Ms. Emily Long
Senior Solicitor
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Level 5, 263 Clarence Street
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via e-mail: Emily.Long@edo.org.au

21st September 2020

Your ref: 2027843

Dear Ms. Long

Re: Site Specific Operating Conditions in North East NSW – Materials considered by the EPA going to impact of the operations on koalas.

I refer to the associated Brief to Expert dated 13th August 2020. I also confirm that this report has been prepared in accord with requirements of Schedule 7 (Expert witness code of conduct) of the *Uniform Civil Procedures Rule 2005* and I acknowledge my agreement to be bound by such requirements.

1. Summary

This report considers the information that was put before the NSW EPA CEOs when deciding whether to issue SSOCs for a selected series of Compartments in the Doubleduke, Bungawalbin and Myrtle SFs in north-eastern NSW, taking into account the impacts of the 2019/20 bushfires. The report considers that the information before the EPA CEOs was rudimentary at best, nor was there any data/knowledge regarding *post*-fire habitat utilisation/occupancy rates by koalas within each of the Compartments under consideration.

The two fire severity mapping (FESM and GEEBAM) layers that were available at the time the decisions were being made were demonstrably discordant, yet the EPA apparently utilised the layer that maximised potential logging yield, rather than minimised it, nor was there any attempt to quantify the loss of koala browse species that would occur outside of ESAs or through other prescriptive measures. The SSOCs also enacted a condition that in effect changed the way in which koala browse species were to be retained within Compartments, and permitted the additional tree retention requirements to be satisfied with clumped rather than dispersed trees, the implications of which did not reflect knowledge about how surviving koalas would be required to use the burnt landscape.

Regardless of the absence of *post*-fire survey data that could inform on measures of koala presence/absence or habitat use by koalas within each of the Compartments under consideration, or data on survivorship of browse species and associated loss from logging activities, Protocol 5 reports deemed the risk to koalas to be Low instead of High to Extreme.

In this context, and especially given the discord between the two available fire severity mapping layers that were available, there was no indication that a precautionary approach to allowing logging in the fire affected Compartments had been taken by the EPA in issuing the SSOCs.

Because of these considerations and data that could be used to inform a view to the contrary, this report deems it unlikely that principles of Ecologically Sustainable Forestry Management can be met and/or were being enacted by the decisions that issued the SSOCs.

2. Background

Qualifications & Experience

I am a research scientist/specialist koala ecologist with more than 40 years of experience in koala conservation and management. I hold a Ph.D. in Science from Southern Cross University, the title of my thesis dissertation entitled '*Habitat Use by the koala (Phascolarctos cinereus) towards more effective conservation and management'*. I am a former member (Independent Scientist) of the NSW Koala Recovery Team, and a former member of the Commonwealth Government's expert working group on koala distribution and abundance leading up to the 2012 listing of the koala as a vulnerable species for purposes of the *Environment Protection and Biodiversity Conservation* (EPBC) *Act 1999*.

I have participated in many expert koala working groups focussed on matters such as Koala Likelihood and Habitat Modelling, crown and private native forestry, and koala recovery. I have authored book chapters and peer-reviewed publications of various aspects of koala ecology, conservation and management, in addition to preparing several shire-wide Comprehensive Koala Plans of Management, and have undertaken many Regional/LGA-wide studies on koalas, their habitat and populations therein.

My research interests primarily focus on landscape-scale koala conservation biology, tree preferences and habitat modelling. I have been instrumental in the development of hierarchical koala habitat classifications and peer-reviewed survey techniques such as the **Spot Assessment Technique** (SAT) and **Regularised Grid-based SAT** (RG-bSAT) sampling, both of which are recognised as best-practice assessment techniques by State and Federal Government assessment guidelines.

Familiarity with areas being considered.

The Myrtle, Bungawalbin and Doubleduke (part) State Forests (SFs) are in the Richmond Valley Local Government Area (LGA). In 2015 I was the senior author of a tenure-blind koala habitat and population assessment study that was undertaken on behalf of Richmond Valley Council and covered this LGA (Phillips and Weatherstone 2015). Amongst other things, this work involved a shire-wide review of relevant koala studies and other literature, as well as analyses of 767 historical koala records covering 1900–2013. Field assessments in several focal areas identified by Council officers were also undertaken.

