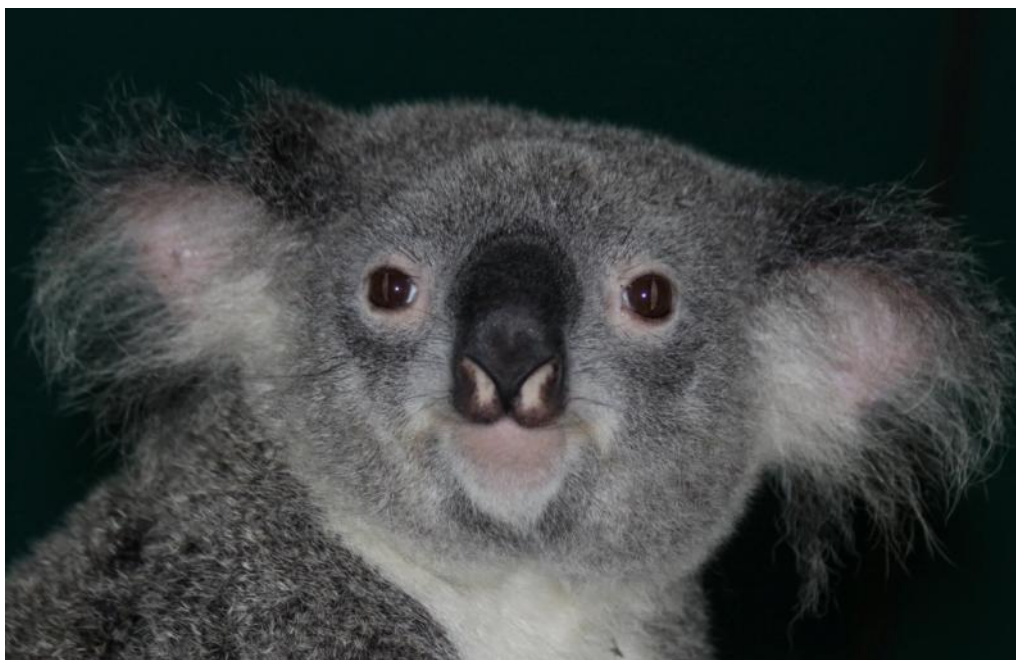


Clearing Koalas Away in North East NSW.

Dailan Pugh, North East Forest Alliance, July 2017



This review of logging operations on public lands applies the Government's new Koala model to past, current and future logging operations on State Forests in north-east NSW and finds that the highest quality Koala habitat is being provided with very little protection and subject to the most intensive logging. Since 2006 there has been an expansion of unlawful clearing of public forests for conversion to quasi plantations, affecting tens of thousands of hectares of what used to be high quality Koala habitat. Logging and clearing of core Koala habitat vital to the ongoing survival of Koalas is happening right now.

North-coast Koala populations have [declined by 50%](#) over the past 15-20 years. Their populations have been decimated by expansion of urbanisation along the coast and intensification of logging in the hinterland. Despite recognition of their plight, and theoretical attempts to redress problems, threatening processes are not being redressed and are intensifying.

As their latest contribution to the extinction of Koalas the Department of Industry's (Dol's) Forestry Unit, with the support of the Environment Protection Authority (EPA), have developed [A predictive habitat model for Koalas](#). Their intent is to use this model to regulate forestry in the future. NEFA has significant concerns with the model, particularly its downgrading of areas of important habitat to "low to medium" habitat and its failure to account for the significant impact that logging and clearing is having on Koala occupancy. While recognising the model's limitations, in this report it is applied, along with Koala records, to assess the impacts that current logging is having on Koalas on public lands in north-east NSW.

The model shows that the timber industry and Koalas prefer the same forests, being the more productive forests on moderate topography with reasonable soil moisture, particularly on the coastal lowlands. These are the forests that the Forestry Corporation, under the supervision of the Environment Protection Authority (EPA), are now clearing and converting to quasi-plantations. Though most significantly the model highlights the contempt with which Koalas are being treated during current logging operations.

