping, often of limited accuracy, and in the case of Forestry Corporation mapping mostly undertaken in the 1960s for commercial, not habitat, purposes. While such old mapping suffers from the problem of not identifying areas containing Koala feed trees it also fails to account for the significant changes that have occurred due to repeated logging events and silvicultural treatments.

As observed by Smith (2004):

> *During field surveys, I observed a poor correlation between mapped forest types and tree species present, an effect that can be attributed to low topographic relief, uniform climate and a long history of logging (rather than fire) as the principal agent of disturbance and regeneration.*

The NSW plant community type (PCT) classification was developed in 2011 to establish an unambiguous master community-level classification for use in vegetation mapping programs.

In their attempts to identify core Koala habitat the EPA reviewed a number of methodologies based vegetation and modelling. The EPA (2016) assessed predictive mapping based on floristic (Plant Community Type) mapping (3Ai-PCT), Forestry Corporation Research Note 17 forest type mapping (RN 17) and predictive modelling, finding that none were sufficiently reliable, primarily because "*the variability of canopy species present within vegetation types is too great for determining percentage occurrence of feed trees and therefore habitat class at the level of detail required (1:5000 metres) for management in state forests*", noting:

> *Of the three different koala habitat mapping methods trialled, the project found:*
> - ***3Ai-PCT mapping*** *was the most reliable indicator of potential habitat quality at the local management scale. However, it is variable, costly and inadequate at accurately identifying habitat to the degree required for management purposes.*

- ***Reassigned RN 17 types*** *illustrated the least habitat discrimination at the local scale, and may have potential use in determining suitable and unsuitable habitat only.*
- ***Predictive modelled habitat (POC)*** *layer cannot currently identify probability of occurrence with any certainty at the local management scale.*

The EPA's (2016) pilot project was subject to peer review by Andrew Smith, Steve Phillips and Rod Kavanagh, leading the EPA to identify:

> *In reviewing the findings of this project, the expert panel concluded that future work should be directed at determining the known, existing koala distribution and resident population. They recommended that a koala habitat map using the methods assessed can only be used to distinguish suitable habitat from unsuitable habitat. Any landscape scale protection provision attached to such a map would need to be both highly protective and follow precautionary conservation measures to protect both resident koala populations and manage unoccupied habitat to sustain the population into the future.*

In his review of the EPA's (2016) Pilot Mapping Project, Smith (2015) stated:

> *It supports the hypothesis that koala population are limited by unmapped social and or historical disturbance factors (eg fire, disease, hunting, logging and predation) which are not incorporated into predictive landscape and environmental models because they cannot be, or have not been adequately mapped.*
>
> *...*
>
> *The models and mapping can only be reliably used to predict areas of non or unsuitable habitat. All tested models were too inaccurate to predict relative koala abundance within areas of "potential Habitat". Consequently, the determination of primary, secondary, core and refuge habitat will only be possible by undertaking ground surveys of koalas and or scats over repeated time intervals. The best fit model (Baseline Map) was based on the results of actual past koala surveys rather than predictive modelling.*
>
> *...*
>
> *The poor performance of predictive models is consistent with the widely held hypothesis that koalas are frequently absent from areas of good quality "potential" habitat because of past disturbance from disease, hunting, urbanization, drought, fire, predation or other unknown causes. When koala populations are below carrying capacity for these reasons their distribution is likely to reflect aggregation for social or mating purposes as much or more than availability of food trees. This hypothesis is supported by the results of the Pilot Study which found a large number of zero scores in areas of predicted moderate and high potential habitat suitability.*

In his review of the EPA's (2016) Pilot Mapping Project, Phillips (2015) stated:

> *I suspect there may have been an underlying assumption/ expectation that koala activity would be associated with higher quality habitat areas such that high habitat quality = high probability of occupancy. However, this is rarely the case because other factors such as fire history/intensity and logging history/intensity, as well as koala sociobiology will need to be considered.*
>
> *...*
>
> *note that the question of what is being protected has also been raised. I would have thought that this was a question that should not have required an answer when surely the most important thing to protect are remaining areas of habitat that are currently supporting*

> *resident koala populations. This consideration remains independent of the issue of habitat quality and so should be the primary objective of management.*
> *...*
> *The modified map is only model that has application in a theoretical/probabilistic/spatial context. As such it is at best indicative and should only be used – as with PCT/RN17 mapping and habitat classification processes - as a potential trigger identifying the need for further survey work ...*

In his review of the EPA's (2016) Pilot Mapping Project, Kavanagh (2015) stated:

> *In summary, each of the above mapping products developed for this project were incapable of accurately identifying the locations of core Koala habitat, or concentrations of the Koala, at the scale (e.g. logging coupe) required to manage them without recourse to further on-ground surveys. However, each of the mapping products was capable of identifying broad areas (e.g. 5 km grid square in northern NSW) within which Koala habitat was likely to occur.*
> ***...***
> *Other potentially important predictor variables, including disturbance history (e.g. logging, wildfire), were not mapped uniformly across the region and so were not included in any models.*
> *...*
> *In conclusion, the mapped products developed in this study, including the snapshot (once only) surveys conducted in this pilot project, are unlikely to identify core/refuge habitat for Koalas. This requires multiple surveys (or, potentially, stratification of BioNet results by time period) across a range of environmental conditions (e.g. rainfall/drought years). The accurate identification and mapping of important refuges for the Koala is an important goal of this study.*
> *...*
> *The main finding from the Crown Forestry Mapping Pilot study was that Koala presence (and activity) was not strongly correlated with any of the main predictor variables i.e. occurrence of Koala feed trees, RN17 forest types, or Plant Community Types (PCT).*
> *...*
> *It is important to develop Koala habitat models that can be applied across both Crown Land and Private Lands.*

As is apparent from the EPA findings, further work is required to better define PCTs in coastal areas, particularly with a view to better correlate PCTs with Koala habitat. For new mapping to identify core Koala habitat it is important to take into account Koala records in the mapping process and to account for Koala movements between high quality habitats when accounting for Koala use of PCTs. When undertaking field validation indicators of Koala presence (i.e. scats, distinctive scratches) and species preferences should be recorded.

Moore *et. al.* (2004) consider:

> *... it seems that densities of arboreal folivores are influenced by geologic parent materials, soil nutrient status, elevation, topography, floristic diversity, rainfall, history of land clearing and no doubt by interactions among these factors. Although there have been some successful attempts to model the density of arboreal folivores in certain habitats (e.g. greater gliders in the montane ash-type forests of Victoria, Lindenmayer et al. 1990; 1995),evidence suggests that accurately predicting the presence and density of arboreal marsupials is*

> *currently precarious and will be for the foreseeable future. Further, to apply predictions at an appropriate scale for conservation purposes will require technology, such as remote sensing, supported by field survey work.*

From their modelling of Koala sensity in south-east Queensland Rhodes et. al. 2015) found *"the primary factors associated with the broad-scale distribution of koala densities were climatic factors (temperature and rainfall)".*

From their assessment of Koalas in a fragmented landscape around Ballarat, Januchowski *et. al.* (2008) concluded:

> *The results showed that an increased likelihood of koala presence in fragmented landscapes in the urban–forest interface (as opposed to larger blocks of forest habitat) can best be explained by the positive effects of soil fertility and the presence of preferred koala tree species in these fragmented areas.*

Regarding their predictive model the EPA (2016) found that:

> *The BRT model presented is useful for predicting "potential" koala habitat (areas of moderate to high suitability) but has no power to distinguish habitats that are occupied from those that are unoccupied by koalas within areas of "potential habitat"*

There are advantages for broad regional models though they may not pick up regional variations. One of the problems with the EPA modelling is the broad scale of the region considered and the large variation in Koala tree preferences over such an extensive area. The EPA (2016) identify that models could be improved by "*detailed knowledge of local koala habitat preferences*" and taking into account "*regional variations in food tree preferences*". This emphasises the need for modelling to be undertaken at the metapopulation level. For example McAlpine *et.al.* (2008) compared habitat preferences from across the range of the Koala, noting:

> *We found that a similar hierarchy of habitat variables explained the occurrence of koalas in each region, validating the importance of a hierarchical landscape approach to koala conservation across its range. However, ... we found that the effect size and rank of most individual variables within the hierarchy varied regionally for the koala (Table 2). Therefore there is a strong justification for adopting a hierarchical approach to koala conservation across its broad geographical range, but differences in habitat relationships within this hierarchy make a uniform conservation programme misguided.*

The current planning focus on core Koala habitat for protection is supported. If Koalas are to be given a future it is essential that areas of "land with a resident population of koalas", and high quality habitat with evidence of an historical presence, are given the highest protection. This is evidenced by attributes such as recent sightings OR evidence of Koala presence (i.e. scats, distinctive scratch marks) OR historical records of a population.

As a first step in identification of core Koala habitat it is essential that potential habitat be mapped. Rather than focussing on single Local Government areas there are efficiencies in undertaking habitat mapping on a broader basis, though it is important to limit the scale of each mapping exercise to regions where there are likely to be similar factors affecting Koala distribution in a consistent manner. To improve the accuracy of habitat mapping it is important to improve the compatibility and accuracy of vegetation mapping and to identify and rectify data gaps in Koala records. The need for detailed habitat mapping needs to be

balanced with the need to undertake habitat mapping over the Koala's distribution in a reasonable timeframe.

The NSW Government needs to establish a Koala habitat mapping program and commit adequate resources to undertaking the task in a reasonable timeframe. This should focus on undertaking Plant Community Type mapping (where needed) and rapid surveys to identify Koala presence/absence in priority areas and ecosystem types.

Identified potential habitat that is known to be, or likely to be, occupied by Koalas, and high quality habitat considered capable of restoration, should be identified as core Koala habitat.

It is apparent that within potential habitat Koala populations have been affected, and often extirpated, by past disturbances (i.e. logging, fire, drought, predation), disease, social factors or dispersal limitations. Forest structure is a key variable that should be accounted for in identifying currently occupied habitat and the quality of that habitat. Though it needs to be recognised that the recovery of Koalas depends on rehabilitating currently unoccupied high quality habitat and habitat linkages.

Modelling needs to be undertaken to identify key drought refuges and likely future climate change refuges

2. GOVERNMENT THE BIGGEST THREAT TO KOALAS

The Chaelundi court judgement in 1991 made it clear that Koalas are threatened by logging and that it is not allowable to take, kill, disturb or injure endangered wildlife at your whim.

The restriction on the taking, killing, disturbing or injuring of threatened species had a long legacy of parliamentary support, extending back through time to the National Parks and Wildlife Act 1974, to the Fauna Protection Act 1948, to its origin in the Birds and Animals Protection Act 1918.

Parliament reaffirmed that they wanted to take action to redress the decline of threatened species by the passage of the Endangered Fauna (Interim Protection) Act later that year. This directive was reinforced by the passage of the Threatened Species Conservation Act 1995, and for Koalas in particular by the introduction of State Environmental Planning Policy No. 44 (Koala Habitat Protection) in 1995. This legislative direction was also reflected in the Native Vegetation Conservation Act 1997 and its successor the Native Vegetation Act 2003.

This legislative support was not always fulsome, such as by the inclusion of the Private Native Forestry exemption in SEPP No. 46: 'Protection and Management of Native Vegetation', which was carried over into the Native Vegetation Conservation Act in 1997. Though maybe those who supported the inclusion never realised how it would be abused.

With such clear direction there is no excuse for those agencies responsible for implementing the legislation not to have acted. But their reaction was slow, piecemeal and ineffective. While this was in part institutionalised opposition, such as by the Forestry Commission (through its various name changes) and elements in the Department of Land and Water Conservation (through its various name changes and shift to other agencies), it is perplexing as to why the National Parks and Wildlife Service (though its changes) or the Department of Planning (through its changes) and later the Environment Protection Authority were unwilling or unable to capitalise on the goodwill to protect the Koala.

It is now 26 years since the passage of the Endangered Fauna (Interim Protection) Act and the responsible agencies, in their current incarnations as the Forestry Corporation, Environment Protection Authority and Department of Planning and Environment have achieved very little. Despite pissing millions of dollars up against the wall there is little to show for it, and the Koala's demise has accelerated, with a conservative 26% decline in Koala populations over the past 15-21 years.

While numerous community groups, such as NEFA and the North Coast Environment Council, have battled hard against the bureaucratic malaise and often downright hostility, we have been unable to effect the meaningful change necessary to save the Koala. We have had our victories, such as increasing the reserve system, and exposed some of the problems, but we have been unable to achieve the attitudinal changes necessary to implement the intent, aims and objectives of all that legislation. We have come across numerous well meaning people in the bureaucracies over the years, though they too have been swamped by the bureaucratic morass.

For the Koala there has been a catastrophic failure of governance.

It is thus astounding that the Chief Scientist has relied upon advice of these failed agencies to identify problems and solutions. With their vested interests, denial of problems and baggage of inept

management they are neither fit nor proper 'people' to review their own failures and identify meaningful solutions. Their positions are simply reiterated by the Chief Scientist without critical review. It thus comes as no surprise that she just proposes more of the same failed approach. A fundamental attitudinal change is needed not more tinkering around the edges.

This section seeks to highlight various aspects of the management of Koalas, and threatened species generally over the past 26 years in the hope that by shining a light on them that they will help effect the attitudinal changes needed. We start by providing a few north coast examples and then focus on public forestry, private forestry and SEPP 44. We suggest some solutions, which we hope will be duly considered.

2.1. Case Studies of Government Mismanagement

Six case studies of Government mismanagement of Koalas are presented. The case studies relate to management of public land for forestry, private land for forestry, rezoning of private land for urban development, management of the impacts of a music festival and contempt for core Koala habitat. These all display an abject failure of Government policy, management and regulation. Though the most worrying aspects are the widespread disregard for well-intentioned laws, policies, and strategies, a failure to impartially consider the evidence, and a callous disregard for the fate of Koalas.

These are but a few examples of the wider failure of Government to implement meaningful and effective controls to stop the ongoing decline of Koalas, on both public and private lands. They are a few of the more prominent failures of Government policy on the north coast we have documented, and undoubtedly only represent the tip of the iceberg of abuse of Koalas. We recognise that similar examples will exist throughout NSW, most of which will never see the light of day.

2.1.1. Case Study 1: Pine Creek State Forest

In 1990 "*little was known about the status and distribution of Koalas in the Coffs Harbour local government area, except that it was identified as containing one of the biggest populations in NSW*" (Lunney *et. al.* 1992). NPWS undertook a study:

> *The study found that the density of Koalas has decreased and is now low, and that the population continues to decline. The distribution of koalas is shrinking and is now concentrated in a few local areas....The koala in Coffs Harbour is now almost gone from most of its previous strongholds ...Without an active conservation program, Coffs Harbour faces the prospect that the koala will become unviably rare in this district within 20 years at the current rate of loss and will be at risk of local extinction.*

Smith (2004) recounts how in 1995 he was told of logging being undertaken in Pine Creek State Forest (near Coffs Harbour) in contravention of the Coffs Harbour Urunga Management Areas EIS (SFNSW 1995) which excluded clearfelling from areas with koalas and koala feed trees under a protocol developed in consultation with the NSW National Parks and Wildlife Service that required surveys for evidence of koalas and other threatened species before logging, noting:

> *Site inspections revealed the most destructive and intensive clearfelling that I have ever observed in a State Forest in northern NSW, including the removal of koala feed trees (grey*

> *gums with abundant scratches and scats) in contravention of NSW National Parks and Wildlife Service (NPWS) section 120 licence conditions that then regulated harvesting impacts on threatened fauna . ...Extensive gap clearfelling can be considered destructive because it reduces or eliminates habitat for mature, oldgrowth and hollow dependent fauna ... In this case the clearfelling was effectively land clearing.*
>
> *A survey for koalas and koala scats around the edges of logged areas and stumps within clearfelled areas concluded that "the evidence of high levels of koala activity is so abundant in the logged compartments that it could not have been missed by anyone genuinely searching for evidence of koalas" (Moon 1995). Following inspections by officers of NPWS, harvesting operations were suspended in Pine Creek State Forest under the provisions of the Endangered Fauna (Interim Protection) Act 1991 and clearfelling in Pine Creek was publicly condemned in local and state media. Approval to recommence harvesting Pine Creek State Forest was made conditional on the development of a joint SFNSW/NPWS plan of management for koala conservation and timber production. An inquiry into gap and cluster silviculure (gap clearfelling) was also announced by the Minister for Land and Water Conservation.*

From his study in Pine Creek State Forest (which was undertaken within a production forest with no areas of undisturbed forests for comparison) Smith (2004) considered that Koalas could persist in areas subject to selective logging but not intensive logging, commenting:

> *This result suggests that variation in koala scat abundance is best predicted by a combination of inter-related floristic, structural, and logging history variables. This gradient was interpreted to be one of increasing koala abundance with increasing tree stocking, increasing uneven-aged structure, increasing predominance of medium sized and mature stems, and increasing tree species richness, associated with a history of patchy and frequent low intensity selective logging and TSI.*
>
> *...*
>
> *Koalas appear to favour uneven-aged forests which have developed after a long history of low intensity, single tree or large diameter-limited harvesting. Koala scats were also most abundant in portions of compartments with few or no new stumps or no evidence of recent logging (within the last 10 years). This observation is consistent with the predictions by Smith et al. (1995) that koalas may require long periods (10-20 years) for population growth and recovery after displacement by moderate to intense logging because of their low reproductive potential*
>
> *...*
>
> *Creation and maintenance of koala habitat in production forest will require a new approach to harvesting and silviculture based on the low intensity, single tree selection and diameter limited harvesting practices more typical of those carried out in the past. Plantation development and creation of plantation-like structure in native forest is not compatible with maintenance of natural koala densities.*

In 1997 Smith (2004) reports he put forward a number of management recommendations to State Forests for Pine Creek State Forest, involving a zoning based on Koala presence and:

> *A package of recommendations to sustain koala populations within production forests, including the setting of limits to timber yields, maintaining a minimum stocking of mature and older trees and feed trees, reservation of a minimum 15% of koala habitat in each logging compartment and harvesting at intervals of not less than 15 years in timber production zones,*

State Forests subjected Smith's 1997 recommendations to unprecedented *"review, scrutiny and intensive criticism",* leading Smith (2004) to comment:

> *I concluded that SFNSW, at that time, was not an appropriate authority for independent review of threatened forest species research. It stood to benefit financially by finding reviewers that would reject findings that might constrain wood production.*
>
> *...*
>
> *Key recommendations for integration of koala conservation and wood, particularly the need to maintain the low intensity harvesting instead of Australian Group Selection and gap harvesting were rejected. Approximately 12 months later, dissatisfaction with the Pine Creek Koala Plan of Management and insensitivity in its implementation prompted the local community (Pine Creek Koala Support Group) and NEFA (North East Forest Alliance) to put forward a proposal in 1998 to transfer the best koala habitat in Pine Creek to national park. This proposal was in large part adopted by the NSW Government in 2003 ...*
>
> *... In my opinion, this result is almost entirely due to failure of SFNSW to reverse timber over supply commitments and adopt new, low intensity harvesting practices and minimum stocking standards that prevent over-cutting of natural forests and their conversion to tree farms.*

In 1995 in response to community concerns NEFA exposed clearfelling by (then) State Forests of NSW of an area of known core Koala habitat in Pine Creek State Forest. A subsequent inspection by NPWS considered *"the evidence of high levels of koala activity is so abundant in the logged compartments that it could not have been missed by anyone genuinely searching for evidence of koalas".* Andrew Smith who had done the fauna assessment for the State Forests' Coffs Harbour Urunga Management Areas EIS, which excluded clearfelling from areas with koalas and koala feed trees under a protocol developed in consultation with the NSW National Parks and Wildlife Service, described it as "*the most destructive and intensive clearfelling that I have ever observed in a State Forest in northern NSW*". When as part of the 1997 *Pine Creek Koala Plan of Management* Smith put forward management recommendations "*for integration of koala conservation and wood*" in the forest they were attacked and rejected by State Forests.

The Forestry Corporation's refusal to implement agreements with the NPWS, and commitments of their own EIS, to survey for Koalas ahead of clearfelling operations in Pine Creek State Forest in 1995, and the subsequent clearing of Koala habitat, is testimony to the long-term nature of the organisation's contempt for the conservation of Koalas in NSW. Their subsequent refusal in 1997 to accept expert recommendations to modify their logging practices to reduce impacts on Koalas exemplifies the Forestry Corporation's blind obsession with obtaining timber irrespective of the environmental cost.

2.1.2. Case Study 2: Royal Camp State Forest

In July 2012 the Forestry Corporation maintained that they had undertaken the required Markup Survey (TSL 5.1., 5.2.1.) and Koala Markup Search (TSL 5.2.2) in Compartment 15 of Royal Camp State Forest and commenced logging. It was identified as an "intermediate use" area, and a Koala High Use Area had been identified in Compartment 14 the previous year (before a controlled burn got out of control and burned any evidence of Koala scats elsewhere in the logging area).

On NEFA's (Pugh 2012) initial audit of logging between 4th and 5th August 2012, not one Koala feed tree was found to be marked specifically for retention within Compartment 15, and in most areas the marked hollow-bearing and recruitment trees (which can double as Koala feed trees) were far too few and of the wrong species to satisfy this requirement. Marked trees were primarily in the vicinity of tracks and the boundary of exclusion areas, indicating that Mark-up Surveys had not been conducted throughout the logging area. Forests NSW had apparently made no effort to comply with the requirement to mark 10 primary browse trees per 2 ha.

NEFA (Pugh 2012) found abundant evidence of Koala use of feed trees in Compartment 15, such as distinctive scratch marks on the trunks of numerous trees, Koala faecal scats under many trees, and a sighting of a Koala when spotlighting. In our brief inspection NEFA located 4 areas that met the criteria for Koala High Use Areas. One area near log dump 20 was in the process of being logged, another near log dump 19 had been marked up for logging which was about to commence, and the two others near log dump 25 were proposed for logging in the near future. The area being logged had logging extending into it on three sides, and almost the entire area was within 300m of log dump 20 and within 100m of active logging.

NEFA (Pugh 2012) also found significant scat evidence of Koalas, including some that appeared to be from a mother and baby, in the small part of compartment 16 inspected, identifying that this indicated further Koala high use areas. Subsequent checks by both the EPA and Forestry Corporation confirmed the presence of Koala High Use Areas in all the localities we had identified.

After our complaint, and while the EPA audit was supposedly underway, the Forestry Corporation burnt off substantial parts of the logged area of Compartment 15, thereby destroying the evidence of any remaining Koala scats in those areas and any further evidence of Licence breaches.

In total, with a follow-up assessment on 9th August, we located 23 trees with >20 scats beneath them within the Koala High Use Area being logged, including three with large and small scats indicating the presence of at least one mother and young, and 22 additional trees with 1-19 Koala scats beneath them. The range of ages of scats showed long-term usage until very recently. While the Forestry Corporation had identified no Koala high use trees on our first visit, by the 9 August they had marked at least 7 high use trees with >20 scats. Given that many of the scats were clearly visible on the surface it beggars belief that anybody could have even undertaken a cursory look and not seen any.

Logging resumed in compartment 16 on 9 August. On the 19 August NEFA inspected the eastern part of compartment 16, and located Koala scats under 20 trees, with three of these reduced to stumps in recent logging. More than 20 Koala scats were found under four trees and more than 50 under another. One Koala High Use Area was found to have had logging within it. Searching was limited by logging debris and ground disturbances. We thoroughly searched over 100 potential Koala feed trees and stumps for Koala faecal scats and saw no evidence that anyone else had previously searched in the long grass, leaves and bark around the bases of these trees before us (even trees marked as K trees and those with >20 scats). In the older logged area no Koala feed trees had been marked, though many Koala feed trees were marked in recently logged areas. Logging continued.

On 23 September NEFA undertook an audit to the north-east of log dump 5 in compartment 16. Logging had been undertaken subsequent to our August 20 Audit Report. We searched a total of 103 preferred Koala feed trees (Grey Gums and Grey Box) for Koala scats. Scats were found under

16 trees, with two of these having >20 scats beneath them. The two high use trees had not apparently been identified before and had clearly not been subject to star searches. Our subsequent searches in this area revealed another Koala High Use Area that had logging undertaken around and within it. Of the 103 potential Koala feed trees we searched for scats only 7 had been obviously searched before.

The EPA found that 61 trees had been logged and 405m of snig tracks constructed in the koala high use exclusion zone that should have been imposed near log dump 20. In compartment 16 the EPA concluded that 7 trees were logged and 230m of snig tracks constructed within another Koala High Use Area near log dump 7, which had occurred after logging had resumed on 9 August. The EPA (2014b) later identified the problem as

> *The EPA identified the root cause of the breaches of the licence as the Forestry Corporation's failure to undertake searches for evidence of koala in compliance with the licence. The EPA considered that if searches are inadequate or not undertaken at all, the default protection provisions in the licence become ineffective. That is, if you don't look, you don't find and if you don't find, you don't protect.*

Regional Forester Craig Busby (28/8/12) told the EPA "*There are some grey areas in the licence about thoroughly doing the search. It is about what thoroughly means - our searches look under trees it doesn't say to get on your hands and knees and scrape the surface - it just says thoroughly*". Craig Busby's email to CEO Nick Roberts of 7 November 2012 stated (NEFA 2014):

> *We are still in dispute with EPA over the interpretation of "thoroughness" of searching and techniques used and are standing our ground based upon the fact that we have not changed our techniques since the introduction of the TSL.*

In February 2013 the foresters responsible for the scat-searches and marking-up in Royal Camp told the EPA that they hadn't changed the way they searched for Koala scats and would not (NEFA 2014).

In April 2013 Regional Forester, Craig Busby, told the EPA that they had done the required pre-logging surveys and not done anything wrong, stating (NEFA 2014):

> *FCNSW marked up at least 300m in advance of harvesting operations right across the subject harvesting area ...Marking (including koala mark-up searches) in the vicinity of dump 20 took place around 16-18 July ...*
>
> *... no triggers for star searches were found at the time of pre-harvest mark-up around log dump 20. ...The techniques for pre-harvest koala mark-up searches has been audited by the EPA many times since the introduction of the TSL. The EPA's current interpretation of the relevant TSL condition is inconsistent with historical practices.*
>
> *... no features indicating a koala high use area were located in the vicinity of dump 20. ...Therefore FCNSW did not knowingly harvest within a high use area nor the associated 20m exclusion zone.*

Despite the Forestry Corporation displaying no remorse or contrition, on 28 June 2013 the EPA issued FCNSW three penalty notices (and fines on $300 each) for contravening a threatened species licence (TSL), including:

- undertaking specified forestry activities (timber harvesting) in koala high use areas - TSL 6.14(c)(i)
- undertaking specified forestry activities (timber harvesting) in koala high use exclusion zones - TSL 5.1(a)(i)

- failing to conduct a thorough search for, record and appropriately mark koala high use and intermediate use areas – TSL 5.2.1(a)(b)

The EPA informing the Forestry Corporation (NEFA 2014):

3. The EPA investigation identified significant breaches in contravention to the TSL. Specifically, EPA officers identified that:

a. *Specified forestry activities including the felling of 61 trees in a koala high use exclusion zone and the construction and operation of snig track, an approximate length of 405m in a koala high use exclusion zone east of log dump 20, in compartment 15; and*
b. *Specified forestry activities including the construction and operation of snig tracks that crossed koala high use areas east of log dump 20, in compartment 15.*
c. *FCNSW staff member responsible for the compartment mark up and koala searches did not conduct koala searches in certain areas in the compartment including part of the area that was subject to specified forestry activities in a koala high use area, east of log dump 20, in compartment 15.*

The penalties were taken to be inconsequential by the Forestry Corporation and they continued to deny any wrongdoing or display any contrition. On 12 July 2013 ABC North Coast reported:

> *But regional manager Craig Busby says the breaches were administrative, and akin to staying too long in a parking lot.*
>
> *He says they involved the identification of koala droppings beneath trees.*
>
> *"The environmental interest groups were excavating koala scats, so it's an indication that they were there historically," Mr Busby said.*
>
> *"We know they were there historically, but largely we look for fresher scats on the surface and that's where the discrepancy is.*
>
> *"So we're working with the EPA to work out what the true definition of a koala high-use area is and we'll continue to do that.*
>
> *"I can understand that there's a perception in the community that ($300) would be a light sort of fine.*
>
> *"The reality is that the fines reflect the environmental outcome.*
>
> *"Look in terms of the fines, they're administrative, they're like staying in a parking lot for a little bit too long, but the reality is there has been no environmental harm to koalas in that area."*

Prest (2003) warns:

> *Breaches of environmental law in the rural context are often perceived as minor or technical breaches. They are seen as neither criminal in nature nor morally reprehensible. Landholders may view environmental impacts as minor, unproven or as an unintended by-product of economically beneficial activities. In such a context, it is inherently difficult to secure high levels of voluntary compliance, particularly where that compliance would come at an economic cost to the landholder.*

At Royal Camp the Forestry Corporation had been logging for months in what was undoubtedly core Koala habitat before we stopped them. They were actively logging a Koala High Use Area, and

about to log another 3 that we identified at the time. Over the preceding months there had been widespread removal of Koala feed trees, most likely within a number of Koala High Use Areas (the Forestry Corporation identified one such area to the EPA but they refused to inspect it (Pugh 2014)). The Forestry Corporation went on to log another 2 Koala High Use Areas (one of which the EPA refused to investigate). The reaction of the EPA was to treat this as a minor offence, with the only reaction amounting to a total of $900 in fines for a single Koala HUA. All other offences (Yellow-bellied Glider, habitat trees, stream crossings etc.) were forgiven, with many of our complaints (including ones shown to the EPA) not even investigated. With such lax enforcement it is no wonder that the Forestry Corporation considered the offences inconsequential, and went on to repeat them.