Reference:

Phillips, S., and Weatherstone, C. (2015). *Koala Habitat & Population Assessment: Richmond Valley Council LGA*. Final Report to Richmond Valley Council.

In preparing the following advice I have reviewed and/or otherwise been informed by the following documents, the majority of which (as detailed below) were provided to me as background material to the Expert Brief:

1. General Materials

a) Coastal Integrated Forestry Operations Approval (**CIFOA**) conditions dated November 2018 (Brief Tab 2).
b) CIFOA protocols dated 2020 (Brief Tab 3).

2. *Materials that, according to my brief, were before the EPA CEO when making the March decision*

c) Myrtle State Forest (**SF**) Site Specific Operating Conditions (**SSOCs**) for Compartments 010-012, 014-016 dated 3rd March 2020 (Brief Tab 4).
d) Fire Extent and Severity Mapping (**FESM**) for specific Compartments in Myrtle (Brief Tab 6) and Doubleduke (Brief Tab 10) SFs, as prepared by and marked with the logo of the EPA.
e) Doubleduke SF SSOCs dated 3rd March 2020 (Brief Tab 9).
f) EPA Briefing Note dated 3rd March 2010 (Brief Tab 16).
g) E-mails between Forests Corporation of New South Wales (**FCNSW**) and the NSW Environmental Protection Authority (**EPA**) (Brief Tabs 17–21).
h) Two identical but undated tables outlining risks and supposed mitigation associated with the proposed SSOCs generally (Brief Tabs 22 & 32).
i) Letter from the EPA to FCNSW dated 3rd March 2020 (some sections redacted) referring to the granting of SSOCs for North Coast Burnt sites (Brief Tab 23).
j) A series of four Protocol 5 reports relating to specific Compartments in the Bungawalbin, Doubleduke and Myrtle SFs (Brief Tabs 24–27).
k) Undated scientific advice prepared by the NSW Department of Primary Industries & Environment (**DPIE**) (some sections redacted) (Brief Tab 28)

3. *Materials that, according to my brief, were before the EPA CEO when making the May decision*

a) Myrtle SF SSOCs for Compartment 13 dated 25th May 2020 (Brief Tab 5).
b) EPA Briefing note dated 25th May 2020 (Brief Tab 29).
c) Letter from the EPA to FCNSW dated 25th May 2020 referring to the granting of SSOCs for Myrtle SF Compartment MYR013 (Brief Tab 30).
d) Undated Environmental Risk Summary for Compartment 13 in Myrtle SF (with references to 6th March and 15th May) (Brief Tab 31).

4. Materials that I independently downloaded from the EPA website while responding to the Expert Brief.

e) Bungawalbin SF SSOCs dated 3rd March 2020.
f) Fire Extent and Severity Mapping (**FESM**) for specific Compartments in Bungawalbin SFs, as prepared by and marked with the logo of the EPA.

To respond to this brief, I have assumed the following:

a) That FCNSW is required to submit to the EPA a report that complies with the requirements of Protocol 5 of the CIFOA. Alternatively, the EPA is required to have before it information that satisfies all of the requirements set out in Protocol 5 (even if that information wasn't provided by FCNSW).

b) The EPA is required to have regard to the information required by Protocol 5 when deciding whether to issue an SSOC. Clause 5.3 of Protocol 5 sets out the 'Report content requirements' for Protocol 5 reports.

Prior to responding to the specific requirements of the brief, my understanding of the forestry/koala management interface is as follows:

a) *Pre*-fire Prescriptions
The basis for the following prescriptions is dependent upon a spatial dataset that reflects the intersecting values of a Koala Likelihood Map (**KLM**) and a Koala Habitat Model (**KHM**) such that:

- **koala browse prescription 1** applies where the KLM and KHM both record 'high' values; and
- **koala browse prescription 2** applies where:
    - 25% or more of the harvest area has a combination of moderate values for both KLM and KHM; and/or
    - any compartments with one or more 'contemporary' koala records.