The principal findings of this review are that:

- Within the 103 State Forest compartments currently being actively logged on public land in north east NSW there are 4,663 ha of modelled high quality Koala habitat and 357 Koala records.
- The identified protection for Koalas in current logging entails 2 Koala High Use Areas totalling 1.2ha from which logging is excluded and the identification of 15% of the high quality habitat as "Intermediate Use Habitat" where 5 feed trees of any size are required to be retained per hectare. This is mere tokenism.
- Thirteen of the 20 current logging areas with >17% high quality Koala habitat are being targeted for logging intensities (regeneration and heavy Single Tree Selection) involving up to 60-86% basal area removal in blatant contravention of the Integrated Forestry Operations Approval (IFOA's) limit of 40% basal area removal.
- During the period when it was practiced from 2000-2010 over 10,000ha of forests in the Lower North East region were allocated to Australian Group Selection patch clearfelling, incorporating 6,460ha of high quality Koala habitat, despite a prohibition on the use of AGS in "intermediate" Koala habitat.
- Since 2006 in the Lower North East region. the Forestry Corporation have subjected 74,906 ha to the unlawful logging practices of 'medium', 'heavy' and 'regeneration' Single Tree Selection involving 41-100% basal area removal. This is comprised of 23,742 ha (32%) of high quality Koala habitat and 717 Koala records.
- Of the unlawfully logged area, 23,340 ha has been subjected to 'heavy' and 'regeneration' STS, comprised of 39% high quality Koala habitat, in what amounts to clearing and conversion to quasi plantations.
- Over the past 10 years the Forestry Corporation have progressively and unlawfully converted half of the logging area of the proposed North Coast Intensive Zone in the Lower North East Region to "quasi plantations", with the proposed zoning to give retrospective approval.
- There have been no records of Koalas from 41% of the current logging areas encompassing high quality Koala habitat, and no records for at least the past 9 years in 12% of the areas. Records over the past 20 years indicate that Koalas are in decline across State Forests.

There needs to be an urgent intervention to stop the accelerating degradation of Koala habitat in north-east NSW. Surveys need to be urgently undertaken to identify all areas containing remnant Koala populations. Identified areas, along with sufficient additional areas of potential Koala high quality habitat and habitat linkages, need to be fully protected to establish viable populations across the landscape.

1. Identifying High Quality Habitat

For years the Environment Protection Authority (EPA) have made it clear that they intend to get rid of the Threatened Species Licence's requirement for the Forestry Corporation to thoroughly search for Koala scats ahead of logging to identify and protect Koala High Use Areas. Their intent was to develop a model of Koala habitat and use it to identify tree retention rates based on modelled habitat quality. Their plans came undone when the expert review of EPA's (2016) [Koala Habitat Mapping pilot](#) concluded that models 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"*.

The EPA were determined not to let science get in the way of their plans to get rid of requirements to look for Koalas ahead of logging, so they funded the Forestry unit of the Department of Industry (DoI) to develop [A predictive habitat model for Koalas](#). They have produced a model that broadly identifies and ranks Koala habitat across both public and private lands in north-east NSW, north from the Hunter River. The validation of the model has no credibility. Irrespective of its accuracy, the EPA seem intent to use the model to regulate the management of Koala habitat on public and private land.

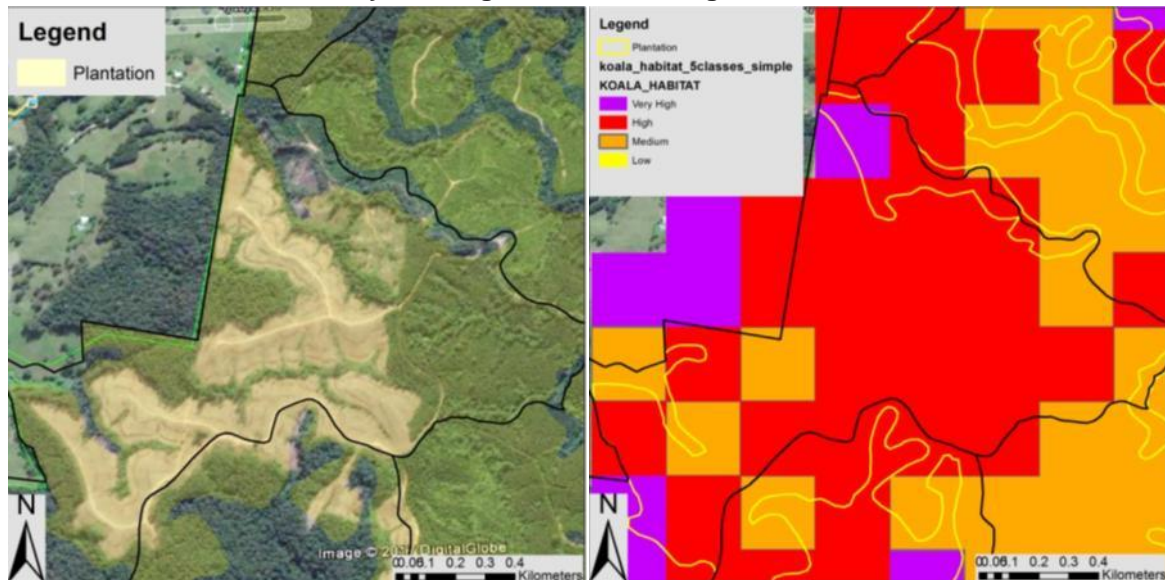
The Koala model assigns each 250m pixel with a value ranging from 0 to 1 which represents the probability of presence of suitable environmental conditions for Koalas (i.e., higher values indicate higher suitability). For the purposes of this review natural breaks in the data were used to identify 5 habitat classes: very high, high, medium, low and very low. It is the high habitat classes (including very high) that are the focus of this review.