In 2013 NEFA became alarmed that the Forestry Corporation was proposing to commence logging in Compartment 13 of Royal Camp SF. The Forestry Corporation's draft Harvesting Plan identified "nil" Koalas. On 4 July 2013 NEFA inspected the area because of our concern that they may again log Koala High Use Areas. On one day we located 34 trees with Koala scats about their bases. Of these trees, 11 were found to be Koala high use trees on the basis that 10 had >20 Koala scats about their bases and another because it had scats of two different sizes, indicating the presence of a mother and young. Two Koala High Use Areas were identified.

Based on his inspections of Royal Camp State Forest for NEFA, wildlife expert David Milledge (NEFA 2014) concluded:*"The level of Koala activity revealed by these searches is amongst the highest I have recorded in my experience of over 20 years conducting Koala scat surveys in coastal and escarpment forests in north-eastern NSW. This highlights the significance of Royal Camp State Forest in supporting a dense local Koala population and possibly one of the most important on public land in the region".*

A subsequent inspection by the EPA (Aboud 24 July 2013) of the two Koala High Use Areas found on 4 July 2013 in compartment 13 by NEFA confirmed their presence and located abundant additional high use tree locations. Leading the EPA to conclude:

> *Based upon these findings and recent findings made from investigations undertaken in compartments 14, 15 and 16 of Royal Camp State Forest, the EPA considers these areas contain koala habitat and play an important role to Koala populations in the region. The EPA consider compartment 13 to have areas that indicate koala high use that is ongoing and contemporary.*

The then Minister for the Environment requested the EPA to determine the regional significance of the koala population, with the subsequent June 2014 report by Dr. Steve Phillips for the EPA finding a resident koala population within Royal Camp that *"should be considered important at all levels of assessment"* due to the koala populations of the encompassing Richmond Valley LGA being found to be *"endangered on the basis of international, national and state-based conservation criteria".*

In August 2014 the Forestry Corporation engaged Jim Shields to search for Koalas using a sniffer dog, they detected 14 Koalas at a mean density of 0.36/ha in 11 hours of searching.

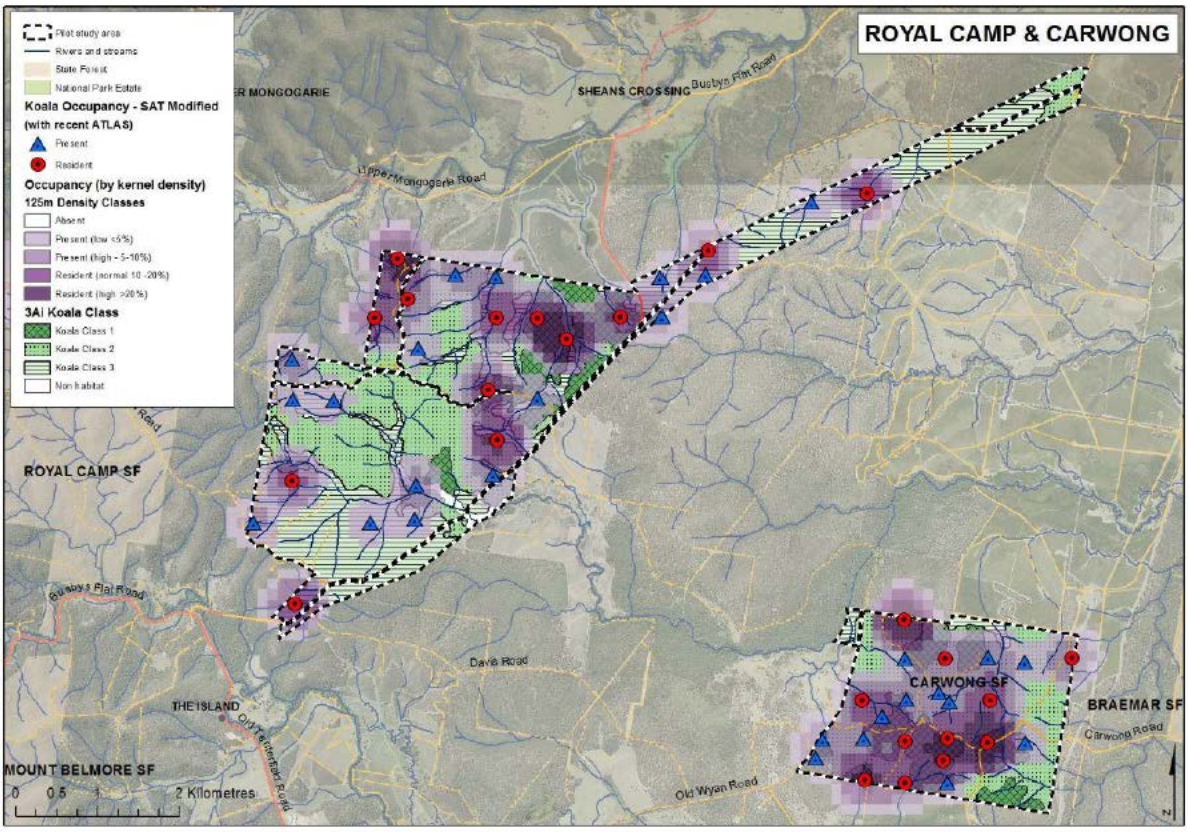
Based on Koala records, in November 2014 NEFA proposed the creation of the 2,100 ha Sandy Creek National Park, comprised of two parts, including part of Royal Camp State Forest (compartments 13-16, 1,500ha) and the whole of Carwong State Forest (600ha).

The EPA (2016) study of 4 key areas of State forests known to once have good Koala populations once again verified that Royal Camp and Carwong State Forests have significant populations of resident Koalas:

> *The activity results and Phillips' (2013) report both indicate that Royal Camp and Carwong state forests support extensive areas of koala occupancy and habitat utilisation, and that in compartment 13, at least 50% of the habitat is utilised and conforms to optimal utilisation of secondary habitat by a low density population. The project found that 80% of Carwong and 58% of Royal Camp State Forest is utilised, which supports Phillips' (2013) results. On this basis it can be concluded that habitat in Royal Camp and Carwong is source habitat, where reproduction exceeds mortality on average over time.* (p84)

It is further noted (p86):

> *In relative terms, Carwong appeared to be the least disturbed by logging and fire. Having both wildfire and multiple recent logging events absent for approximately 20 years, appears to correlate with overall highest occupancy compared with other pilot areas that have experienced multiple, more recent silviculture treatments. This result aligns with Smith's (2004) findings that koala prefer areas of least disturbance.*



Records and potential Koala habitat (based on Plant Community Type) identified by EPA (2016) for Sandy Creek National Park proposal.

It is important to recognise that a study of Koalas across the Richmond Valley LGA (Phillips and Weatherstone 2015) identified *"two "Important Populations" as defined for purposes of the Federal Government's Environmental Protection and Biodiversity Conservation Act 1999",* as "*key source populations for breeding and/or dispersal*", including "*Habitat to the north of Rappville in the general vicinity of Royal Camp and Carwong State Forests and associated lands".* They also found:

> *Extent of Occurrence of koalas across the RVLGA has remained relatively unchanged over time. However, further analyses of habitat occupancy rates has indicated a statistically significant decrease over the last 3 koala generations of ~33% in the amount of habitat actually being occupied by koalas. This trajectory, if left unchecked, will lead to increasing endangerment of the RVLGA's koala populations over coming years.*

In 2012 when the Forestry Corporation were two-thirds through logging 3 compartments in Royal Camp State Forest, a limited survey by NEFA identified a Koala High Use Area (HUA) actively being logged, with four others proposed for logging. We forced the logging to stop with both the EPA and Forestry Corporation confirming the Koala HUAs we had identified and the EPA identifying that 61 trees had been logged and 405m of snig tracks constructed within the Koala HUA. Logginf resumed nearby a few days later and NEFA again identified that a Koala HUA had been logged, the EPA confirmed that 7 trees were logged and 230m of snig tracks constructed within this Koala HUA. Logging contined and NEFA again identified a Koala HUA was longed - the EPA failed to investigate. When the Forestry Corpration proposed to start logging another part of the forest where they said there were "nil" Koalas, a brief survey by NEFA identified 2 Koala HUAs in the proposed logging area, finding more on later occasions. Numerous other breaches were reported to the EPA, most of which they refused to investigate. The EPA issued the Forestry Corporation with 3 fines, totalling $900 for just the first Koala HUA.

It is evident that Royal Camp and Carwong State Forests support a breeding population of Koalas with abundant scats clearly showing their presence. The failure of the Forestry Corporation in 2012 to find any Koala scats and identify any Koala High Use Areas in Compartment 15 of Royal Camp SF, despite claiming to have undertaken the legally required searches, clearly demonstrates their ongoing intentional failure to identify and protect Koalas on State forests. That logging of Koala High Use Areas continued in compartment 16 after NEFA had exposed the problem, and while the EPA were auditing compartment 15, is testimony to the Forestry Corporation's contempt for their legal obligations to protect Koalas. The Forestry Corporation's lack of remorse or contrition, and a refusal to improve their practices, exemplifies a total disregard for Koala conservation.

The evidence now clearly proves that Royal Camp and Carwong State Forests support a State significant population of Koalas that should be protected in their entirety if the NSW Government has any genuine intent to arrest the decline of Koalas in NSW. The proposed Sandy Creek National Park is a litmus test of the NSW Government's commitment to Koala survival.

2.1.3. Case Study 3: Whian Whian private forestry.

NEFA (Pugh 2014) became involved with logging of a private property at Whian Whian (adjacent to the Nightcap National Park) when neighbours tried to have their concerns regarding Koalas addressed. The operation was undertaken by the same Forestry Corporation staff who oversaw logging operations in Royal Camp SF. The forester in charge of the operation, Matt Kinny, had previously accompanied EPA on their searches for Koala scats in August 2012 and July 2013 during EPA investigations of NEFA's reported Koala High Use Areas in compartments 15 and13 of Royal Camp SF.

Discussions with Forestry Corporation on 14 September 2013 revealed that they had found evidence of Koalas on the property and were thus applying the Private Native Forestry Code of Practice requirement to retain 10 primary koala food trees and 5 secondary koala food trees per hectare. Forestry Corporation said that to achieve this they were basically excluding most Tallowwoods from logging, with only "a few" proposed for removal. They also stated that they had found 2 Koala high use trees (ie with $\geq$20 Koala scats under them). For Koala high use trees the Code requires:

> *Any tree containing a koala, or any tree beneath which 20 or more koala faecal pellets (scats) are found must be retained, and an exclusion zone of 20 metres must be implemented around each retained tree.*

Concerns that this property is of exceptional value for Koalas and that Koala's were not being adequately protected were highlighted by a brief assessment by NEFA of trees in the vicinity of the boundary on 14 September which located 5 Koala high use trees, none of which had apparently previously been searched. One of the Koala high use trees found had not been previously searched despite having a new road constructed right next to it. The scats at the base of the tree were shown to the Forestry Corporation on the day and to the EPA the next week, though both agencies refused to accept the evidence we showed them.

Tree found to be Koala high use tree on 14 September (Tallowwood to left of rd), scats shown to FC and EPA, still not accepted as a high use tree and not buffered.

When NEFA (Pugh 2014) learned that the Forestry Corporation were proposing to construct a new road we surveyed the marked route and identified that it passed through, and within 20m of, 8 Koala high use trees (>20 scats), over 60 vulnerable Red Bopple Nut *Hicksbeachia pinnatifolia,* and 3 endangered Slender Marsdenia *Marsdenia longiloba.* NEFA wrote to the EPA on the 22 September 2013 to request the immediate and urgent imposition of a Stop Work Order in accordance with Section 37 of the Native Vegetation Act 2003.

The EPA sent a team in to oversee the Forestry Corporation, though refused to stop work. They EPA did not bother to check NEFA's records, yet spent 2 days wandering around the proposed route with the Forestry Corporation while they identified a new route.

The EPA team had been transferred from the North Coast Regional Office of DLWC that over a decade earlier Prest (2003) described as having a "*laissez-faire stance of allowing self-assessment ...At its worst, this involved turning a blind eye to the impact of logging under exemption*", which he likened to a "*scenario of 'negotiated non-compliance', a term invented ... to explain where regulator and regulatee come to an unspoken agreement not to apply the legislation to the letter*".

Three days after our request for a Stop Work Order the new track was constructed. Subsequent inspections by NEFA (with botanists) found that the track had been illegally constructed through what should have been 20m exclusion zones for 3 Koala high use trees, 7 endangered Slender Marsdenia, 12 vulnerable Arrow-head Vines, and 8 vulnerable Red Bopple Nuts, most of which had been identified and tagged with pink tape (by either NEFA or the Forestry Corporation) prior to track construction. One of the Koala high use trees that had been identified by the Forestry Corporation in the presence of the EPA had the track constructed within 15m and debris within 12m without its exclusion boundary being marked, one 3.2m from the track had been checked by the Forestry Corporation in the presence of the EPA but had not been identified despite subsequent inspections showing abundant scats, and one had been identified by NEFA but could not be subsequently verified due to scats being removed. Two Slender Marsdenia were killed, one injured and 3 are missing. One Arrow-head Vine later died.

Over the course of events NEFA (Pugh 2014) found and reported a total of 16 Koala high use trees with 20 or more Koala scats beneath them. The Community Surveys of the weekend of 27-29

September found an additional 10 Koala high use trees with limited searching, bringing the total to 26 such trees in an area where the Forestry Corporation had only identified 2. A total of 8 Koala high use trees (and numerous threatened plants) were found to have had roads and tracks constructed within 20m of them.

This large number of high use trees proves that there is an active breeding Koala colony on the property, with evidence of males, females and young, that largely escaped the attention of the Forestry Corporation. There can be no doubt that the property constituted high quality core Koala Habitat but the EPA didn't care.

Aside from their incidental sighting of the 2 Koala high use trees, the Forestry Corporation had undertaken no survey for threatened plants or animals on the property despite it being in next to the Nightcap National Park in one of Australia's recognised biodiversity hotspots with numerous threatened species recorded in the vicinity. With all their experience the Forestry Corporation would have been well aware that there were a large variety of Threatened Species Conservation Act listed threatened plants and animals that were likely to occur on the property, just as NEFA were.

Over the course of events, in addition to Koalas, without undertaking comprehensive surveys NEFA and the community (Pugh 2014) identified the presence on the property of two Endangered species, eight Vulnerable species and the Endangered Ecological Community Lowland Subtropical Rainforest. The TSC Act listed species were: the Vulnerable animals Marbled Frogmouth, Sooty Owl, Masked Owl, Alberts Lyrebird and Pouched Frog; the Endangered plants *Endiandra muelleri* ssp. *Bracteata* and *Marsdenia longiloba;* and the Vulnerable plants *Corokia whiteana*, *Hicksbeachia pinnatifolia* and *Tinospora tinosporoides*.

All these species (aside from Pouched Frog) are identified in the Private Native Forestry Code of Practice as requiring exclusion areas or increased tree retention. Disgustingly, the Forestry Corporation, a public entity, were taking advantage of the basic premise of the PNF Code that the prescriptions aimed at reducing logging impacts on select threatened species are only activated where there is a “record” or “site evidence” of the species. Given the PNF Code has no survey requirements the Forestry Corporation was operating on the basis that they would not look before they logged, presumably because they did not want to apply the required prescriptions to reduce impacts on threatened species.

Even after we engaged a recognised expert who identified 3 records of Marbled Frogmouth, and one each of Masked Owl and Sooty Owl on the property, and requested the Ministers to intervene, the Forestry Corporation refused to implement the required prescriptions until grudgingly forced to days later by a community blockade. The Forestry Corporation argued they did not have to implement the PNF prescriptions because our expert records were not on Wildlife Atlas and thus did not constitute a "record" in accordance with the PNF Code.

Similarly both the Forestry Corporation and the EPA refused to accept or recognise NEFA's records of Koala High Use trees, despite the fact that our previous records in Royal Camp SF had been verified by both agencies. The foresters we had exposed at Royal Camp were accusing us of moving Koala scats, from as far away as Coffs Harbour. It was plain to see, for anybody who bothered to look, that there were plenty of fresh scats and it was obviously high quality core Koala habitat.

There was a 2 year window of opportunity for the EPA to legally pursue this matter, and they used most of this time up before they issued the Forestry Corporation with two Penalty Notices (each with

a fine of $5,500) on the 11 September 2015 for constructing their track through what should have been 20m exclusion zones for a Koala High Use Tree and the Endangered vine Slender Marsdenia.

They were issued an Official Caution for violating buffers of 4 Red Bopple Nuts, with violations of 6 Arrow-head Vine buffers noted. This is half the breaches documented by NEFA.

The Forestry Corporation stated they intended to vigorously dispute the fines on the grounds that their intent *"was discussed with EPA staff on site during the operation".* In other words, the EPA knew they were going to construct the illegal road and, at best, did nothing to stop them.

Given that the EPA had almost used up their 2 years for legal action, the Forestry Corporation simply bided their time before telling the EPA that they would not pay the fines and would rather dispute them in court. By then, the EPA claim, it was too late to defend the fines in court. Given the EPA's complicity in the construction of the illegal road it is no wonder they waited so long to take action so that they could avoid court.

The private property at Whian Whian contains a breeding colony of Koalas and is undoubtedly high quality core Koala habitat. In 2013 the Forestry Corporation commenced logging, generating strong community opposition from their heavy handed approach. Where the Forestry Corporation identified two Koala high use trees, NEFA and the community identified 26 Koala high use trees, along with two Endangered species, eight other Vulnerable species and the Endangered Ecological Community Lowland Subtropical Rainforest, most of which required protection under the Private Native Forestry Code of Practice.

The logging operations undertaken by a Government corporation on private land at Whian Whian clearly demonstrate that the PNF Code of Practice provides no meaningful protection for any threatened species, including Koalas, on private land. It also clearly demonstrates the abject refusal of the Forestry Corporation to identify and protect threatened species, including Koalas, even when required to by explicit legal obligations. There is no will to avoid or minimise impacts on threatened species.

The Forestry Corporation's construction of an illegal road through what should have been 20m exclusion zones for 3 Koala high use trees, 7 endangered Slender Marsdenia, 12 vulnerable Arrow-head Vines, and 8 vulnerable Red Bopple Nuts, most of which had been identified by the Forestry Corporation and the EPA proves that they are willing to intentionally flout threatened species laws. They did not even bother to mark the required buffers in the forest prior to track construction, and the EPA did not ask the Forestry Corporation to meet this legal requirement. The fact that the EPA knew the Forestry Corporation were about to construct an illegal road and did not try to stop them, is indicative of a captured regulator, as are their token last minute fines that expired before they took effect.

2.1.4. Case Study 4: West Byron urban development

On the outskirts of Byron Bay there is an area of cleared paddocks and bush, including a caravan park and scattered buildings known as West Byron. Since 2004 Byron Shire Council's Biodiversity Conservation Strategy has identified primary Koala habitat as occurring on the property and classified the remnant native vegetation as High Conservation Value Native Vegetation. It is clearly core Koala habitat.

The Far North Coast Regional Strategy (DoP 2006) was released in 2006. It requires that Council prepares a *Local Growth Management Strategy* to identify how best to meet its dwelling targets. This is required to address urban and rural settlement, as well as commercial, retail, industrial and tourism development, and detail through 10 year staging programs and 5 year priority areas how its dwelling target will be achieved.

One of the identified environmental challenges of the 2006 Regional Strategy is to:

> • *improve protection and enhancement of environmental assets (including wetlands, littoral rainforest, koala habitat, and estuaries), biodiversity and landscape values*

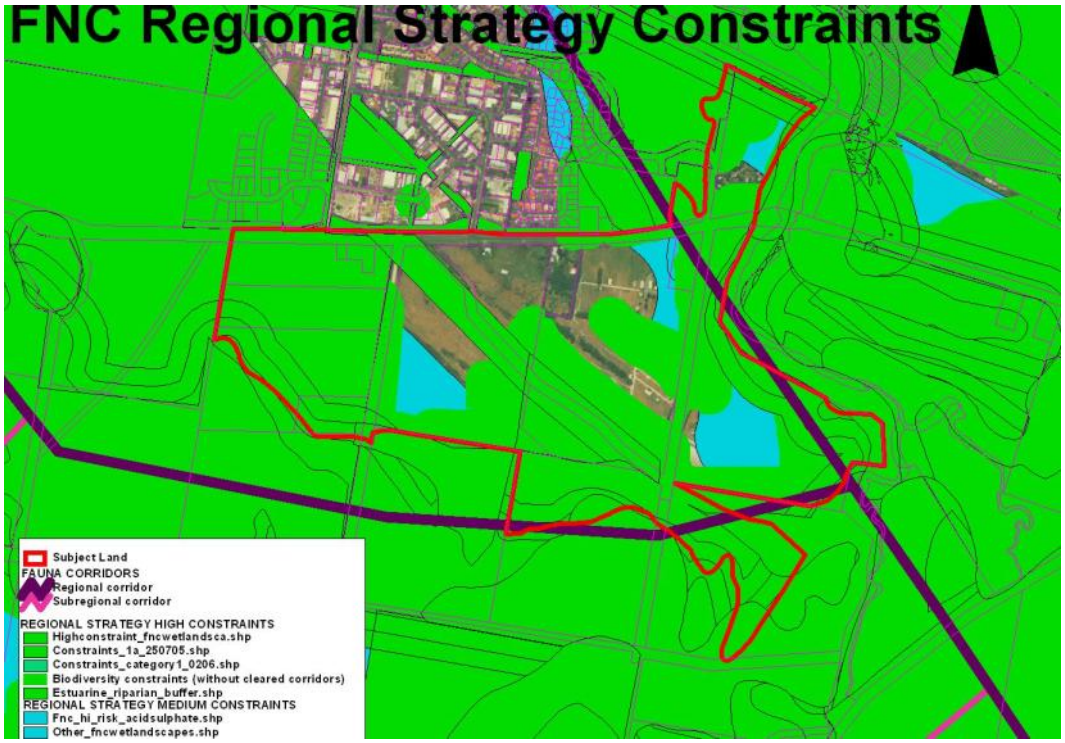
The Regional Strategy requires that proposals satisfy the Sustainability Criteria, which include:

> *Consistent with government-approved Regional Conservation Plan (if available). Maintains or improves areas of regionally significant terrestrial and aquatic biodiversity (as mapped and agreed by DEC). This includes regionally significant vegetation communities, critical habitat, threatened species, populations, ecological communities and their habitats.*

Relevant actions identified in the 2007 Regional Strategy include

> • A Regional Conservation Plan prepared by the Department of Environment and Conservation will guide local councils in implementing conservation outcomes.
>
> • Local environmental plans will protect and zone land with **State or regional environmental**, agricultural, **vegetation, habitat, waterway, wetland** or coastline values.

For town growth areas the strategy states that "*Land that is subject to significant natural hazards and/or environmental constraints will be excluded from development*".



West Byron example of the Regional Strategies identified and mapped "*Far North Coast NSW – Constraints 1a – Land quarantined by legislation, defined policies or registers*", which was identified because "*This constraints layer is derived from a number of datasets which exclude the possibility of development on legal grounds or by govt. policy*".

The associated 2007 Settlement Planning Guidelines state:

> *5. Future development should avoid areas of environmental significance, significant natural and/or economic resource, potential hazard, high landscape or cultural heritage value, or potential increased risk associated with impacts of climate change.*
>
> *6. Future development adjoining land with the above values should incorporate buffers as necessary to help protect those values and to avoid future land use conflict.*

The 2007 Settlement Planning Guidelines' **"Schedule 1. Application of regional mapping data"** provides the guidelines for application of the regional mapping of high and medium risk areas:

> **Step 2 – avoid impacts and hazards**
>
> **1. High Risk**
>
> Planning principle: settlement should not be located in areas of high risk of environmental impact or hazard.
>
> *Development should be directed to unconstrained land(s) within the release area. In the occasional and justifiable circumstance where part of a proposal will be located on land identified as high risk because of the presence of biodiversity values, natural hazard impacts or other physical limitations, the development must be planned to minimise these impacts and provide appropriate offsets. These may include protecting and enhancing the long term viability of priority vegetation and/or rehabilitating degraded priority areas. Justification of this approach should be based on social and economic grounds.*
>
> **2. Medium Risk**
>
> Planning principle: settlement should avoid areas of medium risk of environmental impact or hazard wherever possible. The majority of the development should be directed to the least constrained land within the release area.
>
> *In the justifiable circumstance where this cannot be achieved appropriate mitigating and compensatory actions will be required to be incorporated at the relevant stage in the planning process,*

The Byron Environmental and Conservation Organisation (BEACON) welcomed the strategy because of its environmental commitments, though principally because the preparation of a Growth Management Strategy would give the community the chance to have a say on how best to meet Byron's dwelling targets.

The Strategy also included a potential new urban release area at West Byron that was added to the strategy late in the process. BEACON strived to convince both the Council and the Department of Planning that a growth strategy was needed before any major residential developments, such as West Byron, were considered. For West Byron the Department of Planning said they would not require the preparation of a Growth Management Strategy and instead rely upon a discredited 1993 Byron Residential Development Strategy (which had been effectively abandoned) and pressured Byron Council to include West Byron in their new Local Environment Plan, saying that DoP would '*do whatever it can to assist in this process'.*

In October 2009, the Minister for Planning gave notice that she had accepted that a 108ha West Byron site on the western outskirts of Byron Bay was a potential State Significant Site under the *State Environmental Planning Policy (Major Development) 2005.* She considered that it was of "*regional environmental planning significance*" because it was "*identified for potential urban*

development under the Far North Coast Regional Strategy" and would "*contribute towards alleviating pressures on housing supply and affordability within the region*".

The Department of Planning and their Minister justified taking decisions on West Byron off Council on the basis that it was State Significant Development, claiming that they had to intervene because Byron had a significant housing supply crisis. They ignored the fact that at the time Byron was the only Local Government Area in the region to be meeting its housing targets, approving housing at twice the rate required by the regional strategy. DoP's own figures proved there was no housing supply crisis, though they were not going to let the facts get in the way of their intent.