In theory, the KLM offers a chronologically dynamic, records-based approach (*i.e.* values of a fixed cell can change with the input of survey data and/or successive generational analyses of koala records), while the KHM offers a static approach based on vegetation communities, the value of which to koalas is contingent upon information regarding koala browse species.

Earlier work undertaken on behalf of the EPA by Phillips and Wallis (2016) established that the likelihood of the KLM underestimating the extent of high-quality cells was high in low nutrient soil landscapes where koalas naturally occur at low density. The accuracy of the KHM in terms of predicting high quality habitat is also limited by its inability to accommodate disturbance history, as well as an understanding of what tree species most influence habitat use by koalas. Because of these anomalies, many areas of otherwise High value koala habitat are not able to be identified.

<u>Reference</u>

Phillips. S., and Wallis, K. 2016. *Koala Likelihood Mapping - Baseline Koala Survey Analysis and Reporting*. Final Report to NSW Environment Protection Authority.

Following on from the above but prior to the issuing of SSOCs, it is my understanding that koala habitat was managed using the two aforementioned approaches, the associated prescriptions that follow not having any scientific basis that I am aware of but otherwise detailed in Division 3, Sec 65 of the CIFOA as:

Koala browse tree retention (Upper North East Subregion and Lower North East Subregion)
The following trees must be retained for the duration, and at the completion of, each forestry operation in accordance with Protocol 23: Tree retention:

(a) a minimum of 10 koala browse trees per hectare of net harvest area where Koala Browse Prescription 1 applies;
(b) a minimum of five koala browse trees per hectare of net harvest area where Koala Browse Prescription 2 applies and in any (or remaining part of a) compartment where a contemporary koala record exists but is not otherwise attributed Koala Browse Prescription 1 or 2; or
(c) all koala browse trees in areas where the minimum coverage of koala browse trees set out in conditions 65.1(a) and 65.1(b) does not exist in the net harvest area before the commencement of the forestry operation.

b) *Post*-fire (SSOC) Survey requirements
Post-fire survey requirements were prescribed in Conditions 13–17 for each of Bungawalbin, Doubleduke and Myrtle SFs as being restricted to a **broad area habitat search** as described in Table 2 on page 26 of the CIFOA. A broad area habitat search imposes no specific requirements beyond what I would describe as a cursory search for koalas or evidence thereof because the methods by which the searches are to be undertaken have not been specified.

In my opinion, following a fire event when there is an *a priori* need to establish whether or not koalas have survived within a given area, a cursory broad area habitat search for koalas is exactly the opposite of what should have been specified.

c) *Post*-fire (SSOC) Conditions
Condition 11 of the SSOCs for each of Bungawalbin, Doubleduke and Myrtle State Forests require all unburned or partially burned areas > 0.05 ha to be identified as Ecologically Significant Areas (**ESAs**) for purposes of the approval. Category 1 ESAs were to be applied to all unburned and/or partially burned areas greater than 0.5ha in size but less than 1 ha in size, whereas Category 2 ESAs were to be applied to all unburned and/or partially burned areas that were greater than 1 ha in size.

I note that these areas could also be included as wildlife habitat or tree retention clumps if they otherwise met the standard of **Protocol 22** (which if elected to be applied for koalas would mean areas where Koala Browse Prescription 1 or 2 would otherwise apply).

Condition 28 of the SSOCs for each of the relevant compartments in Bungawalbin, Doubleduke and Myrtle State Forests specify a requirement for retention of temporary feed tree clump(s), these being defined as having a minimum patch size of 0.1 ha and a maximum of 2 ha., for the purpose of protecting and retaining, '*to the greatest extent possible*', koala browse species.

Based on my understanding of the SSOCs, any koala browse trees required to be retained for the purpose of condition 65 of the CIFOA can be included within the temporary feed tree clumps. If correct, this approach thus effects a change from that of a variable dispersed rate

of browse species retention (*i.e.* 10 or 5 trees/ha as specified by either Prescriptions 1 or Prescription 2 respectively) to that of an aggregated proportion of the burnt area of the compartment being retained in the form of temporary tree clumps.

I do not consider that the measure of retaining temporary tree clumps for koalas is a superior approach than that of the variable dispersed rate. This is because it enables a change in the koala management prescriptions from that of cross-compartment retention of preferred browse trees to a more constrained, clustered approach. In my opinion this is not in the best interests of koalas because it does not reflect knowledge about koala density and movement patterns in the three SFs.