According to the model these high classes are considered to have a Koala occupancy rate >0.3 per 6.25 ha grid square. While historically this may have been the case, if Forestry Corporation surveys are any guide, this is no longer the case with populations severely depleted in many areas.

The model does correspond well with historical records and thus does identify where some of the best Koala habitat used to be. The principal problems seem to be that the vegetation mapping underpinning the model is not of sufficient resolution to adequately delineate patches of high quality habitat at a local scale, and its failure to account for the severe impacts resulting from the logging and clearing of the larger feed trees and mature forests preferred by Koalas.

The unresponsiveness of the Koala model to forest structure is clearly shown by its ranking of plantations according to what the original vegetation would have been, even when the plantations have just been clearfelled. The example below is from Tuckers Nob SF, where an existing long-term plantation was cleared and subsequently replanted, and still appears as high quality Koala habitat. Other examples of cleared forests are presented in Appendix 2, where identified high quality Koala habitat has been previously clearfelled and yet the quality of the Koala habitat hasn't altered. These examples clearly show the folly on trying to use a model that doesn't account for habitat degradation due to logging as the basis for regulation.

Tuckers Nob is a long established plantation that is still identified as high quality Koala habit despite being cleared in 2013, with most adjacent plantation areas also being cleared and restarted over the previous 5 years. The identification of 3-8 year old plantings as high quality Koala habitat reflects the folly of using the model for regulation.



NEFA accepts that the model is useful for the identification of potential Koala habitat on a regional scale, and has applied it in this context.

Because Koala populations in potential high quality habitat have been decimated by clearing, logging, dieback and other perturbations, the only way to identify the remaining areas of forests containing good populations of Koalas is to undertake systematic surveys to locate and protect viable populations. The model should be used to help guide surveys, though is no substitution for the required on-ground surveys. It is essential to recognise that the model is inadequate to delineate isolated patches of high quality habitat, and that as proven at Royal Camp SF (ie EPA 2016) some of the healthiest Koala populations remaining are in medium quality habitat.

There needs to be an urgent intervention to stop the accelerating degradation of Koala habitat in north-east NSW. Surveys need to be urgently undertaken to identify all areas containing remnant Koala populations. These surveys need to be undertaken independently of the Forestry Corporation and employ the range of appropriate survey methodologies, including scat detection dogs. Identified areas, along with sufficient additional areas of potential Koala high quality habitat and habitat linkages, need to be fully protected to establish viable populations across the landscape.

2. Protecting Koalas from Logging.

For the past 20 years the Forestry Corporation have been required by their Threatened Species Licence to undertake standardised pre-logging surveys utilising spotlighting, call playback and walked transects. In addition to this they have been required to thoroughly search for Koala scats (faecal pellets) ahead of logging. By now this should have resulted in a comprehensive data base of records across the public State Forest estate.

On State Forests, areas of core Koala habitat are meant to be identified in pre-logging surveys with all high use areas protected from logging. Koala habitat is protected when sufficient scats (faecal pellets) are found to trigger the identification of Koala High Use Areas. Tree retention is theoretically increased in logging areas around Koala High Use Areas or where sufficient scats are found to warrant an increase.