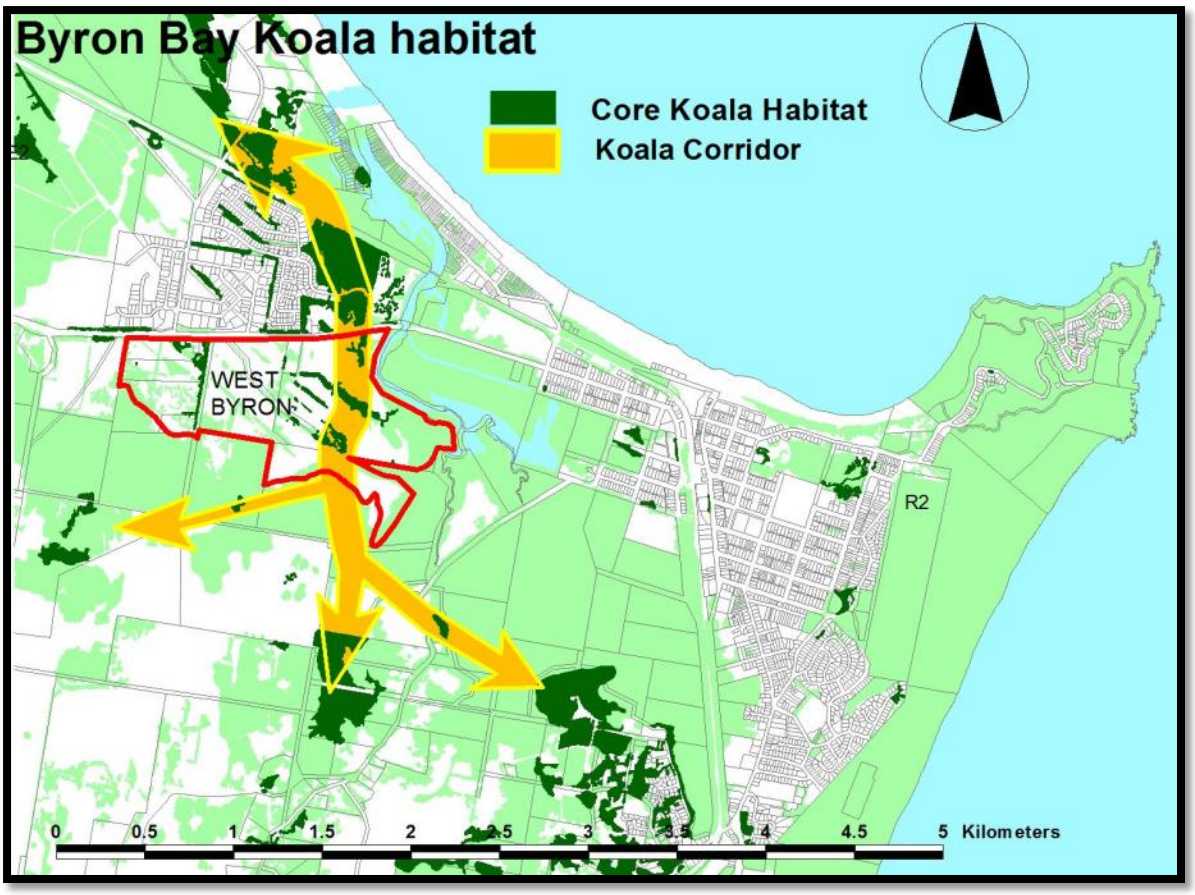
The Far North Coast Regional Conservation Plan (DECCW 2010) was belatedly released in 2010 stating:

> "*Areas supporting known Koala populations should not be developed for urban purposes and in rural areas land use should not be intensified, as research clearly demonstrates that this results in koala deaths, population declines and local extinctions. Councils should zone land known to support viable populations of Koalas for environmental protection. ...*"
>
> *"Several proposed urban development precincts are adjacent to, or encroach upon, known or predicted koala habitat. Development of these areas should be reviewed to ensure that core koala habitat, as defined by SEPP 44, is excluded and that indirect impacts on the mobility and viability of the population due to the position and intensity of the development are fully mitigated.*
>
> *"To promote a strategic approach to kola management, comprehensive koala plans of management should be developed according to SEPP 44. ... Development of* [known or predicted koala habitat] *should be reviewed to ensure that core Koala Habitat, as defined by SEPP 44, is excluded and that indirect impacts on the mobility and viability of the population due to the position and intensity of the development are fully mitigated*" (5.2)

The proponents, West Byron Landholders, prepared a State Significant Site Study and a Preliminary Development Control Plan (DCP) for the site which were exhibited by the Department of Planning and Investment (DoPI) on 12 October 2011.

Ironically the NSW Environment Minister, Robyn Parker (27 October 2011), told an Environment and Heritage Estimates hearing two weeks later:

> *It is clear that in some areas there are impacts of human existence, where we are building and developing in areas, that threaten a number of species, the koala being one of them. What we have to do is make sure that whenever there is a new development we protect the environment in which they live; that whenever there are new roads we have a management plan that addresses what happens with koalas. We make sure that the habitat in which they exist is protected. The Senate environment committee inquiry identifies things such as urban development, forestry, mining, climatic events such as droughts, bushfires, disease, dog attacks and motor vehicle strikes. Those are the major threats to species, and koalas are one of those species.*



Core Koala habitat identified around Byron Bay and the presumed major Koala dispersal corridor. Note the fragmented distribution of Koala habitat. As well as small but significant patches of occupied core koala habitat, West Byron comprises key stepping stones linking populations to the north and south of West Byron which are essential for maintaining the viability of the population and the persistence of Koalas around Byron Bay.

The West Byron Landholders had commissioned a report on Koalas by Biolink Ecological Consultants in 2010 which the developer and DoPI found inconvenient, so they decided to suppress it and subsequently omitted it from the exhibited documents.

In 2010 Biolink recorded Koala activity at 12 of 14 field sites, observed two Koalas and identified Core Koala Habitat. Biolink (2010) mention that:

> *Thus we conclude that core koala habitat is present within the study area and hence a Koala Plan of Management that effectively addresses the requirement to manage such areas for the conservation of koala population will be required ..*
>
> *...*
>
> *... Interpolation of koala activity data recorded during field assessments depicts the general distribution and extent of core koala habitat on the site as approximating 19ha, occupying the northeastern corner and eastern end of the study area (Fig. 3). In this instance however, modelling over-estimates the extent of core koala habitat due to the highly fragmented nature of the remnant vegetation within the study area. Thus the extent of core koala habitat is realistically restricted to the vegetated areas within these boundaries, although some use of the peripheral cleared areas can reasonably be expected to occur over time as koalas move through and/or make use of the site.*

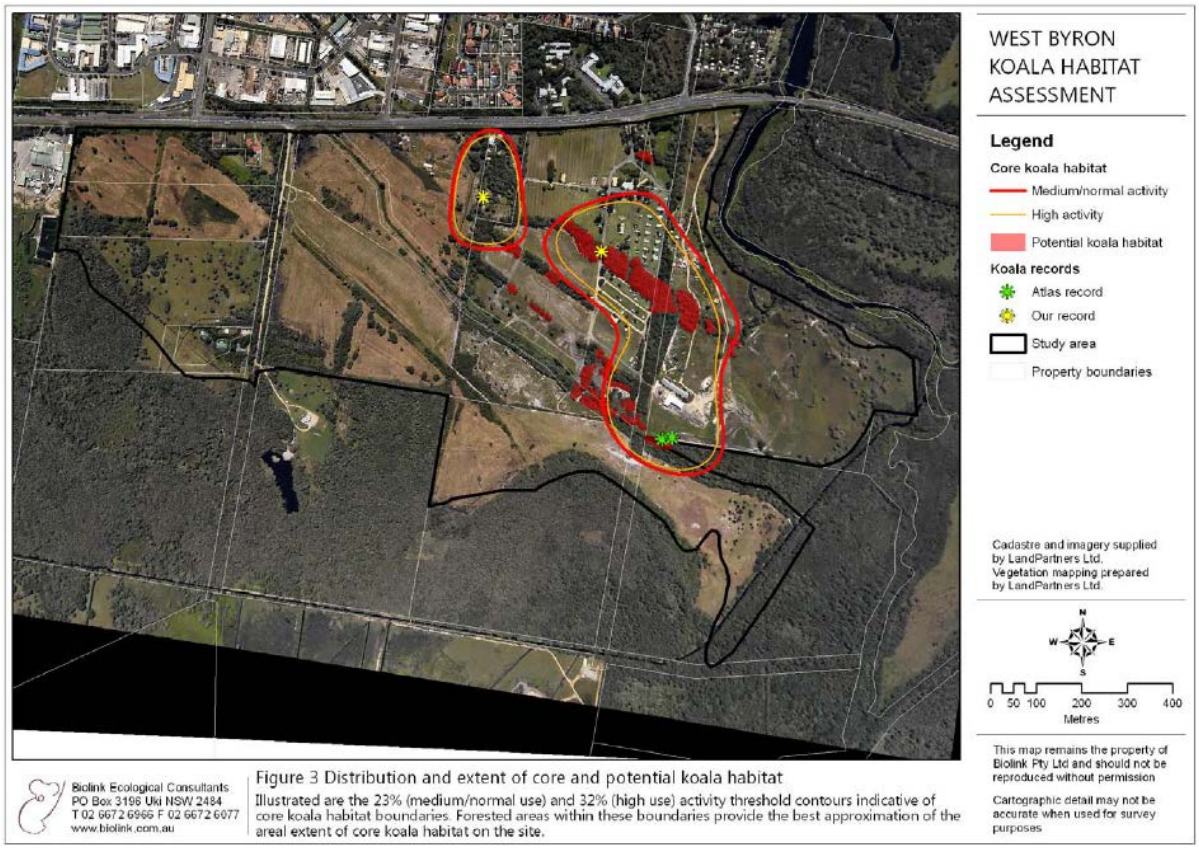


Figure 3 Distribution and extent of core and potential koala habitat
Illustrated are the 23% (medium/normal use) and 32% (high use) activity threshold contours indicative of core koala habitat boundaries. Forested areas within these boundaries provide the best approximation of the areal extent of core koala habitat on the site.

...

The two 2007 records from the site along with our observations of two koalas during the course of fieldwork clearly establish the presence of the species on the site. Additionally, and more importantly perhaps, activity levels recorded at the majority of our field sites clearly exceed those thresholds specified as being indicative of the presence of core koala habitat and representative of occupancy by a resident population. Thus we conclude that core koala habitat is present within the study area and hence a Koala Plan of Management that effectively addresses the requirement to manage such areas for the conservation of koala population will be required to accompany any Development Application for this site.

...

... we identify two broad options which may form the basis for planning use of the site in consideration of the above. These options are as follows:

(i) Excluded development

This concept would require designation of a koala habitat area focused on the mapped areas of core koala habitat and from which all development would be excluded. This approach may allow some modification of currently unoccupied areas of potential koala habitat for the purposes of development, but would require adequate compensation in the form of replanting of potential koala habitat that serves to ultimately increase the total area of protected koala habitat while at the same time decreasing current edge to area ratios.

(ii) Integrated development

This concept infers integration of koalas and their habitat into any (re)developed landscape in a way that does not place continued persistence of the population in jeopardy. Along with the specific principles outlined above, development design would incorporate such factors as larger lot sizes (to an extent that retention of food trees in situ is feasible), remnant embellishment with associated (food) tree plantings, a prohibition on the keeping of domestic dogs and vehicle calming devices on any proposed roadways.

To refute Biolink's results the proponents engaged another company Australian Wetlands Consultancy Group (AWCG) to prepare an Ecological Study. They spent 3 nights spotlighting in Nov

2010, observing 2 Koalas one night and one on the third night, which they considered could be a repeat. They also undertook scat searches at 36 survey plots, recording Koalas at 11 plots. .

The developer's decided not to admit that core Koala habitat actually existed, instead stating:

> *Core Koala habitat is likely to occur, and therefore a Plan of Management would be required for the future development of the site once the rezoning process has been finalised.*

Meanwhile Byron Shire Council were in the process of preparing their Byron Coastal Plan of Management, the first step of which was to undertake a habitat study. In 2012 the Byron Coast Koala Habitat Study (Biolink 2012) identified significant patches of primary Koala habitat as occurring at West Byron, and recognise this habitat as part of an isolated population of around 240 Koalas extending from the Brunswick River south to Broken Head. Within this range 5 "cells" of high activity were identified, with two major koala population centres identified; Myocum – Tyagarah, and West Byron. West Byron extends through Cumbebin Swamp in the east to the West Byron Urban Release Area. Biolink note:

> *The presence of a resident population cell at West Byron was also alluded to by the analysis of historical records, confirmed by field sampling and supported by previous work in the area (Phillips and Hopkins 2010b).*
>
> *...*
>
> *While transient koalas ultimately contribute to overall population size, the primary focus of conservation and management efforts must be to maintain and ultimately increase those areas currently occupied by the main resident (source) populations of the area. Thus it remains that the bulk of the BCSA's koala population is contained within the Myocum – Tyagarah, West Byron and Mullumbimby localities.*

Biolink recommend:

> *... there is a need to not only recognise currently occupied areas as core koala habitat and implement management accordingly, but also for areas of high quality koala habitat to be afforded the highest level of importance and protection.*
>
> *There will be a need for adoption of a standard Development Control Plan to ensure that all future developments in the vicinity of the remaining areas of koala habitat and/or any resulting KMA consistently result in implementation of 'best-practice' koala-friendly planning measures.*

In a supplementary submission to DoPI Council identified the need for significant changes to the zoning and DCP for them to comply with Council's draft Coastal Koala PoM, noting:

> *... Council is concerned about likely impacts on the local koala population that would result from the proposed rezoning and development of the West Byron Urban Release Area. The release area is within the area covered by the CKPoM, is currently occupied by koalas and is core koala habitat.*
>
> *... Significant north−south koala habitat linkages have been identified at the eastern edge of the release area (alongside Belongil Creek) and its western edge, which are required to be maintained and restored to retain and improve connectivity between currently isolated populations throughout the coastal area.*
>
> *The CKPoM will aim to ensure that development within a Precinct must be 'koala friendly;' not only to ensure no adverse impact on existing koala communities but also to enable the long−term persistence of resident koala populations. To that end any application to amend the Byron LEP must address all of the requirements of the Plan, which includes the following specific planning controls:*

- *Any rezoning proposal which includes preferred koala habitat must include a Vegetation Assessment Report to ensure that koala habitat is correctly identified*
- *Any rezoning proposal within Preferred Koala Habitat, a Linkage area, or a KMP must include a Koala Habitat Assessment to ensure that the extent of any habitat occupied by koalas is correctly assessed and any potential for negative impact can be identified.*
- *Within a KMP, inter alia:*
  - *There shall be no removal of any preferred koala food trees > 200mm dbh.*
  - *The keeping of domestic dogs on any new residential lots arising from the subdivision of land shall be prohibited by Covenant and/or Community Title Management Statement.*
  - *Road design standards and/or approved vehicle calming devices must be incorporated such that motor vehicles are restricted to a maximum speed of 40km/hour within a development area.*
  - *Any Asset Protection Zone (APZ) must be provided within the development area and must not result in the removal of koala food trees.*

The rezoning proposal for West Byron has not included any of this analysis and therefore it is not possible to provide an assessment of the impact of any development of the West Byron Urban Release Area in respect of koalas and the requirements of SEPP 44.

The Office of Environment and Heritage (OEH) Submission of 16 October 2012, Attachment 1: OEH detailed comments − proposal to list West Byron Bay as a State Significant Site

Koalas

The West Byron area is part of a Koala Management Area (KMA) in the Byron Coast Koala Habitat Study (Biolink 2012). Primary koala habitat in the West Byron KMA comprises forests and remnant trees dominated primarily by Swamp Mahogany. Both older records and recent survey evidence show historical koala usage of these areas. Accordingly, this habitat meets the definition of Core Koala Habitat within the meaning of State Environmental Planning Policy No. 44 − Koala Habitat Protection.

The koala population in this locality is of a genetic makeup already known to be more sensitive to disturbance than other populations. The subject land is therefore proposed to be encapsulated in the West Byron Koala Management Precinct within the Byron Coast Comprehensive Koala Plan of Management. The West Byron koala population will also be identified as an important population for the purposes of the Environment Protection and Biodiversity Conservation (EPBC) Act 1999.

The Environmental Assessment (Planning Report) prepared by Landpartners (June 2011) states that the koala population recorded on the site is most probably migratory rather than resident. This statement appears misleading and may lack scientific credibility given the historical and current use of the site by a number of koala individuals. The Planning Report also states that the area and number of koalas is too small for a viable population, even though this area is part of a wider population cell and an area of habitat.

The subject site should not be assessed in isolation from the surrounding area. Additionally, the Planning Report states that koalas should be encouraged away from the site and that compensatory habitat can be established nearby. Such an approach, however, does not take into consideration that the Swamp Mahogany remnants within the site are part of the core habitat presently used by koalas and that any compensatory habitat establishment has at least a ten year time lag. The statements in the Planning Report are therefore inconsistent with respect to maintaining the Swamp Mahogany forest remnants whilst encouraging exclusion of koalas that presently utilise the trees.

> *Further, the statement that revegetation along Belongil Creek and other areas will mitigate the impacts of infilling the site with urban development does not take into account the current pattern of use of the area by individual koalas that will be displaced. Revegetation, whilst encouraged, will be of no use to existing koalas for at least ten years.*
>
> *The Byron Koala Advisory Group at its meeting of 8 October 2012 determined that the proposal is likely to result in the demise of the koala in this area due to impacts from urban development, the removal of Swamp Mahogany trees, as well as the introduction of dogs, cars and disturbance. The recommendations from this meeting are as follows:*
> - *Reduce the size of the urban footprint by incorporating the southern and eastern areas of the site into environmental zones (for habitat restoration);*
> - *Require a staged development footprint to enable the cleared urban areas in the north of the study site to be developed initially, thereby protecting the existing lineal strips of Swamp Mahogany trees on the site and allowing time for the environmental restoration areas to be restored to a size preferred by koalas prior to developing the remainder of the site as a second stage;*
> - *Ensure that the linkage to the north east of the site is protected and enhanced.*
>
> *In this regard, the zoning plan provided to the Department of Planning and Infrastructure from Byron Shire Council (21 August 2012) addressing impacts on the koala is supported by OEH, as well as the inclusion of specific controls in the draft DCP for the site in relation to the staging of the development, koala friendly design (i.e. 40kph roadways, no dogs or cats), and fencing of the E2 and E3 zones to prevent koalas from entering urban areas.*

Though the DoPI were not to be swayed by arguments for further assessment of Koalas or the need to modify the developer's proposal. In November 2013 the DoPI exhibited their proposed draft State Environmental Planning Policy for the site, which was basically that put forward by the proponent with minor changes. This included the proposed rezoning and a draft Development Control Plan (DCP) for the site.

The DoPI didn't seem to have any understanding of Koala ecology and appeared to have sided with the developers against the advice of OEH and Byron Shire Council. The developers, and their consultants Austeco (Smith 2012), went to great lengths in their attempts to denigrate the importance of West Byron for Koalas in order to successfully convince DoPI to ignore the recommendations of the Office of Environment and Heritage (OEH) and Byron Shire Council (BSC), as well as their legal obligations. Smith (2012) going so far as to make the outrageous claim that:

> *This habitat has the potential to act detrimentally to regional koala conservation and population viability by attracting koalas across Ewingsdale Road from the north exposing them to potentially fatal collisions with motor vehicles.*

Many of Smith's (2012) claims were based upon unsubstantiated conjecture and were not supported by the available evidence. To the contrary the evidence suggests a fragmented coastal population, relying on small isolated patches of core habitat, that depends upon dispersal amongst the population for their ongoing viability and persistence. The habitat within the site is obviously core Koala habitat supporting at least 2 Koalas and is a vital link for maintaining connectivity between Kolas to the north and south. Given the small patches of primary habitat south of Ewingsdale Road and the low numbers of records, the more likely scenario is that as proposed the West Byron suburb will isolate Koalas to the south of Ewingsdale Road, making them unviable and leading to their extinction.

BEACON made a significant issue of this in their submission to DoPI, detailing evidence that contradicted the claims made. BEACON expected that at the very least the DoPI would obtain independent expert advice, particularly in light of the submissions from OEH and BSC though (as revealed by a later freedom of information request) they made no attempt what-so-ever to obtain independent advice, instead accepting the proponents position without question.

In their draft DCP DoPI also displayed their disregard for planning processes by ignoring the SEPP 44 and Far North Coast Regional Conservation Plan requirements for a Koala PoM. DoPI recognised that core Koala habitat was both proposed for clearing and to be zoned E3 (with a broad range of allowable uses). As noted by Smith (2012) E3 zones were designated as such to allow major works to be undertaken within them:

> *The location of E3 zones was chosen to allow for the construction of stormwater processing infrastructure and possibly perimeter roads. The extent of these works is to be determined in subsequent master planning, environmental management plans and additional DCPs at a later date, after rezoning but before development. .... Water treatment infrastructure will be located within E3 zones.*

DoPI's draft DCP theoretically required the preparation of a Koala Habitat Protection and Restoration Plan (rather than the legally required Koala POM) as a sub-plan of a Vegetation Management Plan, though this requirement only came into effect for *"Any application for subdivision ... of or within Zones E2 Environmental Conservation or E3 Environmental Management"*. Why would any of the property owners want to subdivide in an environmental zone?

In late 2013 Byron Shire Council exhibited their draft Byron Coast Comprehensive Koala Plan of Management (CKPoM). It mapped Preferred Koala Habitat and identified it as being "*Core Koala Habitat*" within the meaning of SEPP 44, and recommended that "*Council shall consider the merit of zoning for Environmental Protection all or some of the mapped areas*". It also proposed establishing 50m buffers around Preferred Koala Habitat, within which "*Council cannot approve a development application unless it is satisfied that the proposal will not impact on the associated area of Preferred Koala Habita*t".

The Department of Planning and Environment's Assessment Report was released in November 2014. It ignored the draft KPoM and dismissed community concerns about the Koala, which had been a focus of the community campaign, with over 1,800 people signing a Change.org petition calling for the protection of the Koalas (which the DoPE did not even acknowledge were opposed to the development). DoPE made no significant changes to the exhibited proposal aside from increasing the density of housing allowed.

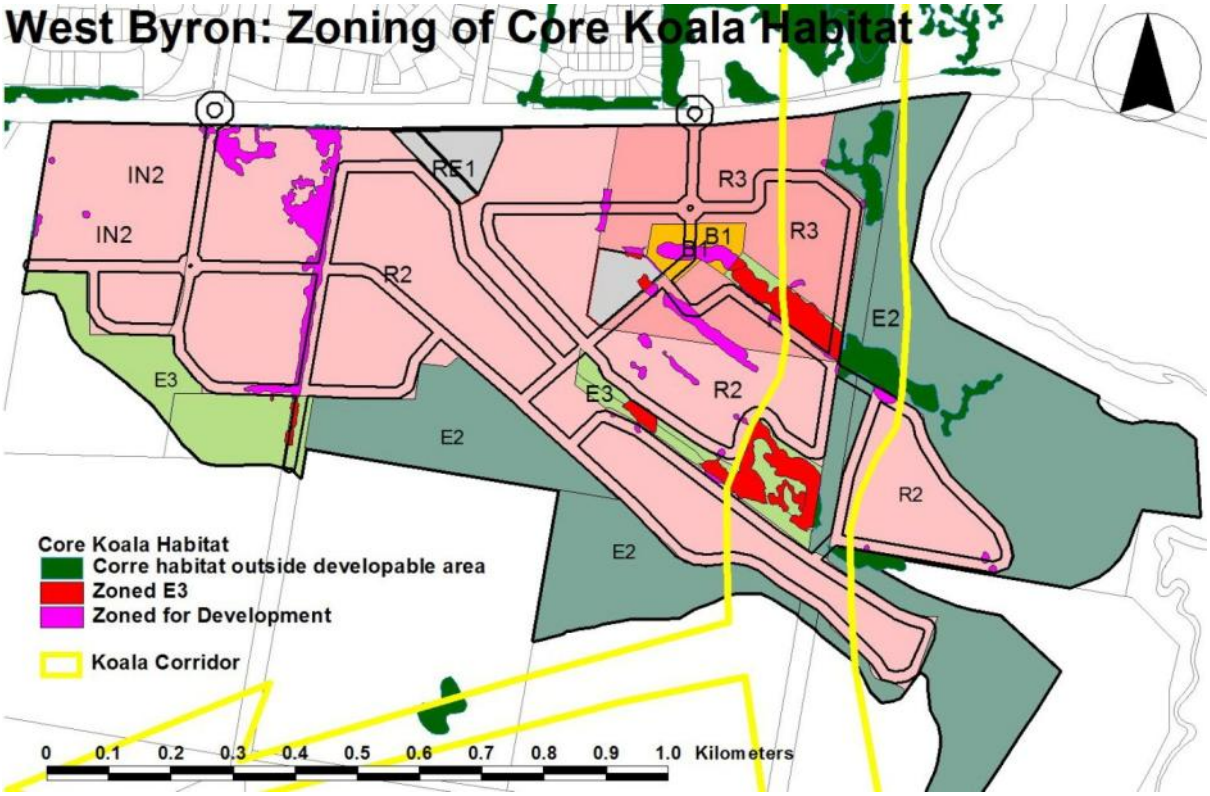
DoPE did not bother to obtain independent advice on Koalas, and decided to ignore the Byron Coastal Koala Plan of Management and the clearing of 42% of the 6.9 ha of core Koala habitat identified on West Byron, instead going along with the developer's view that *"impacts on koala habitat can be adequately mitigated and supports the consolidation of habitat along Belongil Creek"*. The fact that the strip adjacent to the creek is a sedge wetland and thus unsuitable habitat that will rapidly get inundated by rising sea levels appeared to be incomprehensible to them.

A further 32% of the core Koala habitat was identified as an E3 zone, with allowable uses including clearing for drains and Asset Protection Zones and numerous other uses. The zoning permits:

> ***79 Zone E3 Environmental Management***
> *(1) The objectives of Zone E3 Environmental Management are as follows:*
> *(a) to protect, manage and restore areas with special ecological, scientific,*

cultural or aesthetic values,
(b) to provide for a limited range of development that does not have an adverse effect on those values.
(2) Development for any of the following purposes is permitted without development consent on land within Zone E3 Environmental Management: environmental protection works; home-based child care; home occupations.
(3) Development for any of the following purposes is permitted only with development consent on land within Zone E3 Environmental Management: bed and breakfast accommodation; boat launching ramps; building identification signs; business identification signs; camping grounds; community facilities; dual occupancies (attached); dwelling houses; eco-tourist facilities; emergency services facilities; environmental facilities; extensive agriculture; farm buildings; farm stay accommodation; flood mitigation works; home businesses; home industries; horticulture; jetties; places of public worship; recreation areas; roads; veterinary hospitals; wharf or boating facilities.

Having previously proposed to do nothing for Koalas, at least DoPE now recognised that their draft DCP should be amended to require the preparation of a Koala Plan of Management before DAs were considered.



Department of Planning and Environment zoning of Koala habitat, and proposed road network at West Byron

Despite the proposal being to clear and surround core habitat for the nationally vulnerable Koala in a vital wildlife corridor, and to totally clear a wetland inhabited by the nationally Vulnerable Wallum Sedge Frog, DoPE considered "*The proposal would be unlikely to have a significant impact on species listed under the EPBC Act",* so they refused to refer it to the Federal Environment Minister. Had DoPE bothered to assess the Koalas in accord with the 'EPBC Act Referral Guidelines for the vulnerable koala (combined populations of Queensland, New South Wales and the Australian

Capital Territory)' they would have recognised that the site meets the criteria for "habitat critical to the survival of the koala".

The site is definitely Koala habitat within the context of the EPBC Act. It is also apparent that the development may constitute a primary threat, as it is likely that the proposed development being situated in mapped Koala habitat and an important wildlife corridor, will result in *"Loss, fragmentation and degradation of habitat, including dispersal habitat".*

It is also evident that the retention and enhancement of the Koala habitat on the site would constitute *"Interim recovery objectives"*. for protection and conservation of large, connected areas of koala habitat and maintenance of corridors and connective habitat that allow movement of koalas between large areas of habitat. From a national recovery perspective, this is koala habitat that is important for the long-term survival and recovery of the koala.

The process is still not complete as Byron Shire Council is still finalising a DCP for the site, and are still proposing roads and tracks through the core Koala habitat. Though even if there was a will to do something meaningful to protect Koalas on the site there is little they can do because DoPE's rezoning has sealed their fate. The preferred outcome for Koalas would have been to consolidate Koala habitat with replantings in the corridor (in areas now zoned R2 and R3), to buffer this with a low development precinct to the west, and to construct an underpass under the main road.

To the west of Byron Bay there are patches of core Koala habitat in a matrix of wetlands, urban areas, farmlands and music festival sites. An isolated population totalling some 240 Koalas has a tenuous hold on survival, having to disperse through tourist resorts, past urban areas and across the main road into town in order to access the small patches of habitat essential for maintaining a viable population. In 2009 the NSW Government took over control of a site proposed for the largest single urban development in Byron Shire's history right in the middle of the Koala corridor. The development site contains small patches of occupied core Koala habitat that are vital stepping stones for the dispersal of Koalas to the north and south of Byron Bay.