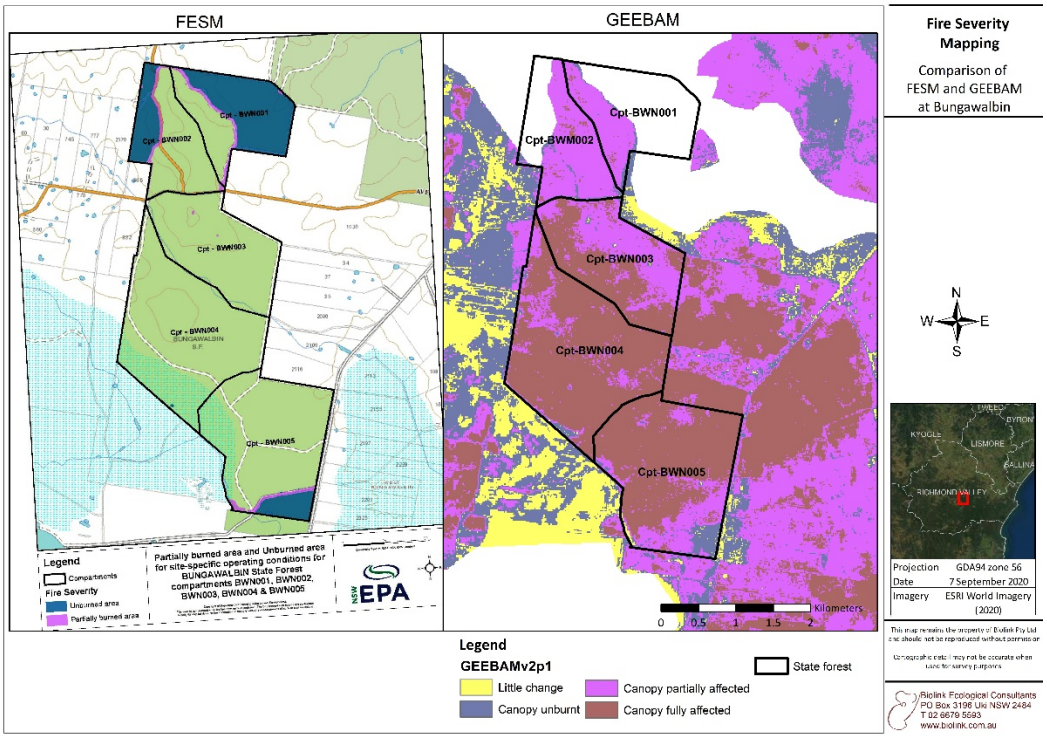
This is because koala densities in occupied areas of these forests are relatively low (0.05–0.2 koalas ha^{-1}) which in turn reflect large home range areas (5–20 ha) being utilised by individual koalas and the commensurately large distances (several hundred meters) that occur between preferred food trees. Thus, the already dispersed nature of the preferred browse resource cannot be met for individual koalas by a maximum 2-ha upper limit for designation of a temporary tree clump.

Following a fire event, individual preferred koala browse trees within burnt areas that may have survived are of increased importance for the survival of koalas *post*-fire. They provide important food and shelter for koalas because they must travel further and wider to find adequate levels of food due to the reduction in food availability because of the fires. The fact that the EPA originally wanted the dispersed browse tree approach to be retained as alluded to in the EPA Briefing note dated 3rd March, demonstrates they understood the importance of these trees to koala survival.

In my opinion, to provide additional protection to koalas, any additional tree retention measures should have insisted on a dispersed tree retention approach, rather than a temporary tree clump approach.

For each of the compartments covered by the SSOCs, accurate fire-severity mapping becomes an important, if not critical, informing underlay because it informs the location of ESAs to be protected. However, with specific regard to the relative amounts of 'partially burnt' canopy as illustrated in the EPA-badged images I have examined for the purpose of responding to this brief (and which I presume were available and could have been provided to the EPA's Chief Executive Officer (**CEO**) at the time decisions were being made), I note that the FESM layer utilised by the EPA differs substantially from that of the Google Earth Engine Burnt Area Map (**GEEBAM**) version 2 (SEED portal, January 2020).