Earlier this year the Government released a model of relative Koala habitat quality which was prepared specifically to be the basis for regulation of logging operations in Koala habitat on both public and private lands in the future. A review of the model in relation to current logging confirms that very little high quality Koala habitat is being protected from logging or clearing on public land and that there is a worrying absence of Koala records from extensive areas of high quality habitat, and an apparent decline in Koala populations occurring.

An analysis of State Forests Biodata (from Wildlife Atlas) over the years 1997-2016, limited to high quality and very high quality habitat, reveals an average of 9.6 Koala observations, the hearing of an average of 3.6 calls and finding of 74.6 trees with Koala scats under them each year, despite requirements for extensive surveys. This is an extremely low strike rate for what is meant to be some of the best habitat left for Koalas in New South Wales.

While there are issues with the limited effort the Forestry Corporation put into their surveys, the paucity of results from 20 years of systematic surveys confirms that Koalas are in real trouble in what is meant to be their major strongholds in NSW.

2.1. Protecting Koala Homes



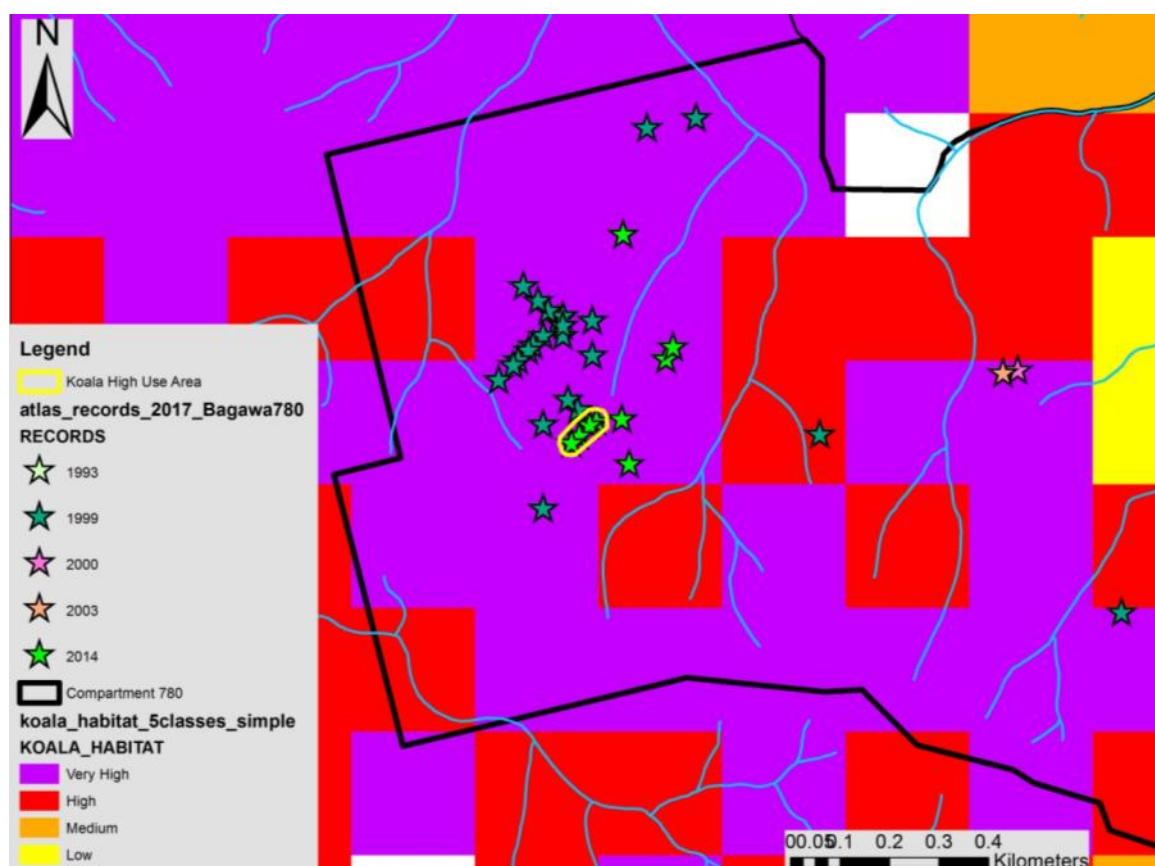
Lansdowne State Forest 2016 – arrow points to person (Photo Lyn Orrego)

If, during pre-logging surveys, the Forestry Corporation identify a Koala High Use tree (with 20+ scats, or scats from a mother and baby) they are required to undertake a systematic scat survey in the vicinity. If they find at least three consecutive trees within 100 metres along a transect line with Koala scats under them it is identified as a Koala High Use Area and must have a 20m logging exclusion zone implemented around it. Theoretically the

search area is required to be expanded as more scats are found, though this rarely occurs. The Koala High Use Area is only protected for the duration of the logging operation, and they are often logged the next time.