Bureaucrats in the Department of Planning were entrusted with the survival of Byron Bay's Koalas. They then proceeded to do everything they could to approve the development. They accepted the proponents claims without question, ignoring planning guidelines, expert advice, a draft Comprehensive Koala Plan of Management and strong community opposition. They did not bother to seek independent expert advice, and at one stage were not even proposing that a Koala PoM should be prepared at a later stage. The outcome was to rezone 42% of the 6.9ha of core Koala habitat on the site for housing, another 31% was included in an E3 zone with a long list of allowable uses, and large areas around and up to the edge of the remaining core Koala habitat were zoned for medium density housing. Their draft Development Control Plan also proposed a network of roads and tracks around and through the core Koala habitat. Council is now in the process of finalising the DCP for the site. It is only after this is done that the developer will then be required to prepare their own Koala Plan of Management. There is something very wrong with a process that leaves the preparation of a Koala Plan of Management up to the last step after much of the damage is done by ignorant bureaucrats, and then lets the developer prepare their own.

2.1.5. Case Study 5: Bluesfest

In 2008 the Blues Festival (Bluesfest) submitted a Development Application for the use of a property at Tyagarah as a venue for the Bluesfest for just one event The Byron Shire News (19 June 2008) reported that "*Festival director, Peter Noble, last week made it very clear there would be only one music festival a year at the site*".

Byron Shire Council Approved the DA in 2009 on a trial basis to 2012 for an annual five day festival with a maximum of 20,000 people per day.

Both the approved festival site and immediately adjoining lands were known to be used by koalas. A site-specific Koala Plan of Management was prepared, with a further program of koala habitat assessment and monitoring of individual koalas on the site through radio-tracking required by the Department of Planning as a condition of consent.

In 2011 Council approved a Section 96 application to modify the lapse date to enable the Bluesfest to occur annually from 2015 up to and including the year 2021. In 2013 approval was given for an additional 3 day event Boomerang Festival in 2013 and 2014. In 2014 the Bluesfest approval was made permanent. A development application was lodged with Byron Shire Council in 2014 seeking consent to change the existing approved use (being a single annual five-day event) to allow

- Small Event: Not more than 2,000 people No restriction on frequency of events
- Medium Event: Between 2,000 to 15,000 people Maximum of 10 *event days* per annum
- Large Event: Between 15,000 to 25,000 people Maximum of 10 *event days* per annum

Phillips (2016) undertook radio-tracking of Koalas to identify the impacts of the first Bluesfest of the site in 2010, identifying that he monitored the movements of seven koalas before, during and after the first five-day music festival, noting:

> *During the monitoring program koalas occupied home-range areas of 0.6–13 ha with one or more core areas of activity. Aversive behaviour in the form of evacuation of known ranging areas was demonstrated by three koalas that had core areas within 525mof the approximate centre of the festival area, the associated responses comprising movements that were perpendicular to and away from staging areas where music was played. Responses contained within known ranging areas were observed in three other koalas whose core areas were located up to 600m away. The type of response appeared related to the proximity of koala home ranges to music-staging areas, while the maximum distance associated with an aversive response was 725m.*

Based on the 2010 monitoring outcomes and that undertaken in 2012 by FitzGibbon and Ellis (2012), Biolink (Phillips 2013) prepared an addendum to the draft Byron Coast Comprehensive Koala Plan of Management in which they identify:

i. *there was a trend towards a lesser number of animals being present on the site during the 2012 event than were present during the inaugural event in 2010 (7 vs 11);*
ii. *there was a low number (n = 1) of recaptures between the 2010 and 2012 monitoring events, implying a high level of population turnover in the interim period within which a further festival event occurred;*
iii. *both studies reported unusually high levels of koala mortality ...; and*
iv. *both studies reported aversive behavior in a similar proportion of individual koalas for which adequate radio-tracking data sets were available.*

Phillips (2013) concluded:

> *...in all instances the koalas who demonstrated aversive behavior were those generally within a distance of up to 500 metres from the staging areas. Moreover, the vacating of home range areas was also most commonly associated with the duration of the "musical" component of the event (i.e. not the "bump-in" or "bump-out" phases). The long term implications of this behavior are uncertain, but should not be discounted or trivialised (adult koalas normally exhibit strong fidelity to their individual home range areas) given the potential over successive events for the permanent vacating of suitable habitat areas within the sphere of disturbance created by the musical component of the event may ultimately result.*

Byron Shire Council's 2013 draft Coastal CKPoM stated:

> *Monitoring of koala movements when exposed to the impacts of amplified sound associated with music festivals has confirmed aversive behaviour in the form of evacuation from individual home range areas. Data suggests a critical distance of ~ 650m is involved, the implications being that over the course of repeated festival events such areas of habitat as are present within the critical distance will not just be vacated by koalas but also be no longer capable of supporting anything other than transient use by koalas.*

The 2013 draft Coastal CKPoM proposed that "*all identified areas of Preferred Koala Habitat within a radius of 650m from any proposed stage areas must be assessed as lost to use by a resident koala population",* and that *"an identical area (or areas) of Preferred Koala Habitat must be created to replace that which must be assessed as lost to koalas*".

In October 2013, based on concerns raised about Bluesfest, Byron Shire Council refused a recommendation that Council's draft Coastal CKPoM go on public exhibition, instead resolving that first a stakeholder workshop for music festivals would occur and that the Project Reference Group (PRG) overseeing the plan's preparation would be required to conduct a subsequent review of the Koala Plan of Management, and that if the PRG and the festival promoters can't agree then an independent review will be commissioned.

Echonet (October 17, 2013) reported that Friends of the Koala president Lorraine Vass put this outcome down to the influence of Bluesfest director Peter Noble, stating "*that the interests of one landholder can delay exhibition of the instrument that is aimed at addressing the bigger picture of koala survival in Byron's coastal areas demonstrates councillors' inadequacy to deal with inordinate influence*".

Byron Shire Council's 2013 draft Coastal CKPoM was exhibited on 11 February 2014 after being changed to reduce the distance from 650m down to 500m, and to be more equivocal about impacts, stating:

> *Monitoring of koala exposed to the impacts of amplified sound associated with music festivals indicates that such exposure may cause aversive behaviour in the form of evacuation from individual home range areas.*
>
> *Some Koalas respond by temporarily moving outside of their normal home ranges during some events. Data suggests that koalas residing within 500m are more likely to be affected, although responses may vary between sites and events. As such koala use of habitat within a 500 m radius of a festival may be reduced and enhancement or compensation is sought.*

Steve Phillips findings were reported in the Sydney Morning Herald on January 21 2016 and strongly criticised by Sean FitzGibbon from the Koala Ecology Group at the University of Queensland, the consultancy team for Bluesfest, who responded "*It is commonly known stress predisposes animals to disease, but there is not a lot of evidence to say this occurs in koalas.*", "*The conclusions from Mr Phillips' study are not supported by the data we have collected in the four years since*", and "*koalas stress responses from the festival were "minor*"".

FitzGibbon *et. al.* (2016) refuted Phillips (2016) conclusions, stating:

> *We conclude that Phillips' paper is based on sufficient data to state that three, not six, of the koalas he studied displayed a short-term behavioural response to the music festival. These koalas temporarily moved outside of their estimated ranges during the festival period (10–80m).... For the two deaths that are reported, no mention is made that these koalas had pre-existing disease. Rather, the author raises the possibility that the mortalities may have been related to festival-induced stress.*

Phillips (2013) does consider that Sean FitzGibbon's 2012 results confirmed his 2010 observations. To help resolve the issue, the results from the 2010, 2012 and 2013 monitoring surveys, the only ones available online, were reviewed. It is clear that both the 2012 and 2013 monitoring results confirm Phillips' concerns. Note that for this review only approximate distances to the "even site" where concerts were held are identified, the distance to the actual stage was not ascertained.

The 2010 Koala monitoring report by Biolink (Hopkins and Phillips 2010) identifies that for various periods over 6 months around the inaugural 2010 Bluesfest (1st-5th April 2010) 11 Koalas were radio-tracked, at least 6 of which died "*one was most likely attributable to capture stress/myopathy*" and for 4 "*it is possible that the combination of the animals' already compromised state and festival activity contributed to the deaths of these animals*". At least four of the six koalas for which sufficient data was available demonstrated aversive behaviour.

For the 10 inaugural Koalas aged, one was 2 years old and the remaining 9 were 4-7, with an average age of 4.5 years. Hopkins and Phillips (2010) note "*population is generally in good condition with sufficient levels of reproductive output, a notion supported by the approximately normal distribution of age classes amongst captured animals otherwise indicating a demographically stable population*". The "*population estimate for the site and immediate surrounds of between 20-30 animals*".

Hopkins and Phillips (2010) recommended "*constraining use of the site for other activities (including any further large-scale music events) to times outside critical temporal components of the koala breeding season*", identifying this as September-January. They made a number of other sensible recommendations, as well as establishing permanent monitoring plots, that seem to have been subsequently ignored.

The 2012 Koala monitoring report by the Koala Ecology Group (FitzGibbon *et. al.* 2012) identifies that for various periods over a year around the 2012 Bluesfest (5th–9th April 2012) 6 adult, and one baby on its mother, were radio-tracked. Average age (excluding the baby) was estimated to be 3.5 years. At the start of the survey one Koala (Ginger) caught was considered so sick she was euthanized. From casual observations another 3 Koalas were thought to use the site, giving a total of 11 Koalas. In February one tracked male (Chillago) was found dead and no sign of a young tracked Koala (Wizza) was found again, leaving 5 that were radio-tracked during the Bluesfest:

Punta used vegetation near the event site, had a home range of 5.7-9.1, remained within his home range but retreated to an area furthest from the event area (the same refuge used by Bonnie the next year) around 350m from the event site.

Red Tag used vegetation near the event site, had a home range 8.3-9.5ha, stayed within her home range around 350m from the event site though didn't move far, but "*When she was again tracked in mid-June her carcass was found at the base of a tree, also within her usual home range area*".

Dax used the vegetation around the event site, had a home range 22.1-26.3ha, but retreated to an off-site area well outside her home range (the same refuge used by Iggy the next year) around 570m from the event site.

Carter used vegetation near the event site and outside the site home range 8.9-9.0ha, "*moved 50– 110m outside of his usual home range area, away from the centre of the Bluesfest site*", located some 400m from the event site.

Wizza was a male who was found shortly before the Bluesfest, he stayed in a small area around 200m from the event site during the event, and was "found dead floating at the edge of Simpson's Creek on the 24th April 2012"

In their conclusions, FitzGibbon *et. al.* (2012) did not consider the death of at least 4 of 7 (57%) of the monitored Koalas (excluding the missing young) warranted mention. FitzGibbon *et. al.* (2012) concluded:

> *... two of the GPS-collared koalas showed no signs of aversive behaviour or physiological impacts as a result of the 2012 Bluesfest event. However, the other two GPS-collared koalas that were alive during the event demonstrated slightly aversive behaviour towards Bluesfest 2012. Sometime in the month leading up to the start of the festival, these letter two koalas moved outside of what was estimated as their normal home range areas.*

The 2013 Koala monitoring report by the Koala Ecology Group (FitzGibbon *et. al.* 2013) identifies that for various periods over a year around the 2013 Bluesfest (28th March–1st April) up to 6 Koalas were radio tracked, three of which died during the monitoring (a high 50% mortality), one was reported dead a few weeks before the festival. Average estimated age was 4.4 years. Casual sightings were considered to represent another 2-3 Koalas, giving a total of 8-9 Koalas. Only 3 Koalas (Brooke, Iggy and Bonnie) were tracked during the festival.

Brooke had a home range of 5.9ha, she was only located offsite in that part of her range furthest from the event site during the festival (over 600m).

Iggy, a young healthy male, had a home range of 4.9ha, remained offsite near the centre of his territory during the festival which was over 600m from the event site. Iggy, was found dead 2 weeks after the festival, which was described as "mysterious".

Bonnie a female with "good body condition" had a home range of 2.7ha and was the only Koala in close proximity to the event site, she used that part of her territory furthest from the event site during the festival and didn't move far, this was only some 350m away from the event site. She was recaptured over 6 weeks after the festival in extremely poor condition, FitzGibbon *et. al.* (2013) noting:

> *She was recaptured in late May at which point she was taken to Australia Zoo Wildlife Hospital (AZWH), as her body condition had deteriorated, her bladder wall was thickened (ultrasound) and her right eye was protruding abnormally ... Due to the advanced cystitis of this koala, the tumour behind her right eye and her lack of*

> *responsiveness to treatment at Australia Zoo Wildlife Hospital, the veterinarians at that facility euthanised Bonnie three weeks after she was admitted.*

In their conclusions, FitzGibbon *et. al.* (2013) did not consider the death of 50% of the identified Koalas, including the only one that remained in proximity to the stage area, warranted mention, stating:

> *...it is concluded that the Bluesfest event did not have a negative impact upon these animals. However, none of these three koalas were located in the vegetation corridors; none of them were as close to the festival events as some of the koalas monitored in 2010 (see Hopkins and Phillips) and 2012 (see FitzGibbon and Ellis), which showed mild aversive behaviour.*

It is extremely concerning that the data presented (including casual observations) shows the numbers of Koalas appears to be declining (from 11 down to 8-9), in both 2012 and 2013 over 50%of the identified Koalas died, there was not a single identified recapture of the 2012 Koalas in 2013, and the apparent Koala use around the event site appears to be declining. These results clear support Phillips (2013, 2016) concerns from the 2010 and 2012 results. The evidence is that the Bluesfest site is now sink habitat, an area where mortality outweighs reproduction.

Though it is profoundly concerning despite the effort spent on studying the Koala population and the Ecology Research Group have not identified any of these obvious problems, only referring to "*mild adversive behaviour*". In his review for Bluesfest, Colvin (2014) considers that these findings "*revealed that there were no significant or lasting impacts upon the local Koala population*". What happened to the survivors of the 2012 Bluesfest: Carter, Dax, and Punta? Why don't those charged with their welfare care?

In accordance with the Environment Protection and Biodiversity Conservation Act 1999 draft Koala referral guidelines, Colvin (2014) assessed potential impacts of the proposed increase in events on the Koala to determine whether the proposal may require referral to the Federal Environment Minister, identifying that the "*site contains habitat critical to the survival of the Koala*" and "*would impact on Koala habitat within the coastal zone*" but that referral "*would not be required as there is a low risk of significant impacts occurring*".

The latest version of the draft Byron Coast CKPoM, requires the planting of compensatory Koala habitat for any core Koala habitat within 500m from the centre of the staging areas "*based on replacement ratio of 1:1 and may be discount by up to 50% of the total area, if no vegetation is to be removed*", stating:

> *Monitoring of koalas exposed to the impacts of amplified sound associated with music festivals indicates that such exposure may cause aversive behaviour in the form of movement within and out of individual home range areas.*
>
> *Some koalas respond by temporarily moving outside of their normal home ranges during some events. Data suggests that koalas residing within 500m are more likely to be affected, although responses may vary between sites and events. As such koala use of habitat within a 500m radius of a festival may be reduced and enhancement or compensation is sought.*

Colvin (2014) identifies that "*finalisation of the BCKPoM will have no bearing on any activities at the site due to the approved KPoM already being in place*". FitzGibbon *et. al.* (2013)A identifies that the Bluesfest KPoM requires that "*future habitat enhancement should be focused on consolidating habitat within and adjacent to the eastern forest*". As compensatory plantings for the proposed dramatic increase in events Colvin (2014) proposed planting Swamp Mahogany (Eucalyptus

robusta) spaced at 25m centres, at least 25m from remnant vegetation, within carparking and camping areas. He notes that these plantings are intended to "*rescind the off-site compensation measures required under the approved KPoM*" and presumably the need to consolidate habitat.

Despite these damning monitoring results in February 2014 the Department of Planning and Infrastructure (Steve Murray 20 February 2014) approved a new Draft Koala Plan of Management for increased festivals on the Bluesfest site under clause 13(1) of SEPP 44, noting:

> *If monitoring during year 1 and 2 of the program shows that habitat within the 500 metre offset area is being used by resident koalas then the revegetation program can be adapted/reduced to reflect the new offset area.*

The use of a property known to have a significant Koala population at Tyagarah, near Byron Bay, for holding an annual 5 day Blues Festival for 20,000 people (Bluesfest) was approved in 2009 for a trial period until 2012. A site-specific Koala Plan of Management (IKPoM) was approved with the Department of Planning requiring a further program of koala habitat assessment and monitoring of individual koalas on the site through radio-tracking. The first festival was held in 2010 and the results of Koala monitoring showed at least four of the six koalas showed aversive behaviour (leaving their home ranges or retreating to the edge of their ranges away from the music), and 6 of 11 dying (some from the stress of capture). On the second monitoring in 2012 there was an overall population decline, only one recapture, 4 of 7 Koalas died, and a number of koalas showed aversive movements. On the third monitoring in 2013 there was a further population decline, there were no recaptures, 3 of 6 Koalas died and a number of koalas showed aversive movements.

The evidence is that core habitat has been converted into sink habit with high mortality and a declining population. The first consultant to Bluesfest expressed alarm at the aversive behaviour and high death rate, in part due to the capture process. Subsequent consultants attacked his credibility and ignored their own results by claiming there is no significant or lasting impacts. Despite the concerning results, in 2011 Bluesfest was given permanent approval. In 2014 Bluesfest applied to be allowed to increase their number of festival days from 5 to 20 with an unlimited number of smaller events.

Despite their required monitoring revealing a declining population and high mortalities (in part due to the monitoring), undeterred, in February 2014 DoPI gave approval for a revised KPoM based on a fourfold increase in large events and unlimited smaller events, subject to yet more monitoring, this time aimed at reducing compensatory habitat. Advice to avoid more events in the breeding season, along with other mitigation measures, were ignored.

This is a rare example of monitoring actually being undertaken, though the alarming results appear to have had no effect on outcomes, aside from apparently increasing Koala mortality. While the department was provided with differing interpretations from experts, they appear incapable of undertaking an independent evaluation, instead uncritically adopting the proponents position.

2.1.6. Case Study 6: Coffs Harbour CKPoM core Koala habitat.

The Coffs Harbour City Comprehensive Koala Plan of Management was the first to be prepared in New South Wales under SEPP 44 in 1999. It was prepared as a joint initiative by the NSW National

Parks and Wildlife Service and Coffs Harbour City Council. The significance of this is major given later events, it is labelled "*A Joint National Parks and Wildlife Service and Coffs Harbour City Council Initiative*" and it is stated that the Department of Urban Affairs and Planning assisted with the planning components of the Koala Management Plan. Its four authors were all NPWS employees, its recommended citation is:

> *Lunney, D., Moon, C., Matthews, A., and Turbill, J. 1999. Coffs Harbour City Koala Plan of Management. Part A The Plan. NSW National Parks and Wildlife Service, Hurstville.*

It covers the whole of the LGA, and in 2000 was given conditional approval by the then Director General of the NSW Dept. of Planning and was incorporated into the CHCC Local Environment Plan 2000 (LEP 2000). Lunney *et. al.* (2016) confirms *"ratification of the CKPoM by Coffs Harbour City Council in 1999 and the State Government in 2000".* It is the only CKPoM to assess and map core Koala habitat across its planning area, with maps depicting five habitat types which are aggregated into primary, secondary and tertiary habitat.

Clause 12 of the LEP 2000 requires the consent authority (council) shall not grant consent to any development on lands mapped as Primary, Secondary or Tertiary Koala Habitat or on lands adjoining Primary Koala Habitat unless the development is in accordance with the KPoM.

Lunney *et. al.* (2016) identifies that despite the CKPoM Koalas still faced challenges: "*Foremost among these challenges was loss of habitat, with areas marked as primary Koala habitat in the CKPoM cleared in late 2000*".

In 2011 the North Coast Environment Council identified that since 2007 the Private Native Forestry (PNF) Division of the NSW Department of Environment, Climate Change and Water (DECCW) had approved 60 separate logging applications covering almost 2000 hectares of the 19,000 ha identified core koala habitat in the Coffs Harbour Local Government Area contrary to SEPP 44. It is probable that before then logging was being undertaken in core Koala habitat using the PNF exemption.

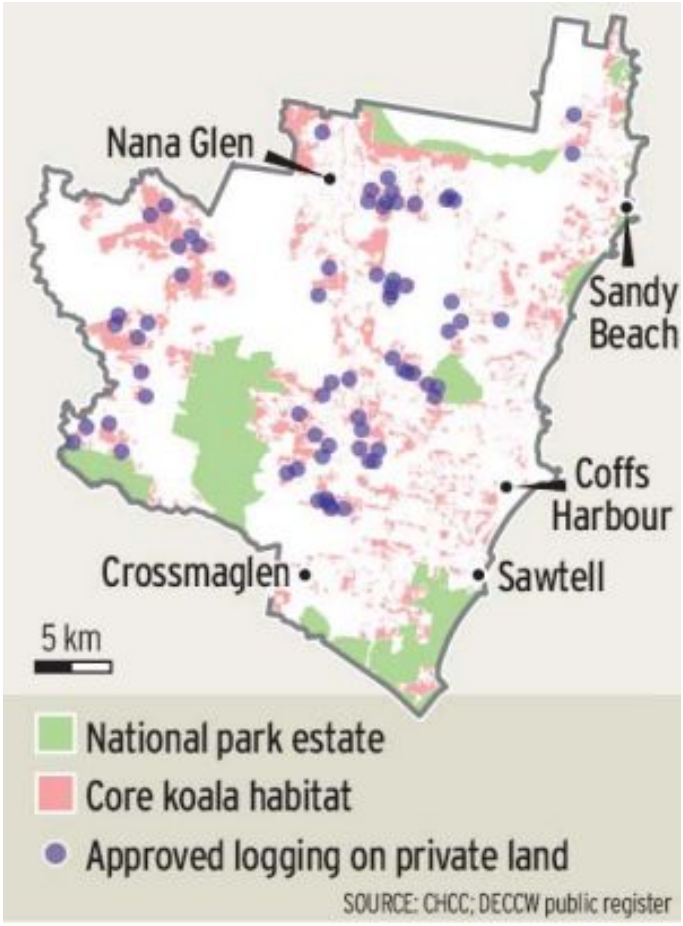
The Sydney Morning Herald (4 January 2011) reported:

> *The department does not dispute the council's figures, but said the Coffs Harbour koala plan of management, which identifies the vulnerable species' local habitats, is not officially gazetted.*
>
> *Because of this, the prohibition on logging that normally applies to important koala habitats under state environmental planning policies could not be enforced in that council area, the department's director of landscapes and ecosystems conservation, Tom Grosskopf, said.*
>
> *"We're helping them to get their plan updated and get it going," he said.*
>
> *But local environmentalists are appalled and have accused the department of playing word games. The environment council's vice-president, Susie Russell, said the department knew full well where the region's key koala areas were. It had been integral in mapping the habitats, but was ignoring the results and approving their destruction.*

The Coffs Harbour Advocate (29 January 2011) reported DECCW's Director of Landscapes and Ecosystem Management Tom Grosskopf as claiming:

He said one of the problems was the Coffs Harbour Plan of Management did not fall under the NSW environmental planning policy but rather the council had its own detailed plan and had written themselves out of the state plan.

The only solution would be for either DECCW to change their code of practice or the council to change their Local Environment Plan.



The Coffs Harbour Advocate (29 January 2011) reported Coffs Harbour City Council's acting director of land use, health and development, Robert Percival, as stating:

"There have been significant differences of opinion between DECCW and ourselves regarding the application of our koala plan of management and where it sits in the overall legal framework," Mr Percival said.

"We thought our koala POM applied, but DECCW has been saying it doesn't. There are clearly holes in the process and we need to get to the table and sort out where the differences are. We need to get back to the original intent of the plan, which is for the protection of koalas."

He said the council's koala plan of management had been prepared in consultation with the National Parks and Wildlife Service (now part of DECCW) and the Department of Planning.

"We complied with all statutory processes required in the preparation of the document, which is part of our Coffs Harbour Local Environment Plan."

It is revealing that the Department of Planning and Environment website (http://www.environment.nsw.gov.au/animals/KoalaConservation.htm) identifies that the Coffs Harbour City Comprehensive Koala Plan of Management 1999 is one of only "*Four plans [that] have been adopted and approved by the Department of Planning and Environment*".

The Coffs Harbour Advocate (29 January 2011) reported DECCW as stating:

> *DECCW says it has a schedule of councils listed in their State Environment Planning Policy for Koala Habitat (SEPP 44) and Coffs Harbour does not appear on it.*
>
> *The department also says it is not aware of any advice from the council that logging approvals it has issued may have been illegal.*

The President of the North Coast Environment Council, Jim Morrison, responded in a media release (31st January 2011) accused the environment department of "*lying about logging in core koala habitat*", releasing excerpts from letters from Coffs Harbour City Council showing that it had been raising concerns about approval of logging in core koala habitat for 16 months:

> 29th September 2009:"*Multiple Agreements have been issued by DECCW for properties containing Primary, Secondary or Tertiary Koala Habitat as mapped by the Coffs Harbour Koala Plan of Management (KpoM)*".
>
> 17th August 2010: "*At that meeting you gave a verbal commitment to provide legal advice from your Department regarding the various concerns Council had raised…..That advice to Council remains outstanding*".
>
> 17th August 2010: "*The concerns expressed by Council have not abated as DECCW continues to issue approvals for logging over legally defined and mapped 'core koala habitat*".
>
> 6th january 2010:"*It is therefore perplexing to see that the NSW Government and in particular DECCW which has carriage to protect koalas as a vulnerable species, is causing the destruction of large tracts of core Koala Habitat and their consequent demise*".

Then Shadow Environment Minister, Luke Foley, (8 November2011) claimed that the Mid North Coast Group of Councils had still not received a reply from a letter they wrote to Robyn Parker on August 19, 2011 stating:

> *"It is understood that the [Office of Environment and Heritage] have issued a number of Property Vegetation Plan approvals in core koala habitat."*
>
> *"In line with the objectives of the Native Vegetation Act and the aims of the State Koala Recovery Plan it is considered highly inappropriate to koala conservation and recovery to permit forestry in areas of core koala habitat."*
>
> *"Accordingly the Mid North Coast Group of Councils seek an immediate policy commitment from the Minister for the Environment that* [Office of Environment and Heritage] *will implement the koala prescriptions within the PNF Code of Practice in accordance with the objectives of the Native Vegetation Act."*

Something is fundamentally rotten with a system when a government department can prepare a CKPoM that they claim identifies core koala habitat in accordance with SEPP 44, and then 7 years later the same department starts issuing PVPs and logging approvals over that same core Koala habitat in contravention of SEPP 44 while claiming the CKPoM they had approved was invalid.

in 1999 the NPWS assisted Coffs Harbour City Council to prepare the first Comprehensive Koala Plan of Management in NSW, and the only one to identify core Koala habitat across a Local Government Area in accordance with SEPP 44. The Department of Urban Affairs and Planning assisted with its preparation and apparently ratified it in 2000, and Council incorporated it into their LEP. Some core Koala habitat was subsequently cleared, and it likely that some was logged while NPWS and DLWC turned a blind eye. With the adoption of the PNF Code of Practice in 2007, which expressly prohibited logging in core Koala habitat, DECCW began systematically approving logging of core Koala habitat in the Coffs Harbour LGA, with 2,000 of the 19,000 ha of identified core Koala habitat approved by 2010. When DECCW was publicly challenged in 2011 they said the Coffs Harbour CKPoM was not officially gazetted and *"The only solution would be for either DECCW to change their code of practice or the council to change their Local Environment Plan".*

DECCW approved logging of core Koala habitat in contravention of a CKPoM they (as NPWS) had prepared, and when caught out they claimed their plan was not legal. There was no contrition and apparently no consequences for those responsible.