Importantly, the FESM layer clearly implies that the greater proportions of the compartments subject to the SSOCs are burned, whereas the GEEBAM mapping implies that this is not the case. In the following figures I present comparative FESM/GEEBAM images for each of the compartments covered by the SSOCs in each of Bungawalbin, Doubleduke and Myrtle SFs.


FESM
GEEBAM
Cpt - BWN001
Cpt - BWN002
Cpt - BWN003
Cpt - BWN004
BUNGAWALBIN S.F.
Cpt - BWN005
Cpt-BWN001
Cpt-BWN002
Cpt-BWN003
Cpt-BWN004
Cpt-BWN005
Legend
Compartments
Fire Severity
Unburned area
Partially burned area
Partially burned area and Unburned area for site-specific operating conditions for BUNGAWALBIN State Forest compartments BWN001, BWN002, BWN003, BWN004 & BWN005
NSW EPA
0 0.5 1 1.5 2 Kilometers
Legend
GEEBAMv2p1
State forest
Little change
Canopy partially affected
Canopy unburnt
Canopy fully affected
Fire Severity Mapping
Comparison of FESM and GEEBAM at Bungawalbin
N
W
E
S
TWEED
BYRON
KYOGLE
LISMORE
BALLINA
RICHMOND VALLEY
Projection GDA94 zone 56
Date 7 September 2020
Imagery ESRI World Imagery (2020)
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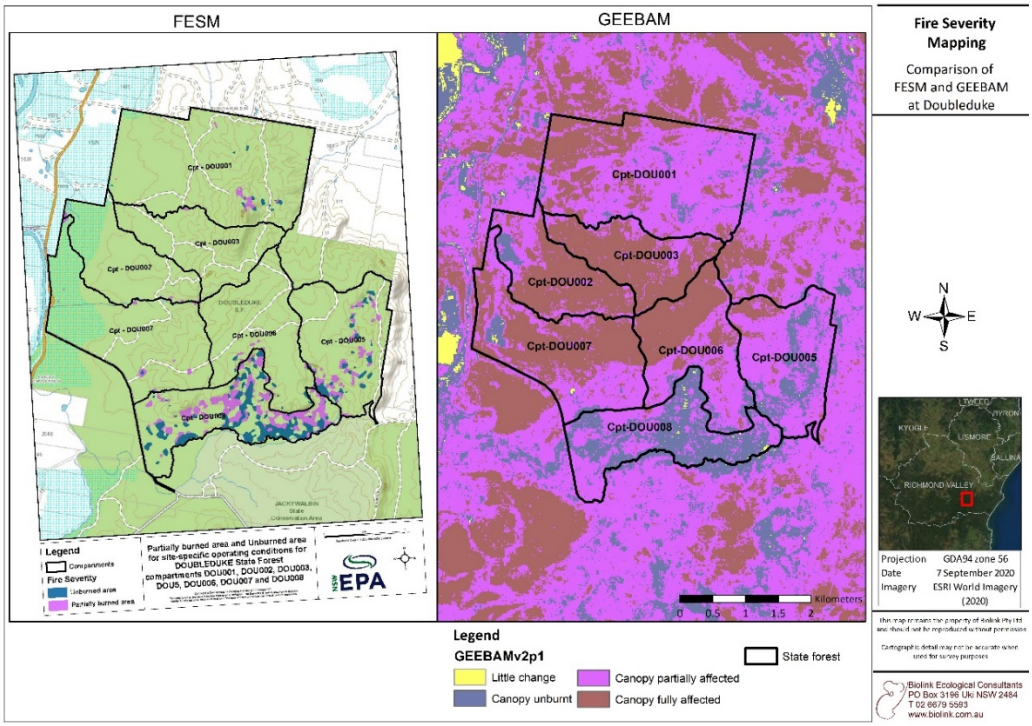
FESM
GEEBAM
Cpt - DOU001
Cpt - DOU003
Cpt - DOU002
Cpt - DOU007
Cpt - DOU006
Cpt - DOU005
Cpt - DOU008
DOUBLEDUKE S.F.
Cpt-DOU001
Cpt-DOU003
Cpt-DOU002
Cpt-DOU007
Cpt-DOU006
Cpt-DOU005
Cpt-DOU008
Legend
Compartments
Fire Severity
Unburned area
Partially burned area
Partially burned area and Unburned area for site-specific operating conditions for DOUBLEDUKE State Forest compartments DOU001, DOU002, DOU003, DOU005, DOU006, DOU007 and DOU008
NSW EPA
0 0.5 1 1.5 2 Kilometers
Legend
GEEBAMv2p1
State forest
Little change
Canopy partially affected
Canopy unburnt
Canopy fully affected
Fire Severity Mapping
Comparison of FESM and GEEBAM at Doubleduke
N
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TWEED
BYRON
KYOGLE
LISMORE
BALLINA
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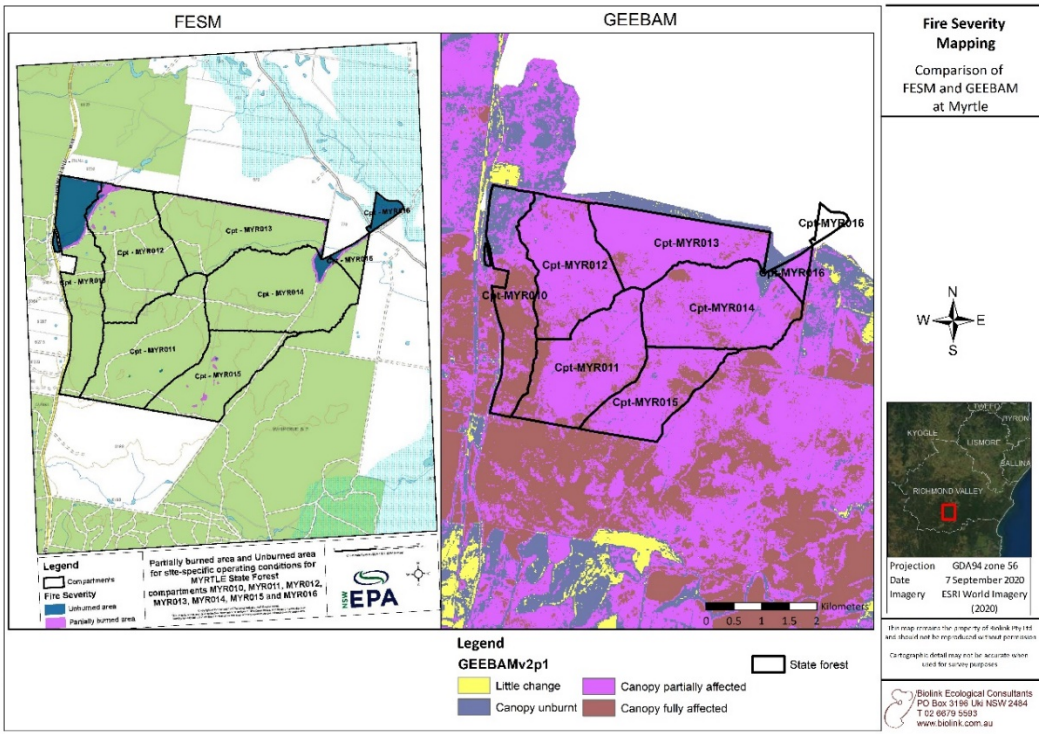