In current logging operations there are 2 Koala High Use Areas: one 0.5ha in size in very high quality habitat in Bagawa SF (cmpt. 780), and one 0.7ha in size in moderate quality habitat in Wang Waulk SF (cmpt. 118). So of the 4,669ha of high quality habitat in compartments currently being logged only 0.5ha is identified in harvesting plans to be protected.

The reason that so little is protected is twofold, firstly because the EPA have set unrealistically high scat detection thresholds and miniscule buffers in the licence, and secondarily because the Forestry Corporation refuse to undertake the legally required "thorough" searches necessary to find sufficient scats to trigger protection. The EPA know that the Forestry Corporation are not undertaking thorough, if any, searches though refuse to take action.



Bagawa SF Compartment 780, showing Koala habitat classes, records and the miniscule protected Koala High Use Area. And this is one of the best examples of current Koala protection. Note that the rows of 1999 records indicate where the Koala High Use Area would have been located in the previous logging, which is now available to be logged despite its obvious significance due to still being part of a Koala's home range 18 years later.

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 in 2012 and 2013 NEFA identified 10 ha of Koala HUAs from strict application of the rules to our limited surveys, so the actual area is likely to have been

many times larger - this compares to the Forestry Corporation's identification of just 1.4ha before we stopped them logging Koala HUAs.

It is apparent that in practice very little high quality Koala habitat is protected. With only 1.2 ha specifically set aside for Koala protection out of the 22,586 ha of north-east NSW's public lands currently subject to logging operations it is evident that something is very wrong. The Threatened Species Licence objective of identifying and protecting high use Koala habitat is clearly not being met. With so little habitat protected it is no wonder that populations are collapsing in logged forests.

2.2. Protecting Koala Feed Trees

Koalas preferentially select individual trees for feeding based on a limited range of species at any one locality, tree size, leaf toxins and leaf moisture. Koalas are known to prefer trees over 30cm diameter, though their use of trees increases with tree size. They also use other trees for a variety of uses, particularly shelter.

As part of a project to map Koala habitat, the EPA's (2016) [Koala Habitat Mapping pilot report](#) assessed the relationship between Koalas and key variables in 4 State Forests in north-east NSW known to have significant Koala populations. They found usage of preferred species increased 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*", and that "*Seventy-four per cent (74%) of all activity resides in the high class of structural maturity*".

The EPA (2016) tested numerous variables, 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.

In a logging area where a Koala High Use Area is identified, or where scats are found under two consecutive trees, it is classed as "intermediate use area" and 10 primary browse species are required to be protected per 2 hectares, though as there are no size limits this requirement rarely results in any additional protection. See the example of treatment of an "intermediate use area" from Cairncross SF in section 3.2. Even if there was a size threshold it is unlikely to result in the protection of many trees in addition to other habitat tree retention requirements.

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.*

The EPA failed to amend the TSL to implement the short term measure suggested by the Forestry Corporation (for no apparent reason), and so without a regulatory requirement nothing is done.

Of the 103 compartments currently being logged, 11 are identified in harvesting plans as Intermediate Use Areas (Appendix 1). Intermediate Use Areas represent 12% of the current logging area, encompassing 699ha (15%) of the high quality Koala habitat, Leaving 85% of the identified high quality habitat without even this token protection.

While the retention of 5 Koala feed trees per hectare in intermediate use areas has been the prescription for 20 years the responsible agencies have never bothered to improve or assess its effectiveness. Given the ongoing decline of Koalas on State Forests it is unlikely to have achieved much. It is outrageous that the EPA are now intending to abandon requirements for pre-logging surveys and the protection of high use areas, instead using the DoI Koala model to set minimal tree retention requirements for the highest quality habitat where there happens to be a recent Koala record.



Found in a logging area, this Koala was taken to a vet and found to have a broken jaw.

3. Clearing Koala Habitat.

Logging intensity on State Forests is limited by the Integrated Forestry Operations Approval (IFOA). The IFOA (5) (3) is very specific in stating "*This approval applies only to logging operations where trees are selected for harvesting using Single Tree Selection or Australian Group Selection*". No other silvicultural practices are legally allowed.