2.2. Regulating Public Forestry

In 1989 the Forestry Commission undertook a survey of their district foresters to find out what, if anything, they bothered to do for Koalas encountered during logging. Their responses displayed a general ignorance about Koalas and whether they were present within logging areas, most stated they had had no standard procedures, commonly responding along the lines of "*About the only thing done in a logging operation when a koala is located is to not fall the tree, at that time. It may be felled later (next day) if the koala has moved*" (Ernie Chiswell, Coffs Harbour District Forester, 29.11.1989)

This all changed when the Forestry Commission were taken to court by NEFA in 1991 over their right to take or kill threatened species, including Koalas, without a licence in Chaelundi State Forest (Corkill vs Forestry Commission 1991). The Forestry Commission's internal admission's of doing nothing for Koalas were a significant component of the evidence presented to court, leading The Australian (24 August 1991) to report in an article titled "*Koalas 'endangered' by Chaelundi logging*":

> *Koala populations are "collapsing" in NSW, according to statements in an extraordinary series of internal reports by Forestry Commission officers, tendered under subpoena to the State's Land and Environment Court yesterday.*
>
> *...*
>
> *The Koala comments of these and other commission officers dominated yesterday's hearing of an application seeking to restrain permanently the commission from logging in the Chaelundi State Forest in north-east NSW.*
>
> *...*
>
> *Mr Robertson was seeking to prove that logging would breach provisions of the National Parks and Wildlife Acr, which make it a criminal offence to take or kill protected or endangered wildlife, including koalas.*

The court case established that the Forestry Commission were required by the National Parks and Wildlife Act 1974 to obtain licences from the NPWS to take or kill endangered species, with this requirement extending back to the 1918 Birds and Animals Protection Act 1918, and continued in the Fauna Protection Act 1948. As early as 1918 'take' was defined to include "'disturb or injure". In relation to Koalas, Justice Stein (1991) concluded from the evidence that:

> *I find that the koala is very likely to be disturbed, or injured by the proposed forestry operations. The species is clearly sensitive and has limited food tree sources. The koala will likely be detrimentally affected by permanent changes in the forest structure. Its numbers will diminish as its habitat is disturbed.*

Justice Stein (1991) identified the Koala as one of the *"endangered species listed in Schedule 12 of the National Parks and Wildlife Act 1974"* that the proposed logging and roading was likely to "*disturb or injure*".

The subsequent passage of the Endangered Fauna (Interim Protection) Act 1991 forced both the NPWS and Forestry Corporation to begin developing licence requirements. The Forestry Commission were issued "temporary licences" which were extended year after year, without preparing the required Fauna Impact Statements. At least, theoretically, they could no longer simply ignore the plight of Koalas

The NPWS Management Plan for the Coffs Harbour Koala Population (Lunney *et. al.* 1992) suggested guidelines for the management of koalas in the State Forests of the Coffs Harbour Region, including:

...

v) Development of a system of reserves for koalas by dedication and/or through the Preferred Management Priority (P.M.P.) system, including both core habitat and adequate corridors;
vi) Adoption of the following procedures and protocol for dealing with koalas in areas being considered for logging:

> *...*
> *e) use the following prescriptions during operations:*
> ** familiarise workers with signs of koala presence.*
> ** if a koala or new evidence is found during logging:*
>
> - *stop work*
> - *mark and identify tree. Leave 200m around tree(s)*
> - *notify District Forester and NPWS*
> - *arrange inspection by independent expert*
> - *if evidence of regular use found, use asterisk technique to determine extent of use.*
> - *alternative logging area to be used until survey complete*
> - *if more than two koalas found within 200m radius, reserve area until next logging cycle. A minimum of 5ha per koala of suitable habitat to be reserved*
> - *logging in regularly used areas to be limited to:*
>   - *25% of stems*
>   - *non-preferred koala food species*
>   - *any trees used by koalas to remain*
>   - *trees larger than 1m DBH may go if unused*
> - *if no regular use determined, resume operations avoiding the koala and trees within 20m*
> - *submit full report to NPWS*
>
> *f) In all instances where logging is carried out in areas where koala evidence is known but a survey has not found koalas on site, a minimum of 10 koala food trees/hectare, over and above other habitat tree retention requirements, should be retained on site ...*

In 1993 the Forestry Corporation identified "Koala Survey Techniques for Intensive Logging Operations" (James Shields 23 July 1993) which involved undertaking pre-logging transect searches (2 100x20m per 20ha) for Koalas, with 2 quadrat searches (5x5m) for Koala scats on each transect, and 4 hours spotlightling and Koala call playback.

In 1995 the renamed State Forests proposed their own "*Management Prescriptions for Logging in Coastal Forest Types: Koala (Phascolarctos cinereus)*". The pre-logging survey requirements were a 1km walk transect for each 100ha, searching 10 trees per 100m for scats - targeting "*primary and secondary browse species larger than 25cm dbhob with an average of more than 50cm dbhob*" for one minute scat searches within 2m of their bases. When any 2 out of 10 consecutive trees searched are found to have scats it is to be designated a "frequent use area", which is then subject to another 4 transects to delineate the boundary of the high use area and "*logging will be excluded from within fifty metres of frequent use areas according to Harvesting Plans*". In addition "*isolated individual trees with more than twenty Koala dung pellets beneath shall be retained and all logging debris removed at least 10 metres from their base*". If during logging a Koala is observed or a tree with 20 scats beneath it found, then the 10 closest trees need to be searched and if 3 or more (including the original tree) are found to have scats it is identified as "*frequent use area" and "all tree felling will immediately and subsequently be excluded from within fifty metres of areas frequently used by Koalas*".

Significantly these exclusions were apparently intended to be permanent, as the Koala prescription included the "management implications":

> *Loss of available resources in areas found to be frequently used by Koalas and hence reserved from logging. Consequently there will be a reduction in expected resource availability and a necessary reduction in timber yield off the Management Area.*

This was presumably the basis for State Forests' negotiations with NPWS over the interim Threatened Species Licence conditions issued as an outcome of the Interim Assessment Process in 1997. After 6 years of operating under temporary licences finally the NPWS issued the required licences, though without Fauna Impact Statements having been prepared. Basically State Forests' proposed conditions were adopted by the NPWS as a licence condition with little change (see TSL *Prescription 25a. Koala Prescription for North Coast Forest Types* pp. 135-139), except removal of the intent to protect Koala High Use Areas in perpetuity.

When these were transferred into the current Threatened Species Licence in 1999 there were significant changes. The need to undertake pre-logging surveys to identify high use areas was removed and replaced with surveys at the time of logging, the need to search for scats within 2m of a tree was reduced to 1m, the recognition of any area where any 2 out of 10 consecutive trees search was identified as a high use area was changed to require a trigger tree (ie sighting, >20 scats, mother and baby) and 3 out of 10 trees consecutively searched with scats, the need to exclude logging from within 50m of high use areas was reduced to 20m, the need to protect individual trees with >20 scats was removed, and the need to protect ten primary browse trees (or secondary browse species if primary are unavailable) per hectare in intermediate use areas was reduced to 5 per hectare. It is important to recognise that the new prescriptions were negotiated prior to reserve outcomes being identified, so no account of reservation adequacy was involved,

Significantly the clause relating to monitoring (TSL p139) was removed:

> ***Monitoring:***

> *Koala monitoring will be conducted as part of the general monitoring procedures planned by SFNSW. Compartment monitoring may be advantageous to Districts for future planning in areas that have positive Koala records and prior management.*
>
> *At the initial stage the state wide monitoring of Koala populations will require a comprehensive compilation of the location and extent of high use areas. The monitoring program will be designed to give information on the effectiveness of these prescriptions in meeting their objectives.*
>
> *The survey methodology for detecting Koalas and determining high use areas (contained in these prescriptions) may be reviewed in the light of findings from the monitoring program.*

The 1999 Threatened Species Licence 5.2.2 requires that in compartments which contain preferred forest types, marking-up must be conducted as part of mark-up surveys at least 300 metres in advance of harvesting operations, with primary browse trees inspected at ten metre intervals with **thorough** searches around the base of trees for Koala scats (faecal pellets).

The identification of an "intermediate use area" for Koalas is, in part, defined as *"a single compartment where Koala scats have been detected under two of any ten consecutive trees searched within that single compartment"*. the Threatened Species Licence 6.14 (c)(ii) requires In intermediate use areas 10 primary browse trees must retained per 2 hectares where available. These trees must marked for retention.

The identification of a "Koala high use area" effectively requires the trigger of finding a high use Koala tree with >20 scats and then the locating of three consecutive trees with Koala scats on at least one of the 100m transects radiating out from the high use tree:

> *"Koala high use area" means an area where any of the following features are located:*
> *i. Three out of any ten consecutive trees inspected are found to have Koala scats beneath them; OR*
> *ii. a sighting of Koala; OR*
> *iii. a tree with more than 20 Koala scats beneath; OR*
> *iv. any trees with Koala scats of two distinctly different sizes beneath;*
> ***AND***
> *i. where the subsequent star search locates at least an additional three out of any ten consecutive trees inspected as having Koala scats beneath them.*

The Threatened Species Licence (5.2.2(c)) requires that Forests NSW must conduct "star searches" for a 100 metre radius around high use trees to delineate Koala High Use Areas. Star searches involve thoroughly searching for Koala scats along eight transects radiating out from a Koala high use tree (i.e. >20 scats) for at least 100m. (see section 3.2. of this submission for examples),

A Koala High Area is only considered to occur where Koala scats are found under at least 3 trees on a transect, and is then applied for 20m around the initial detection site and those 3 trees. In practice this means that where they are identified they are usually very small areas. The Threatened Species Licence 6.14 (c)(i) states *"Specified forestry activities are prohibited from within all Koala high use areas. A 20 metres wide exclusion zone must be implemented around the boundary of Koala high use areas".*

Since the first Threatened Species Licence was introduced in 1997 there has been a ongoing refusal on behalf of the Forestry Corporation to thoroughly search for Koala scats. This went on for 15 years while the EPA (and their predecessors turned a blind eye) until NEFA exposed the failure to search for Koala scats and the logging of Koala High Use areas at Royal Camp State Forest in

2012 (see Case Study 2 - Royal Camp State Forest), for a brief period the EPA attempted to make the Forestry Corporation undertake scat searches though quickly succumbed to Forestry Corporation pressure and abandoned any meaningful attempts to enforce compliance (see section 3.2. of this submission).

Currently only about 14ha of Koala High Use areas are being identified across the NSW public forest estate each year (EPA pers. comm.), more by accident than design.

The EPA and Forestry Corporation met in January 2013 to discuss the failure to thoroughly search for Koala scats at Royal Camp, Wang Wauk and Bulahdelah State Forests, the Forestry Corporation (2013b) later submitting:

> *The intermediate use condition is designed to ensure suitable habitat elements (browse trees of preferred species) are retained during harvesting operations to mitigate both the immediate and longer-term impact of harvesting operations.*
>
> *The high-use condition is intended to protect individual koalas and their current feed trees from the immediate impact of harvesting operations.*
> *...*
> *The mark-up survey approach was developed from the sampling method required in previous licences of 1km/100 ha Koala scat search transects, which included specific requirements for searching based on tree size, quality and a 1 minute minimum search thresholds undertaken during pre-harvest surveys, for two reasons:*
> *Firstly, it was noted that as many, or more, star-searches were triggered during general mark-up survey as from the pre-harvest surveys and, secondly, by the time harvesting commenced, the location or boundaries of the high-use areas were often quite different to those established at the pre-harvest survey stage.*
> *...*
> *The survey methods for both mark-up surveys and star-searches are loose and not well suited to a targeted audit/enforcement approach, nor to a variable approach where search effort is scaled up in those areas with a greater likelihood of koalas being present. Different, experienced and qualified searchers can legitimately choose different trees to search under and/or different parts of the base and crown of a tree to search under and therefore will produce different results. Searches undertaken at different times under the same tree can also produce different results. Under dry conditions and/or in dry locations, scats can last for months; in wet conditions they can last days. Different understorey conditions and growth habits of different tree species/individual trees can markedly influence detectability of koala scats.*
>
> *Medium term - In order to deliver an improved outcome for Koalas, at reduced cost and that is auditable and enforceable, FCNSW proposes the licence should move to a landscape approach for koalas. A new landscape prescription could better specify primary browse tree retention requirements based on current information, apply them to all compartments where primary browse species occur, rather than to just those compartments with records, and maintain a proportion of potential habitat unharvested area in each compartment. FCNSW will work towards developing and drafting a landscape prescription suitable for discussion with the EPA over the coming weeks.*

In 2013 the Forestry Corporation (2013b) identified the problem with having no size limit for the retention of trees in "intermediate use" areas and proposed a "short-term" interim change to the TSL which was never implemented:

> *... a preference for mixed species forests with a high proportion of preferred browse trees, and trees between 30-80 cm dbh. Tree size preference has been linked to climbing efficiency, tree vigour/nutritional value or even lack of competition with Greater Gliders in areas with few large, old trees.*
>
> *...*
>
> *The intermediate-use condition, which FCNSW considers could be the most relevant and practical protection measure, has a flawed definition of 'primary browse trees', with no minimum tree size limit, quality requirements or protection requirements.*
>
> *...*
>
> ***Short-term** – in compartments in which the intermediate use prescription is triggered, FCNSW will apply a higher standard to identification and management of primary browse trees. That is, FCNSW will add to the end of the intermediate use prescription ' primary browse trees should have as many of the following characteristics as possible; >30 cm dbh, mature and have a healthy crown. Retained primary browse trees must be protected from damage to the greatest extent practicable. When locating and marking these trees, the thorough search for evidence of koala scats must include disturbance of the grass and/or leaf-litter layer, where visibility for the detection of koala scats is compromised.*

While the EPA failed to implement the short term measure suggested by the Forestry Corporation (for no apparent reason) they quickly became strong advocates for the Forestry Corporation's *landscape approach for koalas.*

Now the EPA intend to abolish survey requirements for most threatened species and remove the need for the Forestry Corporation to have to do anything when threatened species are found. This extends to removing the need for the Forestry Corporation to search for Koala scats and identify Koala High Use Areas. The EPA (2014) undertook a biased and selective review of the Forestry Corporations survey data to justify stopping surveys for most species:

> *The NSW Government believes that the targeted survey approach used in the current IFOAs can be highly inefficient and that improvements in environmental outcomes over the past 15 years as a result of the surveys has been negligible, particularly when compared to the significant cost and effort required to undertake them.*

The Forestry Corporation claim to spend millions of dollars every year undertaking the required surveys, though they have little to show for it. A major part of the problem is that they use their own poorly trained staff to do most surveys. They are simply not capable of identifying many of the species they are meant to be looking for. They also suffer from a lack of will to find anything, which was particularly obvious at Royal Camp SF where the Forestry Corporation Mark-up Surveys failed to locate any Koala scats in an area with unusually abundant Koala scats, amongst the highest density of Koala scats on State forests in the Clarence-Richmond catchments.

NEFA agrees that the areas of habitat protected around records of threatened species is inadequate, though they still manage to protect fragments of important inhabited habitat for our most vulnerable species. Pugh (2016) assessed 13 areas of State Forest, totalling 10,661 hectares, scattered throughout the Clarence and Richmond River catchments and found that mapped fauna exclusions around records of threatened species (or the default protection of

modelled habitat) resulted in protection of 278 ha (3%) of the gross area, outside base exclusions (ie FMZ 2 and 3a) and riparian exclusions.

NEFA (2016) have established (i.e. Koreelah State Forest) that many key fauna locations are not currently being identified in pre-logging surveys by the Forestry Corporation. Similarly, NEFA (2016) have established that the Mark-up Surveys required to be undertaken during logging to identify Koala High Use Areas, threatened plants, wetlands, *Philoria* habitat, bat roosts, Quoll latrines and various other exclusions are rarely undertaken adequately. The paltry number of exclusions for threatened plants reflects the extremely poor survey effort by anyone who knows what they are looking for.

In NEFA's (2016) review the result for Koalas was amongst the poorest, despite NEFA recording Koalas in many of the areas. In Ellis SF the Forestry Corporation identified two Koala High Use Areas which were included in a single exclusion zone of 7.3ha and in Royal Camp SF the Forestry Corporation had found one Koala HUA of 1.4ha before NEFA intervened. With the addition of Koala HUAs identified in NEFA's limited surveys (and verified by the EPA) of a small part of the area the Royal Camp Koala HUAs would have increased to over 10ha outside other exclusions.

The EPA's (2014) claimed aim is to get rid of most species specific prescriptions for threatened species and focus on a landscape based approach to reduce *"the need to locate threatened species through costly surveys".* They go so far as to assert that *"The government considers that relying on record-based triggers for species protection is an unnecessary risk to most threatened species"*. The absurdity of this claim is astounding.

The EPA intend to abandon any need to undertake pre-logging surveys for Koalas and replace it with prescriptions applied to various classes of modelled habitat. Regarding the Koala prescription the EPA (2014b) plagiarised the Forestry Corporation (2013) when they state:

> *This condition focuses on the process for searching for the presence of koalas and activity levels rather than the objective of the condition, which is to protect important and currently occupied koala habitat and retain preferred koala browse trees. The current condition is very time consuming to implement and searches under different trees or on different days can produce a different result. Conditions such as these are difficult to enforce due to complexities associated with establishing whether a search was done "thoroughly" or what number and size of scats the person doing the search observed.*

The EPA (2014b) told the General Purpose Standing Committee No. 5 'Inquiry into the performance of the NSW Environment Protection Authority':

> ***Core koala habitat mapping***
> *The EPA is mapping core koala habitat so that it can be protected at the landscape level. This is intended to replace the existing presence/absence triggers and is a far more effective way of ensuring koalas and their habitat are protected.*
> ***Regulatory improvements to ensure koala protection***
> *As part of the proposed consolidated Coastal IFOA, the EPA and Forestry Corporation have committed to moving to regional koala habitat mapping. As noted above, the EPA has commenced broad-scale mapping of koala habitat. The outcome of this mapping project will be used to inform appropriate conditions, including exclusion zones, the protection of feed trees and other alternative provisions in the consolidated Coastal IFOA.*

The problem is that the EPA (2016, see section 1.6 of this submission) has only been able to produce a map capable of identify the presence-absence of Koalas and has been unable to identify core koala habitat. Without surveys this only leaves them with the option of reverting to the Forestry Corporation's position where the Forestry Corporation is empowered to select bits and pieces of forests (away from drainage lines) that they choose as ""wildlife clumps" using some undeveloped guidelines and the retention of various numbers of feed trees based on inaccurate habitat quality mapping.

In his review of the EPA's (2016) Pilot Mapping Project, Smith (2015) stated:

> *It is currently uncertain whether current koala conservation protocols are sufficiently precautionary to protect koalas under modern harvesting methods. There have been no conclusive scientific studies of the impacts of modern harvesting methods on koalas. The simplest and most cost effective way of addressing this problem would be to re-survey all sites with koalas that have been subject to pre-logging surveys during the past 18 years and use the data to identify any effects of changes in forest structure, food tree abundance and logging disturbance.*
>
> *...*
>
> *Based on current knowledge, any precautionary Conservation Protocols applied to potential koala habitat in crown and private forests would need to mimic the effects of past low intensity harvesting practices. This primarily involves limiting the basal areas of stems removed across a range of size classes. Guidelines for achieving basal area limited harvesting been applied for many years to regulate private forestry operations on privately owned Protected Lands (Smith 2001,2010, copy supplied). These guidelines may serve as a useful basis for revision and wider application of existing koala Conservation Protocols*

In his review of the EPA's (2016) Pilot Mapping Project, Phillips (2015) stated:

> *Because of the need to incorporate koala socio-biology and disturbance history as fundamental considerations there is little value in relying on categorisation of koala habitat alone to inform management in areas subject to logging.*
>
> *...*
>
> *In my experience it suits Government for timber harvesting approvals and processes to remain obfuscatory, when there is no reason that they should be. How could such matters be addressed / overcome? Transparency of process along with acceptance and application of best practice techniques (as opposed to trying to reinvent the wheel with no axle to place it on).*
>
> *...*
>
> *note that the question of what is being protected has also been raised. I would have thought that this was a question that should not have required an answer when surely the most important thing to protect are remaining areas of habitat that are currently supporting resident koala populations. This consideration remains independent of the issue of habitat quality and so should be the primary objective of management.*

In his review of the EPA's (2016) Pilot Mapping Project, Kavanagh (2015) stated:

> *A priority for the project should be to gain a better understanding of the responses of the Koala to disturbance, in particular to logging. This is crucial for the development of appropriate management prescriptions to apply within areas proposed for logging. Regardless of the predictions of the models and maps described above, the appropriate management responses to predicted high population density, or occurrences of preferred*

> *Koala habitat, are still unknown. This is because there has been no rigorous, experimental, study in the coastal forests of NSW that has documented the effects of logging on the Koala.*
>
> *An interim (but less conclusive) approach may be to investigate and collate the results of post-logging assessments of Koala presence within RFA (Regional Forest Agreement) coupes that have been previously assessed and logged within the past 16 years. It should be noted that all current and proposed logging prescriptions to manage/conserve Koalas on Crown Lands and in Private Native Forests in this region are precautionary only, with no sound scientific basis for their application.*
> *...*
> *Regardless of the predictions of this map, or any other map, the appropriate management responses to predicted high population density, or occurrences of preferred Koala habitat, are still unknown. This is because there has been no rigorous study in the coastal forests of NSW that has documented the effects of logging on the Koala. All current and proposed logging prescriptions to manage/conserve Koalas on Crown Lands and in Private Native Forests are precautionary only, with no sound scientific basis for their application.*

The need for monitoring identified by Smith (2015) and Kavanagh (2015), has (not unsurprisingly) been reiterated by the Chief Scientist:

> *In many cases, the reliance on traditional point-in-time surveys (such as scat surveys conducted according to licence conditions under IFOAs) has proven ineffective at providing data on population trends, as they are not designed for comparative or repeat surveying (Woosnam-Merchez, Cristescu, Dique, Ellis, Beeton, Simmonds, & Carrick, 2012; Slade & Law, 2016). A robust monitoring program is essential to understand the impact of interventions and activities at a landscape scale and at specific sites and how populations respond over time. A targeted monitoring program is especially important in remote areas that may not be regularly visited by the public or researchers.*
>
> *All major infrastructure projects and natural resource management activities have a local impact on the environment. However, further information is required on how this impacts the broader koala population over time. Monitoring is essential to manage a range of threats. It is also important that effective monitoring of actions is undertaken to ensure that management decisions are founded on 'best available science'.*

It is blatantly clear that the survey methodologies applied under IFOA licence conditions for Koalas are not robust or repeatable as the scat searches are applied in an ad-hoc manner by poorly trained and unwilling foresters who often make no attempt to systematically search areas and usually don't record what they find. Even in the rare event that they find a Koala High Use Area there is no attempt to collate the results or permanently record them (because they don't want to have them recognised next time they log). The fact that most foresters appear antagonistic to the need to look for and protect Koalas means that none of their results can be relied upon.

In relation to biodiversity Forests NSW (2005) ESFM Plan notes:

> *Forests NSW will use adaptive management principles and actions within State forests to complement the management of the CAR reserve system.*
> *…*
> *During operations, site specific conditions are continually assessed, results recorded, the appropriateness of operational conditions reviewed and plans amended where necessary.*

NEFA have come across no evidence of this, quite to the contrary the Forestry Corporation does not learn from its mistakes, which is exemplified by their ongoing refusal to undertake the scat searches necessary to identify Koala High Use Areas. We are most concerned that neither the EPA nor Forestry Corporation have bothered to assess the effectiveness of any fauna prescriptions over the past 15 years and improve them accordingly. The deal between the Forestry Corporation and NPWS to remove monitoring requirements for Koalas from the TSL in 1999 says it all. Rather than applying adaptive management as a routine practice we find that Forestry Corporation use it as an excuse to continue logging in blind ignorance - because they don't want to know the consequences of their actions.

As part of the CRA process an ESFM Biodiversity Workshop was held at Coffs Harbour in August 1998 to review the conservation protocols for fauna (DUAP 1998). The workshop included a variety of experts, agency staff and stakeholders. From the recommendations that were made at the workshop, a few of these were unanimously supported, including:

- *Monitoring is critically important and complex and should not be put into the 'too hard basket' — therefore an action is required immediately (pre RFA). The monitoring program should include the conservation protocols but not be limited to these. Monitoring in conjunction with predictive capacity is required.*
- *Monitoring is not an end in itself but should be used to validate the predictive models/or assumptions of the future*

NEFA actively promoted the need for monitoring of the effectiveness of prescriptions as a key outcome of the IFOA, and we were reassured this would be done. The need to wait for monitoring results has become an ongoing excuse for inaction as the monitoring is never done. Ignorance is used as the excuse for continuing with business as usual while Koala populations plummet. Adaptive Management has become the refuge of rogues.

There have been a variety of systematic surveys using repeatable methodologies undertaken at various locations across the forest estate over the past 30 years by reputable experts that could be rapidly resurveyed if there was a will to identify population trends. Though the idea of continuing business as usual while Government agencies continue to pretend that they intend to do monitoring sometime in the future is no longer acceptable.

Without any attempt to review the status of Koalas on State Forests, and despite evidence that Koala populations are crashing under Forestry Corporation mismanagement (EPA 2016), and despite clear evidence that their proposed approach can not be implemented, the EPA have continued to develop their flawed model and remain intent on implementing the Forestry Corporation's position of removing the need for scat searches and the protection for core Koala habitat on public lands. Nobody cares about the Koalas.

The Forestry Corporation's basic management response to Koalas used to be that if you see a Koala in a tree, wait for it to move before logging its tree. Over the 25 years since threatened species legislation was implemented to protect the Koala from logging operations there has been no meaningful change, except that Koala populations on State Forests have dramatically declined while the EPA turn a blind eye. It took until 1997 for the first logging prescription for Koalas to be implemented across logging operations, and it was written by the Forestry Corporation. Protection for Koalas was significantly reduced in 1999 with the adoption of the current Threatened Species Licence, which also removed the need to monitor the effectiveness of the prescription. It was left up to NEFA to expose in 2012 at

Royal Camp State Forest that for 15 years the Forestry Corporation had not been undertaking adequate searches for Koalas and protecting core Koala habitat. For a few months after this the EPA belatedly attempted to enforce the Koala prescription, though at the behest of the Forestry Corporation they quickly desisted and supported the Forestry Corporation's proposal to remove the need for Koala scat surveys and the protection of Koala High Use Areas. If the Government Agencies are successful, soon they will abandon the pretence that they are doing anything to protect Koalas.

It is self-evident that if the NSW Government has a genuine intention to stop and reverse the ongoing decline of Koalas it needs to initiate a moratorium on any further clearing or logging of potential Koala habitat on both public and private land, while:

5. **undertaking rapid systematic surveys for Koalas on a metapopulation basis to identify extant populations, identify likely core habitat, better define regional food preferences, and refine predictive models on a metapopulation basis.**
6. **only allowing site specific proposals for logging or clearing of potential Koala habitat to occur where they have been subject to surveys by competent professionals applying, at least in part, repeatable methodologies, and reviews by independent experts**
7. **ensuring core Koala habitat is identified and protected**
8. **ensuring potential Koala habitat and corridors are identified and subject to retention and restoration of adequate food trees.**

2.3. Regulating Private Forestry

In NSW some 35-38% of the remaining forests are privately owned and 29% are leasehold (Prest 2003). Private Native Forestry (PNF) is centred on north-east NSW where private forests constitute 46% of the area of commercial forests and provides a third to half of sawlog production in north east NSW (Prest 2003). This means that a large proportion of Koala habitat also occurs on private property and is actively being logged.

Some controls over logging of protected lands, steep lands and selected riparian areas, has existed since 1972, with areas outside these basically unregulated. It is apparent that the National Parks and Wildlife Act 1974 established the need for people undertaking activities likely to cause harm to species, such as Koalas, to obtain a licence. Though this was not clearly established to apply to PNF until the introduction of the Endangered Fauna (Interim Protection) Act 1991.

That Endangered Fauna (Interim Protection) Act 1991 was introduced in response to a court challenge by NEFA and a finding that, on both public or private land, logging was unlawful without a licence granted under the National Parks and Wildlife Act 1974 to take or kill threatened species (including the Koala) were required for logging operations in NSW. Of the hundreds of PNF operations subsequently undertaken, Prest (2003) found that from 1991-1995 only 9 PNF operations were licenced by the NPWS, and that from 1997-200 only 3 s.91 licences were issued by NPWS.

In 1992 a Legislative Council (opposition) amendment to the Timber Industry (Interim Protection) Act inserted a framework for regulating private forestry that would be activated by the making of a regulation. The regulation was never made.