The preceding images indicate that if the GEEBAM mapping layer was utilised instead of the FESM layer, the amount of partially burned canopy, and hence the requirement for ESA designations as specified by Condition 11 of the SSOCs, would have comprised a greater proportion of each compartment.

This is important because it would have reflected application of the precautionary principle by ensuring that the maximum amount of partially burned canopy had been retained in ESAs. Instead, the singular reliance on the FESM layer means that a significantly smaller area was required to be protected as ESAs.

4. Advice from DIPE (Brief Tab 28) (March Decision)

So far as I can ascertain, the sum of information before the EPA's CEO when making the March decision was restricted to information contained in Environmental Risk Tables (Brief Tabs 22 and 32), relevant extracts of which are provided in the following paragraph. The information was apparently prepared in consultation with the DPIE (table refers to discussions with EES 18/02/2020) (Brief Tab 28) but only offer basic (rudimentary) biodiversity information in relation to threatened species and communities, as well as erosion risk and aquatic values.

I am instructed that this document (at Brief Tab 28) was before the EPA CEO when making the March decision to issue SSOCs for Myrtle, Doubleduke and Bungawalbin SFs, but not when making the May decision to issue an SSOC for Myrtle SF Compartment 13. With reference to koalas and their habitat, a *precis* of the information contained in the table (and with no knowledge of redacted sections) is as follows:

- Compartments 46, 47 & 48 in Bungawalbin State Forest: some koala habitat present, fire had a partial effect with no detail about whether the effect was moderate or severe.

- Compartments 1, 2, 3, 5, 6, 7 & 8 in Doubleduke State Forest: deemed to contain high-quality koala habitat which had been fully affected by fire at moderate to severe levels. Two records of pre-fire (koala) scats were known to occur.

- Compartments 65 and 66 in Myrtle State Forest: had been fully affected by fire at moderate to severe levels. Some koala records known to occur, a reference to koalas calling in the forest.

Significantly, there is nothing in the Environmental Risk Tables that specifically address the matter of risk to koalas and their habitat.

5. Environmental Risks Tables (Brief Tabs 22 and 32) (March & May Decisions)
As I understand, the Environmental Risks Tables (Brief Tabs 22 and 32) were before the EPA CEO when making the March and May decisions. With reference to the information in these tables, I note that it is hypothetical in content and does not make specific mention of any of the compartments being the subject of SSOC considerations.

6. Environmental Risks Summary – Myrtle SF cpt MYR 013 (Brief Tab 31) (May Decision)
As I understand, this document was before the EPA CEO when making the May decision. With reference to koalas and their habitat in Myrtle SF Compartment 13, I note that the Environmental Risks Summary makes no specific reference to koalas beyond the need for Prescription 2 to be applied.

7. Requirements of Expert Brief
The Expert Brief requested advice regarding the following matters under consideration:

a. Did the materials that were before the EPA CEO when making the March decisions (i.e. the documents listed at [35(e)]) contain the following information (insofar as these information requirements relate to the koala):

- An assessment and description of any threatened species, subject species or any habitat that will be or are likely to be directly or indirectly affected by the forestry operations or occur within 50 metres of the forestry operations (**Protocol 5** cl 5.3(3)(c)(iv)).
- The potential impacts of the restricted activity either directly or indirectly on any threatened species, subject species or habitat, including aquatic habitat, wetlands, waterbodies and threatened species habitat (for example, the creation of a barrier to movement, increasing threats) (**Protocol 5** cl 5.3(3)(c)(v)).
- An assessment of past disturbance in the proposed area of the restricted activity (**Protocol 5** cl 5.3(3)(c)(vi)).

b. Did the materials that were before the EPA CEO when making the May decision (which related only to Myrtle SF Cpt 13) (*i.e*. the documents listed at [35(f)]) contain the following information (insofar as these information requirements relate to the koala):

- An assessment and description of any threatened species, subject species or any habitat that will be or are likely to be directly or indirectly affected by the forestry operations or occur within 50 metres of the forestry operations (**Protocol 5** cl 5.3(3)(c)(iv)).
- The potential impacts of the restricted activity either directly or indirectly on any threatened species, subject species or habitat, including aquatic habitat, wetlands, waterbodies and threatened species habitat (for example, the creation of a barrier to movement, increasing threats) (**Protocol 5** cl 5.3(3)(c)(v)).
- An assessment of past disturbance in the proposed area of the restricted activity (**Protocol** 5 cl 5.3(3)(c)(vi)).

In relation to **1** and **2** above, was the information before the EPA sufficient so as to permit the decision maker to form a view on the potential impacts of the proposed harvesting operations, as well as to form a view on whether the proposed harvesting operations would accord with the principles of Ecologically Sustainable Forestry Management (**ESFM**)?