The explicit requirements to limit the extent of gaps to 0.25ha under AGS and the basal area removal to <40% under STS reflected an intent to limit both logging intensity and the size of clearfells. This followed expert advice from a Ministerial inquiry into the "gaps and clusters" silviculture that the Forestry wanted to apply across north-east NSW's coastal forests. The inquiry recommended against broadscale clearfelling, instead recommending (Attiwill *et. al.* 1996):

Promotion of the north-east forests as a region for production of high value-added specialty hardwood products (poles, beams, floorboards, kiln dried furniture timber, and timbers of large size and strength) and biodiversity conservation, by management under low cost, low intensity (less than 35% canopy removal) selection logging techniques and discouragement of management for low-value products including scantling (housing frame), woodchips, and wood fibre.

The report acknowledged that the north eastern forests of NSW have the richest faunal diversity outside the wet tropics, advising:

On the basis of available evidence, application of gaps and clusters could be expected to reduce the average abundance and variety of vertebrate fauna in logged forest areas by about 18-30% which is approximately twice the level of reduction evident in north-east forest areas which have been selectively logged in the past.

The objective of Single Tree Selection is to maintain a self-sustaining forest of multiple age/size classes. Single Tree Selection is explicitly defined:

"Single Tree Selection" refers to a silvicultural practice, which in relation to a tract of forested land has the following elements:

(a) trees selected for logging have trunks, that in cross-section, measured 1.3 metres above ground level, have a diameter (including bark) of 20cm or more (that is, a diameter at breast height over bark of 20 cm or more); and

(b) trees are selected for logging with the objective of ensuring that the sum of the basal areas of trees removed comprises no more than 40% of the sum of the basal areas of all trees existing immediately prior to logging within the net harvestable area of the tract.

The IFOA also permits a staged patch clearfelling regime over 90% of the net logging area in a compartment over a 28 year period. Australian Group Selection permits 22.5% of a logging area to be patch clearfelled on 4 occasions at 7 year intervals. Clearfelled patches are not allowed to be bigger than 50x50m (0.25 hectares). The Threatened Species Licence prohibits Australian Group Selection within Koala intermediate use compartments.

Single Tree Selection was always meant to be light selective logging, with Australian Group Selection the heavy logging. It was clearly never intended that STS would be used to clearfell large areas, or even create large gaps. AGS was practiced from 2000-2010, though

starting in 2006 more extensive clearing began to be practiced under the guise of Single Tree Selection and is now being applied over the top of AGS areas.

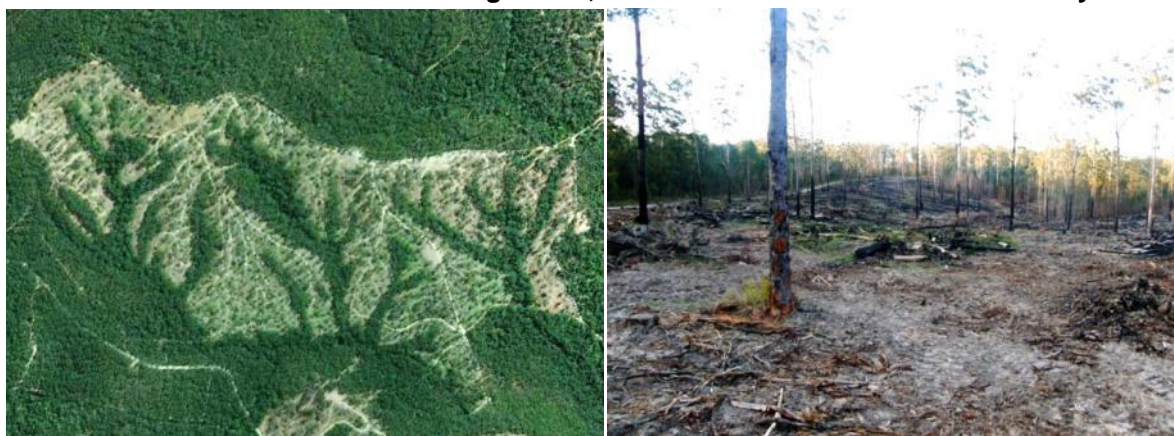
Single Tree Selection is now the principal silvicultural prescription because its intent has been perverted to undertake the heaviest logging where up to 90% of the basal area is removed over large swathes of forest. Forestry Corporation use a loophole that they claim allows for the 40% to be averaged across the harvest area. So to compensate for heavier logging of part of a logging area they temporarily exclude logging from another part claiming the average removal is only 40%. While STS was based upon 15 years between logging events they often return a few months or few years later to log the excluded area. Aerial images prove that this is a cynical pretence (Appendix 2), and that in practice a wholesale conversion of native forests to quasi-plantations is underway.