In 1995 State Environmental Planning Policy No. 44, 'Koala Habitat Protection' (SEPP 44) was introduced (see next section). Also in 1995 SEPP No. 46: 'Protection and Management of Native Vegetation' was introduced as an interim measure to regulate clearing of private lands, it required landholders to seek development consent prior to logging or clearing though included a variety of exemptions from requiring development consent, including for 'authorises' plantation establishment and for PNF:

> *Private Native Forestry. The clearance of native vegetation in a native forest in the course of its being selectively logged on a sustainable basis or managed for forestry purposes (timber production).*

SEPP 46 was replaced by the Native Vegetation Conservation Act in 1997 which carried on the PNF exemption. The poor wording of the PNF exemption effectively allowed any logging operation "*for forestry purposes*" to claim an exemption, and left it open for those "*who wish to use an exemption to make a "self-assessment" as to its scope, and to lawfully commence clearing or logging under exemption without informing DLWC*" (Prest 2003). While DLWC publicly tried to pretend that the exemption only applied to "sustainable" logging, Prest (2003) identifies that DLWC's (2000) internal 'Review of Exemptions' report stated

> *the wording suggests that non-sustainable forestry is also permissible under this exemption ... Due to the location of "or" in the exemption there is no other interpretation possible ... This exemption in effect, allows any clearing of native forests without consent so long as timber is being produced.*

Prest (2003) considers it probable that the intent of the exemption was originally to encourage sustainable logging but that the alternative "managed for forestry purposes" "*was added at the last minute following lobbying from rural and timber interests*". One DLWC officer was later to complain "*This exemption is so ... lacking in any definition that logging of non-protected lands is effectively unregulated by the NVCA. It would be absolutely impossible to convict anyone for alleged breaches that involve forestry*" (Prest 2003).

As a result, irrespective of their nature, 100% of PNF operations outside 'protected lands' in the North Coast and Hunter regions claimed the PNF exemption (Prest 2003), and despite SEPP 44 nothing what-so-ever was required to be done to protect Koalas. Prest (2003) found:

> *PNF was the most important cause of native vegetation "clearing" within the category of all types of approved vegetation clearing between 1999-2001 inclusive. If PNF logging under exemption were to be included ... it is abundantly clear that PNF would have been, by a considerable margin, the most important cause of native vegetation clearing in those regions.*

For example in 2002 PNF approvals for protected lands accounted for 81.2% of the area approved for clearing in the North Coast region, with the PNF exemption accounting for many times this (Prest 2003).

It is revealing that Prest (2003) found that while the DLWC North Coast and Hunter regions just told people wanting to undertake PNF to apply the exemption, at their worst "*turning a blind eye to the impact of logging under exemption*", in the Sydney-South Coast Region DLWC negotiated with landholders to obtain concessions relating to their logging operations in order to obtain the exemption. Similarly of all the applications for PNF on protected lands in the North Coast and Hunter regions from 1997-1999 not one was refused.

The Native Vegetation Conservation Act 1997 also allowed for the preparation of a Code of Practice (COP) as an exemption. Due to the broadness of the PNF exemption, it was recognised by some DLWC staff that a COP for PNF was required to at least provide some semblance of regulation.

In 1998 DLWC developed best management principles for logging which included a wide variety of habitat retention requirements and exclusion areas for biodiversity and threatened species, as well as limiting canopy removal as a key component of ecologically sustainable logging.

It is revealing that DLWC did not consider that any of the PNF applications they considered throughout NSW from 1997-2002 were likely to have a significant effect on any threatened species as no Species Impact Statements were required (Prest 2003).

In 2000 the North East NSW Regional Forest Agreement committed the State Government to producing a Code of Practice for timber harvesting of native forests on Private Lands by 2005, The Government gave the task to the Forestry Advisory Council. A consultancy report (Andrew Smith 2000) was prepared for DLWC which developed draft guidelines for ecologically sustainable forestry, though due to lobbying of the Minister and Director General by timber industry interests it was ignored. Smith (2000) required the exclusion from logging of 25% of wet and dry sclerophyll forests when koalas are found, reduced logging intensities as well as limits on clearfelling techniques.

DLWC then commissioned Bruce Cole Clarke to prepare a paper on operating standards for PNF. This paper was prepared in consultation with DLWC and timber industry representatives, conservation groups were excluded. In August 200 DLWC released their "*Interim Guidelines, A Guide to Managing Private Native Forests in North-east NSW*" as a fait accompli. There was no mention of Koalas. NEFA (Susie Russell 4 January 2001) commented to the media:

> *Under the Department's proposals I would be free to drive a bulldozer into the middle of a Koala colony and cut down most trees with Koalas in them. I would still be complying with DLWC's best operating standards and thus exempt from the Threatened Species Conservation Act*

The Nature Conservation Council (Pugh 2001) strongly recommended " *that a monitoring program be incorporated into the implementation of DLWC's best operating standards*" and "*that DLWC establish a number of sites to measure pre and post logging values, so as to gauge the efficacy of prescriptions*". At that time NCC proposed retention and restoration of multi-aged forests, along with the Forestry Commission/NPWS original prescription for Koalas as existing best practice:

> *Establish an exclusion zone encompassing all Koala high-use areas (as determined by appropriate surveys) and 50 metres around all high use areas.*

The National Parks and Wildlife Service, who had been excluded from development of the draft Code, submitted (August 2002):

> *NPWS is not supportive of the proposed exemption in its current form given the extent and level of harvesting proposed, the definition of old growth forest and rainforest, the inconsistency of prescriptions proposed from public land and private land, and the list of items in Schedule 1. In particular, the proposed draft exemption and operating protocols are not considered to be of minimal environmental impact and are inconsistent with other definitions and prescriptions.*
>
> *NPWS maintains its position that there should be consistency in protective measures for threatened species across all land tenures. The threatened species provisions of the IFOA reflect the negotiated outcomes of experts from within SFNSW and NPWS. These measures seek to*

> *provide a balance between conservation of threatened species and ecologically sustainable forest management. …. NPWS reiterates its view that the conditions of the IFOA should be applied across all land tenures with appropriate modification to certain aspects to reflect the intensity of the operation.*

At that time DLWC did have guidelines that required flora and fauna surveys where a PNF operation seeking consent (ie on protected lands) involved removal of more than 70% of the canopy or covered over 200ha. Otherwise existing records were relied upon.

Along with many others, NCC (Pugh 2001) also emphasised the need for surveys:

> *As part of the planning process pre-logging surveys by a qualified fauna survey professional must be undertaken at the appropriate season and use methods which maximise the likelihood of locating those of the following species, nest, dens, roosts and high use areas that are likely to occur on the property;*

Prest (2003) points out that the requirement of Section 118D of the National Parks and Wildlife Act only makes it an offence to damage habitat of a threatened species "*if the person knows that the land concerned is habitat of that kind*", commenting that that this "*encourages private landowners and forestry operators working on private land to deliberately avoid investigation of threatened species issues prior to commencing work"*: Ignorance is bliss.

The Native Vegetation Conservation Act 1997 also intended to overcome the piecemeal approach that had developed over the years for native vegetation management by establishing Regional Vegetation Management Committees (RVMCs) to develop holistic Regional Vegetation Management Plans. With no resources to undertake required studies, grossly inadequate vegetation mapping, lack of direction and conflicting advices from the DLWC, and prolonged delays the process was a shambles. The RVMPs were required (s.27 (2)) to provide for adequate protection of core koala habitat within the meaning of SEPP 44 for koala-habitat protection, though DLWC never provided any data or methodology to allow the identification of core Koala habitat to occur.

The Regional Vegetation Management Plan process was abandoned, along with numerous draft plans, with the Native Vegetation Act 2003. Years of voluntary work by the RVMCs was thrown out.

On 25 July 2006, the Department of Natural Resources released for public exhibition a draft Code of Practice for Private Native Forestry. Following over 1500 submissions and extensive criticism from both conservationists and loggers the Minister intervened by withdrawing the draft and referring it to his Natural Resource Advisory Council with instructions to prepare a new code.

In 2007 the NSW Government finally gazetted a set of weakened mandatory rules to control logging on private land in NSW as a Regulation under the Native Vegetation Act 2003, with four Codes of Practice for separate geographic regions. The regulation came into effect on 1st August 2007. The announcement included $30 million restructuring funds for the timber industry. These were only meant to be an interim measure while the Government developed a new Act to regulate private native forestry over the next few years.

The Regulation requires that all logging operations on private land require a Property Vegetation Plan (PVP) or a development consent that complies with the Codes of Practice. A PVP could be approved for up to 15 years.

The Department of Environment and Climate Change was put in charge of the implementation of the Code of Practice. At the time NEFA were concerned that most of the important duties under the Code were given to ex-Department of Natural Resources staff within DECC who had a long history of promoting logging industry interests and being antagonistic towards conservation outcomes. These same staff and attitudes were later transferred to the EPA, and their roles in remapping oldgrowth for logging, remapping endangered rainforest for roading, identifying core Koala habitat for logging, and turning a blind eye while a road was pushed through exclusions areas for Koalas and threatened plants later confirmed NEFA's concerns that it remains a captured bureaucracy. Given the secrecy that surrounds this unit, we can only guess at the magnitude of their crimes,

Under the Native Vegetation Act 2003, harvesting and associated forestry operations conducted for the purposes of PNF require an approved PNF Property Vegetation Plan (PNF PVP). PNF operations under a PNF PVP must be conducted in accordance with the PNF Code of Practice (the Code). The Code has been granted biodiversity certification under the Threatened Species Conservation Act 1995 (TSC Act). This means that once a PVP has been approved, landholders do not need to separately apply for a licence under the TSC Act.

The PVP process is just a simplistic desk-top approval. The PNF Code of Practice is the regulatory mechanism. There is nothing in the EPA's guidelines relating to Private Native Forestry that require surveys for any threatened species. Rather the species-specific protections identified in the code only apply to a 'known record' on Wildlife Atlas or 'site evidence' where a landowner may incidentally come across evidence of a threatened species.

For koalas, the specific provisions for the PNF Code of Practice are:

(a) Forest operations are not permitted within any area identified as 'core koala habitat' within the meaning of State Environmental Planning Policy No. 44 – Koala Habitat Protection

(b) Any tree containing a koala, or any tree beneath which 20 or more koala faecal pellets (scats) are found (or one or more koala faecal pellets in Koala Management Area 5) must be retained, and an exclusion zone of 20 metres (50 metres in Koala Management Area 5) must be implemented around each retained tree.

(c) Where there is a record of a koala within an area of forest operations or within 500 metres of an area of forest operations or a koala faecal pellet (scat) is found beneath the canopy of any primary or secondary koala food tree (see Table I below), the following must apply:

(i) A minimum of 10 primary koala food trees and 5 secondary koala food trees must be retained per hectare of net harvesting area (not including other exclusion or buffer zones), where available.

(ii) These trees should preferably be spread evenly across the net harvesting area, have leafy, broad crowns and be in a range of size classes with a minimum of 30 centimetres diameter at breast height over bark.

(iii) Damage to retained trees must be minimised by directional felling techniques.

(iv) Post-harvest burns must minimise damage to the trunks and foliage of retained trees.

Clause (a) is next to useless as of the four Comprehensive Koala Plans of Management approved over the past 22 years, the Coffs Harbour CKPoM is the only one to identify core Koala habitat

across the LGA and the Kempsey CKPoM only identifies two very small areas. Even then, from 2007-2010 the PNF unit approved 60 PVPs allowing logging of 2,000 ha of the 19,000 ha of mapped core Koala habitat identified in the Coffs Harbour CKPoM (see 2.4.2 for details).

Clauses (b) and (c), like all species specific provisions in the PNF Code of Practice, are triggered by either the existence of koala records in the Atlas of NSW Wildlife or the identification of the presence of koalas (or evidence of their presence) by the landholder and/or a logging operator. There are very few records in the Atlas of NSW Wildlife for private lands. The PNF Code of Practice does not require pre-logging surveys for koalas or any other species, which means they are usually neither identified nor protected.

The Forestry Corporations actions when logging private land at Whian Whian (see Case Study 3: Whian Whian private forestry) clearly demonstrate loggers unwillingness to voluntarily search for and identify evidence of Koalas and their antagonism to being required to implement prescriptions designed to reduce logging impacts on Koalas. Where the Forestry Corporation had identified 2 Koala high use trees, the community identified 26 along with core Koala breeding habitat. Though their actions in knowingly bulldozing an illegal road through the exclusion zones around Koala High Use Trees displays their contempt for both Koalas and the PNF Code. The fact that this was done under the supervision of the EPA shows that the supposed regulator is not much better.

Though, as with all prescriptions for threatened species, the fundamental question is whether the prescription is effective in reducing logging impacts to an insignificant level, or even whether it has any beneficial effects. As with public lands, the NPWS, DLWC and EPA have been applying prescriptions for threatened species in a haphazard way since the inception of the Endangered Fauna (Interim Protection) Act 1991 on the premise that the prescriptions would avoid "a significant effect". Though, as far as we are aware, there has never been any attempt to assess the effectiveness of prescriptions - the agencies just don't care.

Prest (2003) undertook a review of regulation of private forestry in NSW over the period 1997-2002, and concluded:

> *It was found that PNF was infrequently regulated under the Native Vegetation Conservation Act, primarily due to a problematic exemption for specified types of PNF. In the North Coast and Hunter regions the exemption was claimed by 100% of PNF operations (on land tenures where it was available). PNF was found to be infrequently regulated by local government under Local Environment Plans (64.5% of 107 local governments did not regulate PNF in the main rural zone). The safety net mechanism of licensing under the Threatened Species Conservation Act was infrequently applied with only five licences granted for PNF. Regarding law enforcement, a low level of prosecution activity was found to have taken place.*

Prest (2003) considers:

> *The findings support the proposition that in practice NSW law was inadequate to ensure ecologically sustainable forest management, due to the poorly designed and integrated statutory framework. They also provide some evidence to support the proposition that the applicable laws were generally implemented with a light touch, generally expressing a* laissez faire *approach to PNF in most regions (with some exceptions).*

One of the biggest problems NEFA encountered with private land logging at Whian Whian (Pugh 2014) was the total secrecy involved. Legally we were not allowed to trespass on private property once we were asked to leave, which created dilemmas when we knew there were likely to be Koala

High Use Trees and threatened plants along the route of a road that the Forestry Corporation were intending to bulldoze the next day, and the EPA had made it clear they were going to do nothing to stop them. Our survey found 8 Koala High Use Trees, over 60 vulnerable plants and 3 endangered plants on the route.

Though the secrecy became most apparent when we found that the Office of Environment and Heritage, at the request of the Forestry Corporation and EPA, had remapped rainforest on the Whian Whian property to reclassify large areas of the nationally listed Critically Endangered Lowland Rainforest of Subtropical Australia as part of the logging area or cleared land to enable the Forestry Corporation to construct a road through it. We engaged an expert who proved from ground transects and Aerial Photographic Interpretation (API) that it had been wrongly remapped (Pugh 2014), with obvious major errors that should not have been made by a half-competent API practitioner.

Under DECCW's Old Growth and Rainforest Private Native Forestry assessment protocols a private landowner can a request a review of oldgrowth and rainforest mapped in 1998 as part of the Comprehensive Regional Assessment process. A 2010 internal review of DECCW's (now OEH) methodology for remapping oldgrowth forest found it was fundamentally flawed and that a significant amount of the mapped oldgrowth was being wrongly deleted. Webster (2010) found that *"the protocol implementation is working very well for rainforest"*, but that implementation for *"old-growth is highly variable and problematic and has apparently resulted in some areas of old-growth being potentially available for harvest"* . Transect assessments resulted in PNF old-growth classification in 4 out of 5 areas that were not identified by DECCW assessments as being old-growth.

NEFA considered that as much as 8 thousand hectares of mapped oldgrowth forest were likely to have been remapped as not being oldgrowth, and thus been made available for logging, in numerous 15 year Property Vegetation Management Plans. The reviewer hoped that improved imagery and hardware, combined with fieldwork, and regular peer review would increase the accuracy and reliability of DECCWs remapping. In November 2012 NEFA attended a field day organised by EPA aimed at showcasing how OEH had improved their oldgrowth field assessments, though it revealed a fundamentally flawed field assessment process that was strongly criticised by all stakeholders.

Whian Whian proved that OEH had still not rectified the manifest deficiencies in their remapping, and that to the contrary, even with state of the art imagery and equipment there was something very wrong. Despite the comprehensive and detailed evidence we presented (Pugh 2014) the EPA refused to investigate our complaint and when we submitted a freedom of information request (GI(PA) Act) both the EPA and OEH refused to provide any documents on their remapping on the grounds that there was "*a public interest consideration against disclosure of information*" because the remapping of public data by a public agency was "*personal information*" and its release may cause harm to a person.

The curtain of secrecy surrounding PNF is intended to hide what is going on from public view. While it is recognised that there needs to be a degree of confidentiality, the lack of any independent scrutiny has enabled the EPA to become a captured agency and encouraged bad practices.

From his review of forestry self-regulation in Tasmania, Prest (2003) considered that it contained insufficient safeguards and "*insufficient measures to counteract the strong incentives to under-report threatened species matters*", noting that when combined with secrecy provisions:

> *the system of self-regulation can create an environment in which external review, evaluation and critique are unwelcome. In such a context, conditions are created in which it is possible, or even expected, for participants to turn a blind eye to breaches of the Act and Code.*

While we supposedly have an independent regulator in NSW, this seems to sum up the situation in NSW. Prest (2003) identifies that there is a danger when the regulator identifies those they are meant to regulate as their "cutomer" or "client". Our experience at Whian Whian was that the EPA perceived their role being to facilitate the Forestry Corporation's activities (regardless of the consequences) while regarding the locals who were complaining as the problem. Prest (2003) suggests that "*the institutional solution is to separate roles and responsibilities between the regulator and the service provider, by creating an Office of the Forest Regulator separate to extension services*".

Prest (2003) also identifies that that "'*soft' techniques for behaviour change, although vital, must take place within a context of the threat of coercive action to ensure compliance. Threats and inducements must be perceived as real, not a mere bluff*". The EPA appear unwilling to regulate private forestry, they are a captured agency.

It is considered that as well as effective regulation there needs to be incentives in the form of stewardship payments to protect core Koala habitat on private property. To improve regulation of PNF in NSW, Prest (2003) makes a number of recommendations, including:

> *offering financial incentives and other inducements for biodiversit conservation and for positive land-management actions to private landholders, in order to overcome existing countervailing incentives to destroy biodiversity.*

The Endangered Fauna (Interim Protection) Act put it beyond doubt in 1991 that Koalas were required to be protected in Private Native Forestry operations, there followed a long period of inaction on behalf of Government agencies while PNF continued unabated. When SEPP 46 was introduced in 1995 it included an exemption for PNF (outside 'protected lands') that was carried over into the Native Vegetation Conservation Act in 1997 and resulted in all PNF operations (outside 'protected lands') being undertaken without any constraints to protect threatened fauna, including Koalas, because DLWC chose to ignore sustainability and threatened species (including Koala) requirements.

In 1998 DLWC developed best management principles for logging, which were replaced with "*Interim Guidelines, A Guide to Managing Private Native Forests in North-east NSW*" in 2000. These made no mention of Koalas and had no requirements to identify or protect Koalas in any way. The application of these was still effectively limited to 'protected lands'. It wasn't until 2007 that PNF Code of Practices that made mention of Koalas were introduced and applied to all PNF logging operations. The Department of Environment and Climate Change was put in charge of the implementation of the Code though the DLWC staff who had been responsible for lax regulation for years were transferred to implement it.

After 16 years of obfuscation and delay since the legal requirement was identified, there was finally some protection for Koalas in PNF operations, though this was mostly theoretical. The prescription established a need for the retention of 15 potential feed trees (30cm dbh) per

hectare where there is evidence of Koalas, and set a high threshold (finding 20 scats) for the establishment of exclusion zones around specific trees being used by Koalas. Though, as intended, as there are few existing records of Koalas on private lands and no requirements in the PNF Code to survey for Koalas, the prescription is likely to have achieved very little in practice, as exemplified by the contempt for Koalas displayed by the Forestry Corporation and EPA at Whian Whian. There is still no meaningful protection for Koalas on private lands subject to logging.

As with public forestry, for decades regulatory agencies have refused repeated requests from a diverse range of stakeholders and experts to monitor the effects of PNF on Koalas in order to assess and improve the effectiveness of prescriptions.

The veil of secrecy surrounding private property logging hinders public accountability and encourages lax enforcement by captured regulatory agencies. The glimpses we have had of the regulator's performance since 2007 reveal numerous transgressions including approving thousands of hectares of core Koala habitat identified in a KPoM for logging, wrongly remapping thousands of hectares of oldgrowth for logging, wrongly remapping critically endangered lowland rainforest for roading, and turning a blind eye while a road was pushed through exclusions areas for Koalas and threatened plants.

If the Government is serious about the survival of Koalas then meaningful measures need to be applied to stop the open-season on Koalas on private properties. This must apply a precautionary approach, involving:

- **Placing a moratorium on clearing or logging of potential Koala habitat on private land until core Koala habitat and habitat linkages are identified;**
- **A prohibition on clearing or logging of core Koala habitat;**
- **Provision of incentives to private property owners who agree to provide permanent protection to core Koala habitat;**
- **Adoption of precautionary prescriptions in potential Koala habitat and habitat linkages that require the retention and restoration of multi age forests and mature feed trees.**
- **Subjecting prescriptions to scientific scrutiny and monitoring to assess their effectiveness and identify needed improvements.**
- **Greater transparency and public scrutiny.**

2.4. SEPP 44

Some Local Government Areas have had a long-term role in regulating Private Native Forestry, though this usually involved few constraints (Prest 2003). Perhaps the most significant impact that Local Government has on Koalas is through their zoning, Development Control Plans, and Development Application processes. Though they also affect Koalas through their own land management and infrastructure projects.

This submission focuses on aspects of SEPP 44

State Environmental Planning Policy No. 44 (Koala Habitat Protection) came into effect in 1995 with the aim to "*encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline:*

a) *by requiring the preparation of plans of management before development consent can be granted in relation to areas of core koala habitat, and*
b) *by encouraging the identification of areas of core koala habitat, and*
c) *by encouraging the inclusion of areas of core koala habitat in environment protection zones*".

SEPP 44 identifies two classes of habitat:

> **"core koala habitat"** means an area of land with a resident population of koalas, evidenced by attributes such as breeding females (that is, females with young) and recent sightings of and historical records of a population.
> **"potential koala habitat"** means areas of native vegetation where the trees of the types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component.

Under the provisions of SEPP 44 local councils cannot approve development on lands greater than 1ha without an investigation of potential and core koala habitat. To this end SEPP 44 requires councils to address koala conservation through either Individual Koala Plans of Management (IKPoM) for a specific site/development, or Comprehensive Koala Plans of Management (CKPoM) that will apply to part or the whole of a Local Government Area. A site-specific IKPoM must accompany any development application (DA) where core koala habitat is found to occur. However, if a CKPoM has been approved for the area, then individual DAs do not need to include an IKPoM – as long as the DA is consistent with the requirements of the CKPoM. An applicant may still prepare an IKPoM if they so choose.

The focus of SEPP44 on core Koala habitat is blatantly obvious and thus the highest priority has to be to identify core Koala habitat. This need was reaffirmed by the Native Vegetation Conservation Act 1997, 27 (2) which required:

> If, in preparing a draft regional vegetation management plan, any part of the land to which the plan is intended to apply is core koala habitat within the meaning of State Environmental Planning Policy No 44—Koala Habitat Protection, the plan must make provision, consistent with any guidelines under that Policy, for appropriate protection and management with respect to that habitat.

The NSW Government did assist Coffs Harbour Council to identify core Koala habitat in their 1999 CKPoM, though subsequently seems to have developed an aversion to core Koala habitat. In all the years since only a few hectares of core Koala habitat have been identified in CKPoMs, presumably because the requirements to protect it are seen as an impediment to clearing, logging and development.

A review of site specific IKPoMs has not been attempted for this submission, though there is a need to do to assess their effectiveness, particularly at identifying and protecting core Koala habitat. The one example considered relates to siting of a Music Festival around and between core Koala habitat where the Department of Planning ignored the declining Koala population.

One fundamental flaw in the IKPoMs are that they are only prepared at the end of the planning process after rezonings and Masterplans may have already approved core Koala habitat for clearing and development. It is shutting the door after the horse has bolted.

Another fundamental flaw is that the application of SEPP 44 is limited to local Government, leaving Ministers, Government agencies and planning panels free to ignore the requirements of SEPP 44 and do what they want. And they do.

The restrictive definition of core Koala habitat creates problems as it is not flexible enough to account for additional areas of high quality Koala habitat that do not satisfy the restrictive species and criteria. For example in its preparation of a draft CKPoM Byron Shire Council identified potential Koala habitat that was verified in local studies. Following complaints from a Councillor that this did not comply with SEPP 44 definitions, the delineation of "potential Koala habitat" was changed to comply with SEPP 44, resulting in 206 ha of native vegetation that were identified as Class A or B Koala habitat in Council's mapping being removed, and areas not identified as Koala habitat being elevated to "potential habitat" , the draft KPoM notes:

> *Additionally some areas of important koala habitat, such as scattered individual koala food trees, or areas containing koala food trees but not meeting the SEPP 44 definition will not be included in the koala habitat maps.*

There needs to be allowance for flexibility in SEPP 44 to vary the identification of potential and core Koala habitat where this is justified in local Koala habitat studies.

2.4.1. Individual Koala Plans of Management

Before Council can grant consent to a Development Application (DA) it must determine whether potential Koala habitat exists on a site and then must "*satisfy itself whether or not the land is core Koala habitat*". If core Koala habitat is identified then a KPoM must be prepared and Councils determination of the DA must not be inconsistent with the plan.

KPoM's are only required at the last stage in the development process, after the land has been zoned for development, masterplans have been approved, and/or a Development Control Plan has been prepared. It is akin to shutting the door after the horse has bolted, as by the time the DA is submitted most of the damage has been done. The Department of Planning use the need for future KPoMs an excuse for ignoring them at the rezoning and Development Control Plan stages.

It is worrying that when the Department of Planning and Infrastructure (DPI) was considering development proposals for North Byron Parklands and West Byron they recognised that Koala Plans of Management (KPOM) were required, though considered that these could be done after the developments had been approved.

The problem with the State Government's panning processes to account for Koalas up-front is detailed in section 2.1.4. 'Case Study 4: West Byron urban development' where a new suburb was proposed in a regionally significant Koala corridor with patches of occupied core Koala habitat. DoPE ignored regional strategies, expert advice, a draft Comprehensive Koala Plan of Management and strong community opposition to uncritically accept the developer's plans to rezone 42% of the 6.9ha of core Koala habitat on the site for housing, with another 31% included in an E3 zone with a long list of allowable uses (such as camping grounds, recreation areas, dwelling houses, extensive agriculture etc), and zoning for medium density housing right up to the edge of the small patches of core Koala habitat. DoPE refused to admit it is core Koala habitat, failed to include Koala conservation measures into their draft DCP, and at one stage was not even identifying that a KPoM would be required at the DA stage.

Another example of the Department of Planning's failure to deal with Koalas in a responsible manner is provided in section 2.1.5. Case Study 5: Bluesfest. The DoPI approved a site specific KPoM subject to requiring a further program of koala habitat assessment and monitoring of individual koalas on the site through radio-tracking. From the single annual music festival, monitoring in 2010, 2012 and 2013 identified a declining Koala population being adversely affected

by the music events, with over half the monitored Koalas dying (some because of the monitoring). The evidence is that core habitat has been converted into sink habit with high mortality and a declining population. Not only did the DoPI do nothing, in 2014 they agreed to an amended KPoM on the basis of a fourfold increase in large events and unlimited smaller events, provided another 2 years of monitoring was undertaken.

The need to monitor the impacts of approved activities on Koalas is a fundamental requirement, so DoPI need to be congratulated for requiring it. The information obtained from the monitoring has provided vital information of the impacts of music festivals on Koalas, though it has come at a high cost because some Koala deaths are attributable to the stress from being caught and collared. There have also been significant issues with the interpretation of the data and the failure to consider the population effects over time. Given this, it is shameful that DoPI have not undertaken their own independent evaluation of the results of the monitoring they required, though it is totally reprehensible that they have ignored the major impacts that are occurring to approve even greater impacts.

Both West Byron and Bluesfest reveal the far bigger problem of developer's consultants tailoring their reports and interpretation of facts to suit their clients proposed developments. In both cases Biolink was engaged to provide professional advice, though when the developers didn't like the advice they engaged other consultants to provide the advice they wanted.