8. Responses to requirements of the Expert brief

While I am not aware of the detail in the sections of the advice that have been redacted, I can see no reason to presume that such sections were different or offering more detail than that which I have referred to above. If this is the case then, in my opinion, none of the materials before the EPA CEO was sufficient to enable this person to have an informed view on the potential impacts of the proposed harvesting operations. My reasons for reaching this conclusion are as follows:

a) There was no data or other information provided to the EPA CEO to indicate the *pre*-fire koala population size or extent of distribution of the koala population(s) in each of the compartments being considered for SSOCs;

b) No knowledge or data was supplied to the EPA CEO that offered any meaningful insight or knowledge into the extent of *post*-fire koala mortality that may have occurred in these or immediately adjoining compartments, or where surviving koala populations or parts thereof, were located within the SFs in question. Hence any references to recovery potential (*i.e*. Doubleduke) were speculative and unsubstantiated.

c) Notwithstanding differences between FESM and GEEBAM layers, there was no data supplied to the EPA's CEO to indicate whether the areas to be categorised as ESAs (*i.e.* unburned or partially burned areas) actually had koalas in them, or whether they were of a sufficient size so as to enable koala population persistence within them.

d) There was no data indicating the impacts of the fire on koala browse species, or any estimate of the numbers of koala browse species that might be removed by logging.

e) There has been no meaningful attempt to avoid further loss of preferred browse trees, individual koalas or populations thereof, nor has there been any assessment of the potential consequences of allowing timber harvesting to occur as arguably required by prudent application of the precautionary principle.

In my opinion, information addressing matters a – e above would have been the minimum required to satisfy Protocol 5 requirements. Because this does not appear to be the case based on the four Protocol 5 reports I have reviewed (all of which are identical in content) as well as the other documents that were before the EPA, it could not have been known by the EPA CEO whether or not extant individual koalas or populations (or parts) thereof remained within the compartments that were proposed for logging.

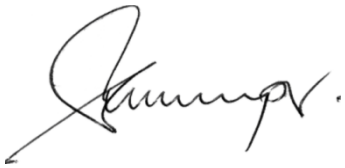
Because of the preceding considerations I strongly disagree with conclusions reached by the Protocol 5 reports that deemed risk to threatened species such as the koala to be Low, when in my opinion the risk should have been recognised as High to Extreme.

The precautionary principal would dictate that if the value of the environment which is to be impacted is not known, then operations should not proceed considering a paucity of data. Information which was readily available at the time of the decision/s includes fire impacts in terms of footprint/severity which informed of the high sensitivity of the environment to be impacted. Given the disparity between the FESM and GEEBAM layers, again a precautionary approach would opt for the layer that offered greater certainty in terms of minimising the potential for any impact. In my opinion, the GEEBAM layer should have been the informing layer because it maximised the number of ESAs, not the FESM layer which minimised them.

In terms of whether the proposed harvesting operations would accord with the principles of ESFM, it is difficult for me to respond objectively because of the extent of ecological ambiguity/uncertainty that I perceive to be embedded in the principles of ESFM as specified in Sec 69L of the *Forestry Act 2012* (NSW).

Specifically, the parameters by which the stated objectives of forest biological diversity (Sec 69L2(a)(i)) sustainability of forest ecosystems (Sec 69L2(a)(ii)), health and vitality of native forest ecosystems (Sec 69L2(a)(iii)), and natural heritage values (Sec 69L2(a)(vii)) are measured are not prescribed beyond aspiration; hence there are no benchmark indicators by which conformity can be measured.

Given the State and Federal conservation status of koalas and that current forestry management practices already function to diminish habitat quality (by removal of koala browse species) and/or decreasing the koala-carrying capacity of forests beyond that which I would deem to be demonstrably sustainable (*i.e.* 50% occupancy of available habitat), and given that information relating to considerations of koala population size and/or occupancy rates *pre* and *post*-fire has not been provided to or even considered by the EPA CEO in making decisions to issue the SSOCs, it is my opinion that despite my misgivings about the ESFM principles the harvesting operations enacted by them cannot be in accord with the principles of ESFM. This is because I have seen no evidence of the application of the precautionary principle in approving the SOCCs when the risks to koalas were already high, while the absence of a comprehensive reporting feedback loop means that the key principles of ESFM as outlined in the preceding paragraph cannot be informed beyond conjecture.



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