At West Byron Biolink identified core Koala habitat and made recommendations for its protection, the replacement consultant resurveyed the same sites and confirmed Biolink's survey results, though downgraded the core Koala habitat to "potential" while failing to identify it and ensure its protection. When the documents were exhibited the Biolink report was suppressed and it was ignored in some consultants reports and by DoPI in their deliberation.

Similarly for West Byron, when the developer's engaged Smith (2012) to rebut claims by the Office of Environment and Heritage and Byron Shire Council the DoPI uncritically accepted his claims. In their submission BEACON document fundamental errors in many of the assertions underpinning Smith's (2012) claims, such as Smith's (2012) unsubstantiated claim that West Byron suffers from a '"*“cul de sac” effect. Koalas dispersing across Ewingsdale Road from the north are likely to be prevented from travelling south by Belongil Creek and drainage canals".* At places these drains are very narrow with tree crowns touching so that Koalas could climb over them, never-the-less BEACON provided evidence (i.e. links to youtube videos showing Koalas willingly swimming across quite wide water bodies) to DoPI but they refused to consider any information that contradicted Smiths claims. It was hoped that at the very least, given the conflicting advice between Biolink, Council and OEH, and the draft Byron Coast CKPoM on one side and Smith on the other, that at the very least DoPI would seek independent expert advice, though they refused to.

A similar situation occurred at the Bluesfest site where DoPI approved the KPoM subject to monitoring. When the first year of monitoring by Biolink revealed impacts on Koalas and advised against additional festivals in the breeding season, new consultants were engaged whose results confirmed those of Biolink, though were interpreted differently to claim no significant impact and used to justify increasing the number of festivals. Yet again DoPI were incapable of independent evaluation and uncritically adopted the advice of the developer's preferred consultants.

If the intent of SEPP 44 is to be achieved it is essential that when development is proposed that affects potential or known core Koala habitat or movement corridors that the impact on

Koalas is considered and mitigated at the very first step in the planning process (i.e. masterplan and rezoning stage).

The excuse of leaving consideration of Koalas up to a future process, such as a site specific KPoM, has been proven to fail as it allows significant destruction of core Koala habitat and degradation of Koala corridors to occur before the impacts and mitigation measures are considered. Similarly approving a development subject to monitoring of impacts is a furphy as DoPE have proven they ignore the outcomes, though most significantly they are unwilling to limit activities once they are approved irrespective of the results of monitoring. It is also apparent that once a development is approved then often 'development creep' occurs where variations are used to increase the scale and impact of the development. It is the death of a thousand cuts.

It is essential that an independent body with ecological expertise review conflicting advices and expert recommendations. It is apparent that DoPE have neither the will nor the ability to do this. Such a body needs to identify monitoring needs, review outcomes, and make recommendations for improvements.

The need to comply with the aims of SEPP 44 must be expanded to apply to Councils, Planning Panels, Government agencies, Ministers and other approval bodies when making land-use decisions. It is essential that potential and core Koala habitat be required to take in to account when approving any land use or activity that may have a significant detrimental impact on Koalas.

2.4.2. Comprehensive Koala Plans of Management

SEPP 44 also encourages Councils to systematically identify areas of 'core koala habitat, stating that councils "should" conduct koala surveys, and take the results regarding core koala habitat into account when making environmental protection zones and development control plans.

SEPP 44 also allows Shire-wide KPoMs to be prepared, often termed Comprehensive KPoMs, for approval of the Director General of Planning. In the 22 years since SEPP 44 came into forces four CKPoM plans have been adopted and approved by the Department of Planning and Environment, with the two most recent only for parts of Local Government Areas. Of these, only the Coffs Harbour KPoM identifies 'core koala habitat' across the LGA. with the Kempsey plan only identifying it in two small areas. Elsewhere various classes of Koala habitat has been identified.

The callous disregard of the Government agencies for Koalas is exemplified by the fact that it was NPWS (later incorporated into DECCW) who in 1999 identified core Koala habitat in the Coffs LGA, then it was DECCW that in 2007 finalised the PNF Code of Practice that specifically excluded core koala habitat from logging, and it was DECCW that in 2007 began systematically approving logging of core Koala habitat in the Coffs Harbour LGA, with 2,000 of the 19,000 ha of identified core Koala habitat approved by 2010 (see 2.1.6. Case Study 6: Coffs Harbour CKPoM core Koala habitat). It is highly probable that prior to 2007, NPWS and DLWC turned a blind eye to its logging. It is also apparent that after 1999 core Koala habitat continued to be cleared.

The other three CKPoMs identify various classes of Koala habitat but fail to identify core Koala habitat anywhere, except for in two small areas near Kempsey. Instead leaving it up to further assessment to identify.

The Port Stephens Council Comprehensive Koala Plan of Management (CKPoM) was developed throughout the 1990's, endorsed by Council in 2001, and approved by the Department of Planning in 2002. The plan only maps preferred and secondary koala habitat and 'core koala habitat' is only mentioned once in the plan.

The Kempsey Council Comprehensive Koala Plan of Management (CKPoM) for the Eastern Portion Kempsey Shire LGA came into effect in 2011, covering the coastal third of the LGA. It only identifies core koala habitat for two small areas within the study area, instead identifying 'preferred' koala habitat elsewhere.

The Lismore Council Comprehensive Koala Plan of Management for south-east Lismore (CKPoM) covers part of the southeast of the LGA, was 18 years in the making and was approved by the NSW Department of Planning in 2013. It includes indicative maps of *preferred koala habitat* and does not identify core koala habitat, rather specifying a process to identify it. There is a map that identifies core Koala habitat around Lismore though it is only referred to as an example of the methodology.

There are a large number of Councils that are in the process of preparing draft CKPoMs for all or parts of their areas that have not progressed after years of stuffing around by by both Councils and DoPE. It is apparent that the principal failure has been the lack of meaningful support for Shire wide mapping since Coffs Harbour. Some grant funding has been available to councils through the *Saving our Species* program, though the process followed has been ad hoc.

The Government's intent to fundamentally change SEPP 44, including re-defining the definition of core Koala habitat, is likely to throw these draft CKPoM into disaray, which given previous history is likely the intent.

It also needs to be recognised that the Councils overseeing preparation of CKPoMs have political agendas that do not necessarily coincide with the aims of SEPP 44. For example Byron Shire Council, at the 4 August 2016 Ordinary Meeting, resolved (Resolution 16 -435) to amend the draft Byron Coast CKPOM and submit it to the Director of the Department of Planning and Environment for approval in accordance with SEPP 44

This adopted draft KPoM represents a significant weakening of the original 2013 draft CKPoM because it removed limits on what Council could approve within 50m of core Koala habitat and within Koala habitat linkages, leaving no limits to which Koala habitat can now be destroyed provided offsets or financial compensation are provided.

The definition that habitat buffers "*means a 50m wide strip of land*" around "*any mapped area of Preferred Koala Habitat*" (ie potential Koala habitat) was dropped and no distance is now specified, making it very ambiguous. Similarly the requirement that "*Council cannot approve a development application to which this section applies unless it is satisfied that the proposal will not impact on the associated area of Preferred Koala Habitat*" was removed and replaced with vague limitations.

The first draft of the CKPoM identifed 5.6 Strategic Linkage Areas that are a subset of Council's mapped wildlife corridors, *which "means a broadly defined but indicative area of land approximately 200m wide that has been identified for the purposes of facilitating the movement of koalas within and between* [Koala Management Precincts]". These were removed and replaced with existing broad wildlife corridors that are not specifically targeted at Koalas. The identification of explicit corridors for Koalas, both between and within KMPs, is considered to be an essential action. The requirement that "*Council cannot approve any development application to which this section applies*

unless it is satisfied that the proposal will not sever or otherwise interfere with the movement of koalas within a SLA" was deleted.

It is also apparent that many councils have no intent to prepare CKPoMs for political reasons.

The preparation of Comprehensive Koala Plans of Management in accordance with SEPP 44 is the most efficient and effective means of identifying potential Koala habitat and habitat links, identifying core Koala Habitat for protection, and detailing appropriate development controls. It is essential that core Koala habitat be identified up-front in the planning process if there is an intent to protect it.

After initial support in preparing the Coffs Harbour City Comprehensive Koala Plan of Management the NSW Government seems to have done everything they can to frustrate the preparation of further plans and stop them fulfilling the goal of identifying and protecting core Koala habitat. It is an indictment of failed Government policy that after 22 years only 4 CKPoMs have been prepared and that the only core Koala habitat identified is in the Coffs Harbour LGA, with two small areas near Kempsey.

It is clear that the only way of ensuring protection of core Koala habitat is to firstly identify it and secondly zone it for environment protection. While this was the clear aim of SEPP 44 it appears that NSW Government agencies, after an initial success, have colluded to obstruct the process and undermine the outcomes.

The NSW Government needs to take on the responsibility of identifying and mapping potential and core Koala habitat, provide clear guidelines for the implementation of SEPP 44 and allocate sufficient resources to assist all local government areas to complete the preparation of finalisation of Comprehensive Koala Plans of Management within 5 years.

2.4.3. Zoning core Koala habitat for protection

In order to give effect to the aims of SEPP 44 it is identified that Councils "should":

> *(a) survey the land within its area so as to identify areas of potential koala habitat and core koala habitat, and*
>
> *(b) make or amend a local environmental plan:*
>
> > *(i) to include land identified as a core koala habitat within an environmental protection zone, or*
> >
> > *(ii) to identify land that is a core koala habitat and apply special provisions to control the development of that land, and*
>
> *(c) give consideration to preparing an appropriate development control plan for land that is or adjoins a core koala habitat.*

The 2016 draft Byron Coast Comprehensive Koala Plan of Management notes "*In this Plan potential koala habitat within a Koala Management Precinct is considered to meet the definition of core koala habitat*". An action of the draft Byron Coast Comprehensive Koala Plan of Managemen is "*Council shall amend Byron LEP 2014 to zone for Environmental Protection areas of core koala habitat*."

The Local Government areas of Tweed, Byron, Ballina, Lismore and Kyogle encompass the spectacular volcanic remnants of the Tweed Shield Volcano, centred on Mount Warning, and the Focal Peak Shield Volcano, centred near Mount Barney. The volcanic ranges support rainforests,

and the sedimentary soils of the valleys eucalypt forests and wetlands. Heathlands, swamps, melaleuca wetlands, saltmarshes and mangroves characterise coastal vegetation.

These Local Government areas are part of "Border Ranges North and South", one of Australia's 15 outstanding biodiversity hotspots, areas which are rich in biodiversity but also under immediate threat. The supporting information states:

> *This sub-tropical and temperate hotspot is one of Australia's most diverse areas - and it is the most biologically diverse area in New South Wales and southern Queensland. It has a variety of significant habitats: subtropical rainforest, wet sclerophyll forest, mountain headlands, rocky outcrops and transition zones between forests.*
>
> *These habitats support a huge variety of bird and macropod species. Many are rare or threatened …*
>
> *This region's high population growth, with associated urban and tourist developments along the coast, is a major cause of habitat loss and fragmentation. Although most remaining natural areas are protected, they are under considerable threat from weeds, fire and recreational use.*

The rainforests of the area are of international significance as evidenced by the inclusion of many of the National Parks in the World Heritage Gondwana Rainforests of Australia, with more recent national parks identified as qualifying for addition. The Big Scrub once covered 75,000ha and was Australia's largest area of subtropical rainforest. It is estimated that there is now only some 664 ha of the Big Scrub remaining as small fragments scattered across its former distribution.

As well as being identified as one of Australia's biodiversity hotspots, these landscapes have been branded as Australia's Green Cauldron, a centrepiece of national tourism as one of Australia's15 'National Landscapes' – *"places that capture the essence of our country - our most inspirational environments offering world class natural and cultural experiences"*. Tourism is a major driver of the regional economy.

The region has been extensively cleared, particularly floodplain and lowland vegetation.

The Border Ranges Rainforest Biodiversity Management Plan (2010) identifies that:

> *Currently a relatively small area of private and public land (less than one per cent) within the Planning Area is protected to varying degrees under a range of voluntary conservation covenants including Land for Wildlife, wildlife refuges, nature refuges or local government environmental protection zoning arrangements.*

There is a need to increase the area of native vegetation, maintain and enhance linkages between remnant areas, and to ensure the retention and enhancement of remnant vegetation. It is particularly important to identify the high conservation value vegetation and habitats remaining in the region and ensure they are appropriately zoned.

Aside from SEPP 44, there are abundant planning directives that require the zoning of high conservation value vegetation for protection. For example the Far North Coast Regional Strategy includes the following actions.

> *Local environmental plans will protect and zone land with State or regional environmental, agricultural, vegetation, habitat, waterway, wetland or coastal values*
>
> *...*

> *Local environmental plans will include provisions to encourage habitat and corridor establishment in future zoning of Environmental Assets and Rural Land area.*
>
> *New development adjoining or adjacent to farmland, extractive resources, waterways, wetlands and areas of high biodiversity value will incorporate buffers to avoid land-use conflict.*

The Far North Coast Regional Conservation Plan (DECCW 2010) emphasises "*As outlined in this RCP and in the FNCRS, areas of validated high conservation value land should be protected in new LEP provisions"*.

Practice Note PN 09-002 (Environmental Protection Zones) states that:

> *The environment protection zones E2 through to E4 are applied where the protection of the environmental significance of the land is the primary consideration. Their importance for visitation, tourism and job creation should also be carefully considered.*
>
> *Prior to applying the relevant zone, the environmental values of the land should be established, preferably on the basis of a strategy or from an environmental study developed from robust data sources and analysis. This is particularly important where land is identified as exhibiting high ecological, scientific, cultural or aesthetic values outside national parks and nature reserves. For example, in most cases, council's proposal to zone land E2 needs to be supported by a strategy or study that demonstrates the high status of these values. Under such a strategy or study, zoning would need to be appropriate and land uses would need to be capable of being sustained.*

DEP identifies the E2 zone is to be for:

> *This zone is for areas with high ecological, scientific, cultural or aesthetic values outside national parks and nature reserves. The zone provides the highest level of protection, management and restoration for such lands whilst allowing uses compatible with those values*

DEP identifies the E3 zone is to be for:

> *This zone is for land where there are special ecological, scientific, cultural or aesthetic attributes or environmental hazards/processes that require careful consideration/management and for uses compatible with these values.*

Byron Council's 2004 Biodiversity Strategy identifies core Koala habitat as being of very high conservation value and thus proposed that high quality required be included in E2 where mapped.

In September 2012, the then Minister for Planning announced that there would be a six months review of E zones just for Tweed, Byron, Ballina, Kyogle and Lismore Local Government Areas. The Minister for Planning then removed all environmental zones (E2 Environmental Conservation, E3 Environmental Management and E4 Environmental Living zones) from far north coast LEPs after they were exhibited. These proposed EZones are now in limbo in the gazetted LEP's as "deferred matters". Within these deferred areas the old LEP zoning and requirements apply, meaning that Councils now have two different LEPs in operation.

The 'Northern Councils EZone Review Interim Report' was completed in September 2013, though was not released for public comment until May 2014. The review supported the inclusion of environmental zones and overlays in far north coast Local Environmental Plans provided they were

based on clear criteria and accurate mapping, noting that "*where high conservation value features or other 'special' features occur in each council, they should be mapped and zoned appropriately as an EZone*".

While the EZone review supported the protection of high conservation value native vegetation, it ignored the requirements of SEPP 44 by recommending:

> *Ballina SC, Byron SC and Tweed SC are currently preparing Koala Plans of Management for the coastal zones within their respective councils. Each council should insert a clause into the relevant SILEP that regulates development in areas of Koala habitat (identified on an accompanying Koala habitat overlay) upon completion of the relevant Koala Plans of Management.*

Lismore, Tweed, Byron and Ballina have now undertaken Koala habitat assessments over parts of their lands and identified core Koala habitat. Overlays provide inadequate protection for such areas. In accordance with SEPP 44 these lands should be given the highest protection in an E2 zoning.

After the Minister for Planning excluded environmental zones from Ballina's LEP Council became concerned with the increasing logging of Koala habitat under PNF approvals. Which led to the council to vote in late 2014 to amend the Ballina Local Environment Plan 1987 to introduce a requirement for council consent for anyone undertaking private native forestry (PNF) in the shire. Council staff prepared a planning proposal to amend the LEP, which was lodged with the NSW Department of Planning and Environment for a 'Gateway determination' in January 2015. DoPE reject the planning proposal, so Council resolved to submit a review application. The Echonet, May 25, 2015 reported:

> *Cr Paul Worth, who led the charge against PNF, said there was limited assessment of ecological and amenity impacts associated with EPA approvals.*
>
> *He said PNF was an emerging activity in the Bagotville, Meerschaum Vale, Wardell, Coolgardie and the broader Blackwall Range localities.*
>
> *He said those areas had been identified by the council as ecologically significant, important from a scenic amenity perspective, and also contained important habitat for threatened species such as koalas.*
>
> *...*
>
> *'In the absence of the planning proposal being able to proceed, there is a risk of an open ended continuation of private native forestry with very limited regulation and further adverse impacts in relation to amenity, ecology, soil erosion, sedimentation, noise, traffic and roads,' staff have warned in their report.*

The 'Northern Councils EZone Review, Final Recommendations Report' (DoPE 2015) notes

> *E2 and E3 zones will only be applied if the primary use of the land is considered to be environmental conservation (E2) or environmental management (E3) and the land has attributes which have been verified to meet the criteria for an E2 or E3 zone*

The "primary use" has become the pre-eminent consideration. For a Council to establish that the primary use is for "*environmental conservation or management, the environmental values of the land and vegetation need to be demonstrated and the absence of any agricultural or other land use confirmed*". Even the highest value vegetation (ie the Federally Critically Endangered Lowland Rainforest of Subtropical Australia occurs on private land in the Tweed, Byron, Ballina and Lismore LGAs), can only be zoned for E2 if either the landowner agrees or Councils can first prove that it is

already primarily managed for conservation. This establishes a threshold that requires Councils to have evidence of a landowner's management intent, such as a conservation agreement or signed statement.

Land currently zoned for environmental protection (7a, 7b, 7j 7k and 7l) can be zoned as E2 or E3, without considering primary use, provided that it meets the criteria for that zone (many currently zoned lands are likely not to satisfy the new criteria).

Even with restricted criteria, Councils now have verify that vegetation satisfies the criteria in a process effectively requiring property level assessments, unless a landowner volunteers part of their land for an EZone. An E2 or E3 zone or other mapped planning controls cannot be applied to land unless the attributes that meet the E2 or E3 criteria have been verified on that land. For environmental values verification requires either biodiversity field inspections and ground surveys conducted by an appropriately qualified person or supporting flora and fauna reports conducted by a suitably qualified person "guided by the *Draft Framework for Biodiversity Assessment*, NSW Office of Environment and Heritage (2014) and the *Draft Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities*, NSW Department of Environment and Conservation(2004)", where the fieldwork is less than 5 years old. Basically both approaches effectively require detailed flora and fauna surveys for each property in order to place an EZone over it. Recent aerial photography mapping can only be used in conjunction with such surveys.

The *Framework for Biodiversity Assessment* quantify and describe the impact assessment requirements and offset guidance that apply to Major Projects, while the *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* are for determining whether a proposed development, activity or action is likely to have a significant effect on threatened biodiversity. These identify minimum survey effort required for assessing the environmental impacts of developments involving the clearing or significant modification of native vegetation and the habitat of threatened species, their requirements for detailed site surveys are an unnecessary requirement for deciding whether to zone an area of native vegetation for environmental conservation or management. This intentionally establishes a level of assessment that Councils can not afford to undertake, assuming the landowner will even allow them to.

A vegetation map will be allowed to be used as an overlay (for consideration when giving development consent), but only after it has been verified in the above manner.

The thresholds now proposed make it unrealistic for Council's to be able to zone land for E2 or E3, or even use vegetation as an overlay, unless a landholder agrees (with agreement, land that doesn't satisfy the criteria can be zoned E2 or E3). This also applies to existing conservation zones unless the Council can afford to undertake the detailed assessments necessary to map and verify criteria.

Extensive agriculture (grazing, cropping) will be allowed with consent in E2 zones and without consent in E3 zones.

This effectively contravenes SEPP 44 and prohibits far north coast Councils from implementing one of its core objectives.

The DoPE state:

> *The Final Recommendations will initially apply only to the five Far North Coast councils. The Department of Planning and Environment will investigate the implications of these recommendations for the rest of the State. However, if other councils in the State are*

> *reviewing the application of E zones, then the principles contained in these recommendations can be used.*

Since then Kyogle Shire Council and Lismore City Council have determined to remove all environmental zones from their LEPs. The process of trying to zone areas for environmental protection has now become prohibitive, it is yet to be seen whether Tweed, Byron and Ballina will be able to overcome then Planning Minister, Rob Stokes, legacy. High conservation value vegetation, including core Koala habitat, will no longer be zoned for protection in those parts of one of the world's biodiversity hotspots and one of NSW's strongholds for Koalas.

The five Northern Councils of Tweed, Byron, Ballina, Lismore and Kyogle encompass identified Australian and world Biodiversity Hotspots, have the most threatened species in NSW, and are identified key refuges for Koalas. The councils went through lengthy processes to fulfil policy and strategy requirements to identify high conservation value native vegetation, including Koala habitat, for inclusion in environmental zones, After the proposed zones had been exhibited in 2012 the Government intervened to delete all environmental zones and environmental clauses from the final LEPs. They were classed as deferred matters, meaning the old zones and old LEPs apply to those areas.

After a prolonged process in 2015 DoPE released criteria that only allow land to be included in Environmental Zones if the "*primary use of the land is considered to be environmental conservation".* This, and the detailed environment information required, effectively prohibits core Koala habitat outside pre-existing E zones from being included *within an environmental protection zone* unless a landowner agrees that they already manage it for conservation. This directly contravenes SEPP 44 and effectively prohibits far north coast Councils from including most core Koala habitat in Environmental zones. So far both Kyogle Shire Council and Lismore City Council have totally abandoned environmental zones, while the others are still trying to work out if anything can be protected. The Government now seems intent on rolling this out across NSW.

Ballina Shire Council's attempts to protect Koala habitat from poorly regulated logging by requiring consent in their LEP was rejected by the DoPE, who will not countenance any alternative means of protecting core koala habitat.

The ability to protect core Koala habitat in the Environmental 2 Zone over private lands needs to be urgently reinstated for Far North Coast Councils, irrespective of a landowner's management intent, and the right to protect it in E2 zones maintained elsewhere in NSW.

3. LOCATING KOALAS

The key issue with identifying the presence of Koalas it to identify a consistent and reliable method of identifying their presence. It is clear that Koala scat searches are the most efficient and effective means of doing this, and has been widely practiced in Koala surveys over many years. Though it is important to recognise the limits of this methodology. It is apparent that if limited effort is involved it is unrealistic to expect to reliably identify key feed trees based on requiring 20 scats to be found around the base of a tree.

This section reviews the issues associated with scat surveys and documents the refusal of the Forestry Corporation to undertake the thorough surveys essential to have any chance of satisfying the requirement to meet the unreasonably high threshold of 20 scats to identify a trigger tree to undertake a star search.

3.1. Koala scats

Koala faecal pellets (scats) have been widely used to determine relative habitat use by koalas due to the difficulty of reliably detecting them by other means, and because scats can provide an indication of use over time. Ellis et. al. (2013) identify that "*published data indicate that koalas rarely reuse or share trees (at least within the timeframe of most studies)*", meaning that one-off sightings do not reveal tree use over time.

The detectability of Koala scats varies significantly across the landscape depending on observer skill, litter complexity, understorey vegetation, scat numbers, scat scatter, and scat decay rate (Rhodes *et al.* 2011, Gow-Carey 2012, Cristescu *et. al.* 2012, Ellis *et. al.* 2013, Woosnam–Merchez *et. al.* 2013). For their trials Cristescu *et. al.* (2012) found that the complexity of ground litter significantly affected scat detectability and the search-time required, with 87% of scats found after 2 minutes searching in simple litter compared to only 11% in highly complex litter (though the mean time to find the first scat was similar), recommending "*improving the robustness of scat surveys requires standardizing the search area (plots of a fixed size) rather than standardizing search time*".

Dense ground-layer vegetation, tall grass and accumulated debris (leaf litter, shed bark) all contribute to a reduction in faecal pellet detectability (Woosnam–Merchez *et. al.* 2013). NEFA's experience is that the presence of dense understories can significantly affect the detectability of scats, with dense grass making it hard to search and dense lantana making it practically impossible,

Scat decay varies from place to place, with weather conditions, leaf litter type, bushfire, regional variability and bioactivity all influencing the time of which a pellet is detectable (Sullivan *et. al.* 2002, Rhodes *et al.* 2011, Cristescu *et. al.* 2012). Cristescu *et. al.* (2012) assessed decay rates of groups of 10 scats in a variety of vegetation types, finding that after 36 weeks the decay rate was highly variable (with every possibility between zero and 10 scats), finding that both rain and flood increased scat decay rate and that litter decreased decay rate.

Woosnam–Merchez *et. al.* (2013) consider:

> *the opportunity to detect faecal pellets through the implementation of the standardised protocol may not be consistent across the study area. This is particularly true if timed surveys are being undertaken in sampling sites where pellet detectability is relatively high, more trees can be sampled per unit of time than at a sampling site where detectability is poor and thus a more intensive search effort at each tree is required. For this reason, it is*

> *proposed that if timed surveys (i.e. time spent searching each tree/time spent searching at a rapid assessment site) are performed, the amount of time dedicated should be proportional to the relative pellet detectability prevailing at the site (the poorer the detectability, the greater the survey effort required).*

Even with variable search effort related to potential detectability is employed it has to be recognised that large areas of degraded forest have dense understories of weeds that make it difficult, and often practicably impossible, to search.

Even accounting for all the variables that affect detectability, Ellis *et. al.* (2013) identify that absence of koala scats does not mean the trees being searched (no matter how thoroughly) weren't used as "*scats will not necessarily be found reliably (as a proportion of daily output or even at all) under up to about a quarter of trees that koalas actually visit*".

Ellis *et. al.* (2013) found that:

> *Tree use was associated with scat presence on 49% of occasions when koalas were radio-tracked in both central Queensland (n=10 koalas) and south-east Queensland (n=5 koalas), increasing to 77% of occasions when trees were rechecked the following day. Koala densities were correlated with scat abundance at sites with koala density between ~0.2 and 0.6 koalas per hectare. Our results confirm that scat searches are imprecise indicators of tree use by koalas, but demonstrate that these searches can be used, with caveats, to estimate koala population densities.*

Ellis et. al. (2013) identify that "Ellis et al. 1998 found that ~18% of all pellets deposited by koalas at a tree were located within a 1-m^2 quadrat around the trunk of a range of species". Woosnam–Merchez et. al. (2013) criticise limiting searches to around the bases of trees as it "*ignores the not uncommon situation that when P. cinereus defecate they do so whilst on lateral branches away from the trunk*". Phillips and Callaghan 2014 defend their emphasis on searches for 1m around the base of trees on the grounds that "*it relies upon detection of a single koala pellet in order to record a positive result for a given tree, rather than on pellet counts*" and that *"it is just not feasible to search beneath the entire canopy of each tree"*.

Phillips and Callaghan (2014) consider:

> *when a sample proportion of a given tree species "x" containing one or more koala faecal pellets within the prescribed 100cm radial search area is approximately 0.5 (50%), then the true proportion of trees that are likely to have been used by koalas is 100%*

The presence of scats has been used to estimate Koala densities, Ellis *et. al.* (2013) identify they compared the average proportion of trees under which scats were found with the mean estimate of koala density derived from the strip transects for that site to identify the relationship between tree usage and density.

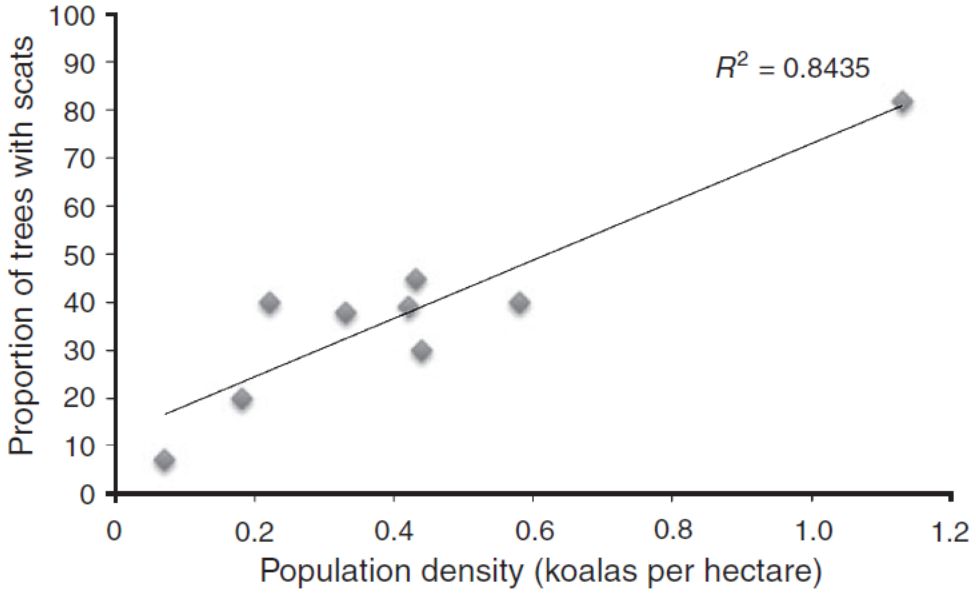


Fig. 1 from Ellis *et. al.* (2013): Proportion of trees (%) under which faecal pellets were found in a 40_40m plot (*y*-axis) and koala population density determined by script transect sampling at the same location.

The presence of Koala scats under trees is not a reliable indicator of what an individual tree was used for, and their use in determining diet preferences has been criticised as unreliable (Woosnam–Merchez *et. al.* 2013, Ellis *et. al.* 2013). Though Phillips and Callaghan 2014 maintain that the results can be used to assess feed preferences "*subject to an appropriately designed methodology governing the collection, analyses and interpretation of the associated data*".

Woosnam–Merchez *et. al.* (2013) warn that "*Care must be taken not to over interpret data obtained using methods that sample for P. cinereus faecal pellets*".

In their discussion on the SAT scat detection method, the EPA (2016) consider:

> *SAT survey methods yielded sufficient data to determine resident and transient koala activity. However its application was limited by cost, accuracy and environmental factors. A weakness of this approach is that scat identification is complex, with some scats often being confused with that of more commonly occurring species such as possums. Access to survey sites was often impossible due to dense vegetation or road access limitations. Differences in climatic variables also meant that the deterioration time of scats differed across the sampled areas, meaning that in wetter forests, scats could have broken down quickly and were not in situ when areas were samples. This could falsely indicate an absence of koala activity.*
>
> *The accuracy of the SAT survey relies on repeated survey to determine koala occupancy. There are also survey design limitations that may result in underrepresented vegetation types not being surveyed and potential to miss high activity areas.*
>
> *Dog detection could be a more accurate and cost effective method in areas of high groundcover and assisted in resolving some scat identification issues. It is also a more rapid method to determine koala presence in areas designated for logging. However, this, along with SAT surveys would need to be frequently repeated to be effective at determining koala activity and occupancy and is still constrained by the access limitations that were faced in the pilot study.*

The Chief Scientist (2016) considers:

> *Population data can be hard to gain for species, such as the koala, that are characterised by low density and large home ranges, and whose behaviour makes visual identification difficult. For these species, indirect measurements such as scat (faecal pellets) surveys can be a useful indicator of the presence or absence of the species and how they use the environment (Phillips & Callaghan, 2011; Cristescu et al., 2015). Scat surveys have been used to inform some of the CKPOMs prepared under SEPP 44.*
>
> *Using dogs specifically trained to detect koala scats is being investigated, particularly as scat surveys conducted by researchers can return a high false negative rate (Cristescu et al., 2015). Experimentally, off-leash dog trials returned a 100% detection rate and was 19 times more efficient than current scat surveys (Cristescu et al., 2015). This study concluded that detection dogs are more cost effective than other survey methods such as human-only detection, camera traps and hair analysis; and that using detection dogs for koalas increases the accuracy and reduces false negatives. Detection dogs will be utilised for the a large scale koala distribution survey on the Northern Tablelands (Northern Tablelands LLS, 2016).*

Koala scat surveys, either manually or with a dog, are clearly the most efficient and effective manner to survey for Koalas to identify tree use over time, areas of occupation and ascertain tree preferences (recognising this could be for either feeding or resting). One problem with the current IFOA requirements to undertake scat searches is that the searches are left up to poorly trained and reluctant foresters who often have no will to implement the required prescriptions.

It is important to recognise that when limiting the search area to one metre around tree bases and limiting search effort, as currently required by the IFOA, it is plainly wrong to require the identification of 20 Koala scats, rather all that can reasonably be expected to be identified is the presence of scats (and even then this is not a reliable indicator that a Koala has not used the tree). The current TSL requirement to identify 20 Koala scats is ecologically indefensible and sets such a high threshold that it appears designed to minimise protection of Koala habitat.

It also needs to be recognised that some areas of degraded forest have dense infestations of lantana that preclude scat searches and that other survey techniques should be applied in such cases. This should include consideration of use of scat-detection dogs, distinctive scratch marks, and sound surveys.

3.2. Finding Koalas when Logging

For public forests the requirement is for the Forestry Corporation to undertake Koala scat searches ahead of logging in preferred forest types to identify Koala High Use Areas. Though in practice NEFA has found that the Forestry Corporation rarely undertake scat searches with any thoroughness and thus rarely identify Koala High Use Areas for protection.

In preferred forest types where there is sufficient evidence of Koalas the Forestry Corporation of NSW is required by their Threatened Species Licence (TSL) to protect minimum numbers of feed trees and to thoroughly search for Koala scats ahead of logging in order to identify and protect Koala High Use Areas.

TSL Section 5.2.2. (b) states:

> *During the marking up of the compartment, an adequately trained person must inspect trees at ten metres intervals. Primary browse trees must be inspected. In the event that there are no primary browse trees, secondary browse trees must be inspected. In the event that there are no primary browse trees or secondary browse trees, other trees and incidental browse trees must be inspected. Inspections must include thoroughly searching the ground for scats within at least one metre of the base of trees greater than 30 centimetres dbhob*

In 2012 NEFA found that in Royal Camp State Forest the Forestry Corporation were not undertaking adequate Markup Surveys or Koala Markup Searches, were not thoroughly searching for Koala scats, and were not identifying and protecting Koala High Use Areas, as required by the TSL. From scat searches NEFA identified that one Koala High Use Area was currently being logged and 3 were about to be logged. NEFA forced the Forestry Corporation to stop. When logging resumed nearby NEFA found that another Koala High Use Area was logged. And after that NEFA found another Koala High Use Area logged (see Case Study - Royal Camp State Forest).

The EPA undertook their own scat searches that confirmed the Koala High Use Areas we had identified and that adequate scat searches were not being undertaken, and confirmed extensive logging and snig track construction within what should have been two Koala High Use Areas, issuing 3 Penalty Notices for offences within one of these.

NEFA had exposed that for the past 15 years that the Forestry Corporation had not been undertaking the required scat searches and were rarely identifying Koala High Use Areas for protection. While we had previously identified the problem, this time we conclusively proved that Koalas were being denied the protection required.

In November 2012 Regional Forester, Craig Busby, wrote to CEO Nick Roberts "*We are still in dispute with EPA over the interpretation of "thoroughness" of searching and techniques used and are standing our ground based upon the fact that we have not changed our techniques since the introduction of the TSL"* (NEFA 2014). In April 2013 Forester, Craig Busby, told the EPA that they had done the required pre-logging surveys and not done anything wrong, stating (NEFA 2014):

> *... no triggers for star searches were found at the time of pre-harvest mark-up around log dump 20. ...The techniques for pre-harvest koala mark-up searches has been audited by the EPA many times since the introduction of the TSL. The EPA's current interpretation of the relevant TSL condition is inconsistent with historical practices.*

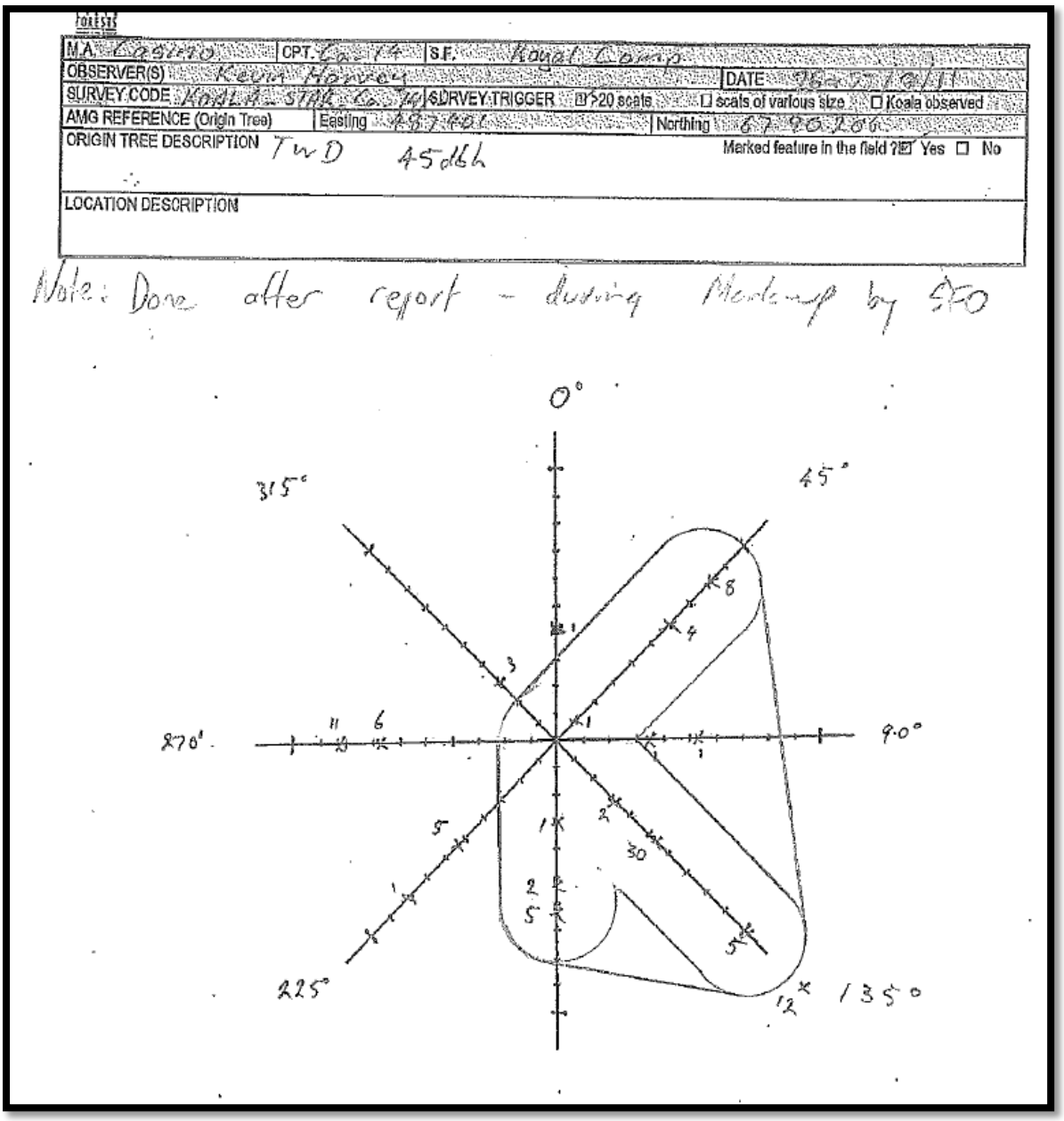
The nature of the problem with Koala scat surveys extends to the subsequent identification of Koala High Use Areas once a trigger tree is identified.

The detection of a Koala, or 3 out of 10 consecutive trees with scats, or a tree with >20 scats beneath it, or different sized scats (indicating a mother and baby) is the trigger for a star search comprising eight transects radiating out from the detection site. The TSL 5.2.2. c) Koala Star search (iii) states:

> *A search for Koala scats must be conducted along each of the eight transects. Each transect must be a minimum 100 metres length. In any one 100 metres section of each transect, ten trees must be inspected for scats. Inspections must include thoroughly searching the ground for scats within at least one metre of the base of the tree. Primary browse trees must be inspected, in the event that there are no primary browse trees, secondary browse trees must be inspected. In the event that there are no primary browse or secondary browse trees, other trees and incidental browse trees must be inspected. Trees inspected should be*

approximately ten metres apart along the transect and should have a dbhob of greater than 30 centimetres.

A Koala High Area is only considered to occur where Koala scats are found under at least 3 trees on a transect, and is then applied for 20m around the initial detection site and those 3 trees. In practice this means that where they are identified they are usually very small areas. The Threatened Species Licence 6.14 (c)(i) states *"Specified forestry activities are prohibited from within all Koala high use areas. A 20 metres wide exclusion zone must be implemented around the boundary of Koala high use areas".*

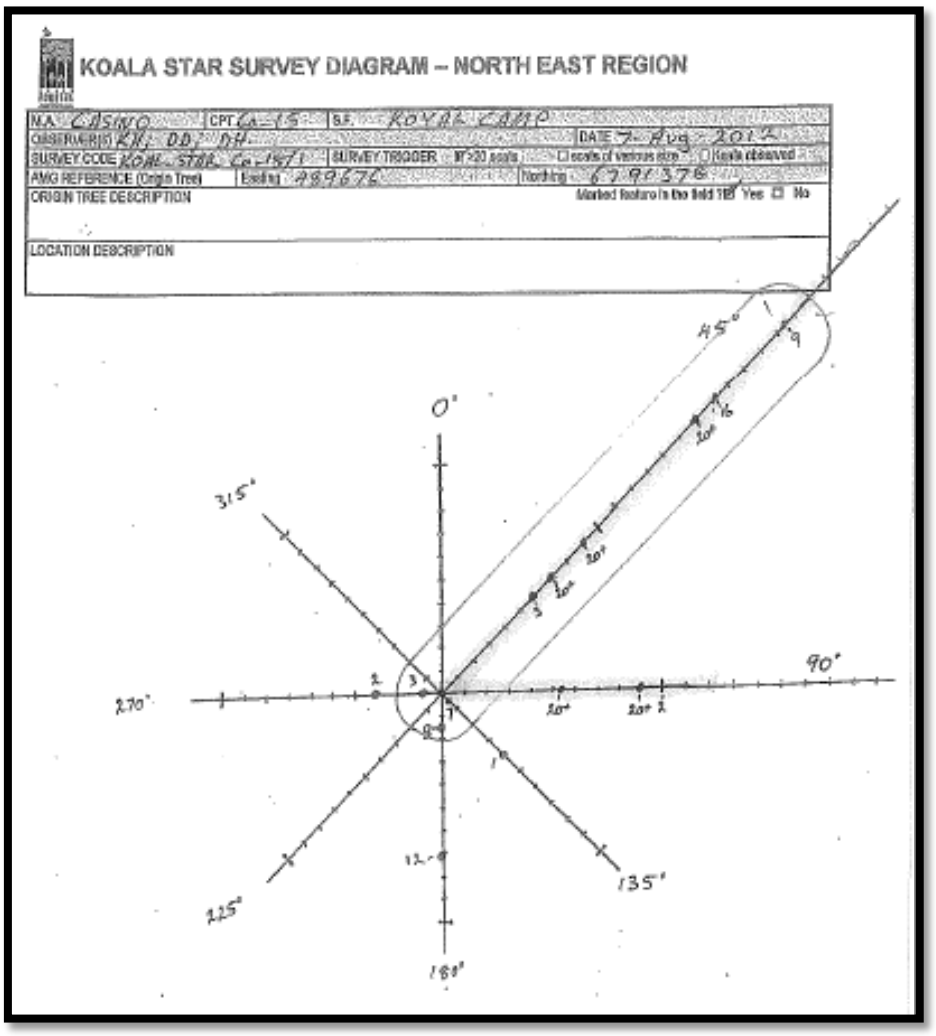


Example of results of a Forestry Corporation star search and identification of a high use area (HUA) conducted around a tree with >30 Koala scats in compartment 14 of Royal Camp SF (26/9/2011). Only those sections of transects with 3 or more trees with scats are required to be included in the HUA. The identified HUA was 1.4ha. Things to note:

1. of the 18 trees located with scats beneath them, only half are included in the HUA.

2. the fourth tree on the 135^{o} transect was excluded from the HUA
3. there was no additional star search initiated around the tree found with 30 scats
4. the transects were not extended for 100m past the identified HUA

The points 2-4 constitute legal breaches, though were ignored by the EPA in their audit of Royal Camp.



Example of results of Forestry Corporation star search and identification of a high use area (HUA) conducted after NEFA's complaint about logging Koala HUAs in compartment 15 of Royal Camp SF (7/8/2012). The trigger tree had >20 scats. This was not implemented due to logging being stopped. Things to note:

1. of the 15 trees located with scats, only nine are included in the HUA
2. unlike the implemented 2011 Koala HUA this time the transects were extended 100m past the HUA
3. the 3 trees on the 90^{o} transect are excluded from the HUA
4. there are 5 trees with >20scats (2 outside the HUA) that were not subject to their own star searches

The points 3-4 constitute legal breaches, which were similarly ignored by the EPA in their audit.. Had star searches been initiated around all trees found to have >20 scats the resultant HUA would likely have been far larger.

It is apparent that after 15 years neither the Forestry Corporation nor the EPA had learnt how to delineate Koala High Use Areas based on scat surveys.

As a consequence of Royal Camp the EPA began to audit Koala scat searches in the Lower North East, identifying that the Forestry Corporation had not undertaken thorough searches for Koala scats ahead of logging in Wang Wauk State Forest (from an assessment of 12 trees) and Bulahdelah State Forest (from an assessment of 9 trees). The response to the EPA's draft findings the Forestry Corporation (2013) admitted inadequate mark-up but refused to accept the need to thoroughly search for Koala scats, responding:

> *FCNSW cannot accept the detail and method associated with the specific allegations relating to ... retained koala feed trees. The link the EPA has made between tree marking and searching is not contained in the licence. The EPA's approach to searching for koala scats is not specified in the licence. The very nature of both the koala mark-up technique and star-search technique is subjective and inevitably different results may be expected on a particular day of searching, let alone results from surveys on different days, weeks or months*

The EPA October-November 2012 final audit report of Wang Wauk State Forest Compartment 116 found that Koala scats were still not being adequately searched for, despite the presence of a Koala High Use Area. They found a tree had been logged within a marked Koala High Use Area, noting *"Given the fact that high use koala activity has been discovered within the compartment it is significant importance that compartment mark up surveys are undertaken in compliance with the licence requirements to facilitate environmental features being located and accordingly protected. For example further koala high use areas"*, finding:

> *The brief assessment undertaken by the EPA including 12 trees only. All 12 trees had evidence to suggest that a 'thorough' search, as per the licence requirement had not taken place. EPA officer observations note that all 12 trees had not had there base disturbed at all, i.e. no leaf litter displaced. Please note that the majority of the EPA assessment was undertaken at the most recently active (currently active) log dump area, which would have been indicative of the likely-hood of SFO searches.*
>
> *Of the 12 trees searched, 5 trees were marked as K or R (or both) trees for retention. Of the 5 marked trees, 8 and 35 koala scats were located at the base of these trees, indicating that the SFO/FNSW personnel had been to the tree, yet hadn't disturbed the surface of leaf or grassy understorey. One search of a marked "K" tree yielded 35 koala scats in a very short space of time, which is a trigger for a koala star search. EPA officer observations noted that age of these koala scats and the likelihood of these scats being deposited prior to or shortly before the commencement of operations in these areas.*

The EPAs response was simply to require an action plan:

> *FNSW must ensure that immediate short term actions are taken to ensure that upcoming koala searches are done in a thorough manner. An long term action plan must be developed and implemented immediately to ensure that all future koala searches are done in a thorough manner for proper identification and appropriate protection of koala high use areas.*

The EPA and Forestry Corporation met in January 2013 to discuss the failure to thoroughly search for Koala scats at Royal Camp, Wang Wauk and Bulahdelah State Forests. The EPA appear to have abandoned any attempts to enforce the requirements for Koala scat searches soon after, and at the behest of the Forestry Corporation began advocating for removal of the need to undertake scat searches in the new IFOA. (see 2.2 for discussion).

Logging operations commenced in Koreelah State Forest on 11 March 2013. On 9 April an injured Koala that *"seemed to have a very bad ear infection"* was found at the base of a tree while marking-up, rather than being taken to a vet it was left there and found dead the next day. The infection could have been of a wound caused by logging. Rather than being taken to a vet to determine whether it had been injured during logging it was buried on site without an autopsy.

NEFA were unaware of this when we briefly visited the area in May 2013 and, in the area we inspected, we saw no sign that anybody had inspected trees at ten metres intervals and thoroughly searched around their bases for Koala scats, and observed a large number of primary browse trees (in this case Tallowwood) that had been cut down with no evidence of searching around their bases. In response to our complaints the Forestry Corporation responded that they had been looking and only found low numbers of scats and that even though it was not identified as a Koala intermediate use area "*koala feed trees have been identified and marked for retention in the current harvest area despite there being no requirement to do so under the TSL".* The EPA also investigated the area and, despite seeing a Koala apparently found no scats and no problems.

In our June 2013 audit NEFA assessed a randomly chosen 1 ha logged plot for tree retention and Koala searches. While logging debris and soil disturbance hampered searching for scats, all but 2 potential feed trees were able to be searched around a significant portion of their bases by us. It was evident that, as far as we could tell, not a single one of the trees we located had been searched by anyone before us - as evidenced by the intact litter. In one part of the transect we found 4 Tallowwoods with Koala scats (30, 5, 4, and 2) under them. The high use tree with 30 scats under it also had 2 smaller scats indicating the presence of a mother and juvenile. So in one randomly chosen small sample we found sufficient evidence to trigger a star survey and have the compartment identified as an intermediate use area. Given these results, and the observations of Koalas, we find it inconceivable that Koala High Use Areas were not present.

We have consistently found in our audits that since then the Forestry Corporation are routinely failing to thoroughly search for Koalas elsewhere (i.e. Whian Whian, Richmond Range SF, Cherry Tree SF, Sugarloaf SF - see NEFA audits). The EPA dismiss all our complaints, often without even investigating them.

As a result of our Royal Camp complaints Koalas were made a compliance priority by the EPA. The EPA (2014b) told the General Purpose Standing Committee No. 5 'Inquiry into the performance of the NSW Environment Protection Authority':

> ***What else is being done to protect koala habitat on public land?***
> *The EPA released the Crown Forestry Compliance Strategy on 1 July 2013. The strategy provides a comprehensive and transparent framework for the regulation of native forestry on public land, including the setting of annual Crown forestry compliance priorities by the EPA. These priorities are based on available data and intelligence, recent compliance findings and a recognition of issues important to the community. The identification and protection of koala habitat is a key compliance priority.*

Koalas are identified as one of the EPA's Cross-tenure environmental compliance priorities for 2014–15 and 2015-16. For "*Protecting koalas and their habitat*" the action proposed was "*Assess compliance with Integrated Forestry Operations Approval (IFOA) and PNF Code requirements relating to protecting koalas and their habitat*" in 2015-16, with the purpose being "*Assess compliance and raise awareness of regulatory requirements around Koala protection*", and the output *"Publish compliance summary on EPA website".*

There are 5 EPA audits available on-line for the Upper North East region, undertaken in 2014-15 they all profess to consider Koalas, but only 3 made a token attempt to assess whether the Forestry Corporation is indeed "thoroughly" searching for Koala scats ahead of logging, and thus identifying Koala High Use Areas, as required by the TSL licence. None of these are mentioned in the EPA's compliance summary.

In the three token assessments a total of 21 trees were assessed, all of which were Tallowwood and had no evidence of searching, though the EPA do claim to have found one tree which may have been searched (though animals foraging around trees can create similar disturbance). Despite the only available evidence. limited as it was, being that the Forestry Corporation are not doing the required searches to identify Koala High Use Areas, the EPA's repeated comment is "*not able to determine whether primary browse trees were inspected thoroughly in line with the TSL requirements".* The EPA refuse to adequately audit or enforce this requirement. This is the limit of the EPA's willingness to enforce the requirement for Koala scat searches ahead of logging.

Contrary to their pretence the EPA have no intent to enforce compliance with requirements for scat searches, and as a consequence the Forestry Corporation are once again not looking, not finding and not protecting Koalas.

Currently only about 14ha of Koala High Use areas are being identified across the NSW public forest estate each year (EPA pers. comm.), more by accident than design. In Royal Camp SF from limited surveys NEFA identified 10 ha of Koala HUAs, and the actual area is likely to have been many times larger - this compares to the Forestry Corporations 1.4ha before we stopped them. From our field inspections we suspect that some of those now being identified are only identified to make it appear that Koala searches are being undertaken. Most Koala High Use Areas are blindly being logged because the Forestry Corporation refuse to undertake the necessary thorough searches to identify them, and the EPA refuse to make them.

The EPA (2014b) told the General Purpose Standing Committee No. 5 'Inquiry into the performance of the NSW Environment Protection Authority':

> **Core koala habitat mapping**
> The EPA is mapping core koala habitat so that it can be protected at the landscape level. This is intended to replace the existing presence/absence triggers and is a far more effective way of ensuring koalas and their habitat are protected.
> **Regulatory improvements to ensure koala protection**
> As part of the proposed consolidated Coastal IFOA, the EPA and Forestry Corporation have committed to moving to regional koala habitat mapping. As noted above, the EPA has commenced broad-scale mapping of koala habitat. The outcome of this mapping project will be used to inform appropriate conditions, including exclusion zones, the protection of feed trees and other alternative provisions in the consolidated Coastal IFOA.
> ...

In his review of the EPA's (2016) Pilot Mapping Project, Kavanagh (2015) stated:

> *Current approaches in forest management rely on the presence of known Koala food tree species and field (on-ground) surveys to detect the presence of this species. Species presence is usually determined indirectly by observations of Koala faecal pellets, which may be several months old, or sometimes misidentified scats of other species. Koala faecal pellets can be difficult to locate, even when they are present in an area of interest, and detectability of these pellets varies widely between different forest vegetation communities*

Regarding the Koala prescription the EPA (Remake of the Coastal Integrated Forestry Operations Approvals Discussion paper, 2014) state:

> *This condition focuses on the process for searching for the presence of koalas and activity levels rather than the objective of the condition, which is to protect important and currently occupied koala habitat and retain preferred koala browse trees. The current condition is very time consuming to implement and searches under different trees or on different days can produce a different result. Conditions such as these are difficult to enforce due to complexities associated with establishing whether a search was done "thoroughly" or what number and size of scats the person doing the search observed.*

On their website "Development of predictive Koala Habitat Model" the EPA (2015) identified their intent to stop on-ground searches for Koalas and instead rely upon their predictive modelling:

> *The draft of the new Coastal IFOA will propose a move away from record-triggered approaches to koala protection, which has been shown to have limitations. Instead, the protections will focus on identifying and protecting the places in the landscape where koalas are more likely to occur. This approach will mean that important koala habitat will be identified and protected across the landscape at all times, irrespective of koala occupancy. This will provide a more comprehensive, adequate and transparent way of protecting important koala habitat*

In his review of the EPA's (2016) Pilot Mapping Project, Smith (2015) stated:

> *Results of the Pilot Study have shown that koala habitat models are not reliable for identifying areas currently occupied by koalas. The only circumstances under which koala habitat models could be used to replace pre-logging surveys for koalas and koala scats would be the blanket application of highly precautionary Conservation Protocols across all areas of "Potential" habitat (all areas that are not predicted to be unsuitable) regardless of the actual presence or absence of koalas at the time of logging.*

The inability for the Forestry Corporation to identify the abundance of scats and Koala High Use Areas in Royal Camp State Forest, despite claiming that they had undertaken adequate surveys in their usual manner, proves that they are both unable and unwilling to undertake the thorough scat surveys necessary to trigger the IFOA protections for Koalas. After a brief attempt to make the Forestry Corporation comply with their legal obligations to undertake thorough scat searches the EPA gave in to their strong objections. Despite the EPA's pretence that enforcement of Koala prescriptions is a compliance priority, this is clearly a sham as the EPA are not enforcing the prescription and have become an advocate of the Forestry Corporation position of abandoning scat searches and the identification and protection of Koala High Use Areas. The EPA's alternative of modelling the identification of core Koala habitat has been proven to be a failure. The only way to identify and protect the most important areas for Koalas is through only requiring the presence of a single scat as a trigger and having surveys by experts independently of the Forestry Corporation.

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