An examination of current harvesting plans indicate that there is no clear definition of the various STS intensities, with "regeneration" STS involving average basal area removals ranging from 62-86% (average 75%), "heavy" STS from 50-85% (average 68%) and "medium" STS from 30-60%.(average 47%). It is however obvious that all the new STS regimes of "regeneration", "heavy" and "medium" are normally in excess of the IFOA definitions of STS as involving less than 40% basal area removal.

Despite this being a blatant rorting of the intent of Single Tree Selection the EPA refuse to do anything about it because they claim it is the Minister's responsibility to enforce the IFOA. The Minister for the Environment acknowledged, through a letter written by the Environment Protection Authority (EPA 2016b) on his behalf, that this type of harvesting as *"practiced by the FCNSW, is not consistent with the definition and intent of STS (Single Tree Selection) in the Integrated Forestry Operations Approval (IFOA) as well as FCNSW's own silvicultural guidelines."*

Far from trying to control this form of clearing the so called EPA are now actively promoting it, and intend to make it the dominant form of logging in the new IFOA.

Examples of EPA PR material for "heavy" STS (5-10m² basal area retention) logging, examples from Broken Bago SF intended to promote this form of clearing, the covering email to the Forestry Corporation (8/9/2014) states "maps now updated replaced 'cleared' with 'harvested'". Note the extensive removal of both large trees, trees <20cm diameter and understorey.



3.1. Current Logging

A total of 103 State Forest compartments covering 22,586 ha of public land have been identified as actively being logged as at June 2017 within the area of north east NSW covered by the Koala habitat model (Appendix 1).

A total of 4,663ha of modelled high quality (including very high quality) Koala habitat and 4,530ha of moderate quality habitat occurs within areas currently being logged (Appendix 1). The Office of Environment and Heritage's Wildlife Atlas identifies a total of 357 Koala records occurring within 34 of the compartments. The Forestry Corporation's [Harvesting Plans](#) identify that a total of 2 Koala High Use Areas totalling 1.2ha have been identified for protection and 11 compartments have been classed as Intermediate habitat which (theoretically) requires increased tree retention. The Harvesting Plans also identify that 22 compartments are (in part) being logged at a higher intensity than allowed by the Integrated Forestry Operations Approval (IFOA).

Despite the clear intent of the IFOA to limit STS to 40% basal area removal, the harvesting plans (Appendix 1) make it clear that the Forestry Intends to practice what it calls "heavy" or "regeneration" STS in parts of 22 compartments that are currently being logged. Of the 10 logging areas (Appendix 1) comprised of more than 50% high quality Koala habitat, 8 are to be subject to intensive logging, with Harvesting Plans identifying maximum intensities of 69-85% basal area removal, with AGS practiced in two. The remaining 5 areas identified for intensive logging have 17-26% of their areas comprised of high quality Koala habitat. In total 13 of the 20 areas with >17% high quality Koala habitat are being targeted for "unlawful" logging. This intensive logging is effectively clearing (see Appendix 2).

Distribution of High Quality (including very high) modelled Koala habitat across State Forest Compartments currently being logged in North East NSW.

Area of HQ habitat in cmpt. (ha)	Number of cmpts	Total HQ habitat (ha)	Cmpts with Koala records	Identified Koala HUAs	Cmpts Intermediate Habitat	Cmpts with Intensive logging
> 100 ha	17	2492	10	0.5 ha	2	11
50 - 99 ha	16	1183	7		2	5
25 - 49 ha	21	794	13	0.7 ha	4	6
1 - 24 ha	19	200	1		2	0
other	30	0	3		1	0
TOTALS	103	4669	34	1.2 ha	11	22

It is readily apparent that in current logging operations a miniscule area of the high quality Koala habitat has been protected and that 85% of high quality Koala habitat is not subject to even the token restrictions required for Intermediate Use Habitat. Also that the compartments with the largest areas of high quality Koala habitat is targeted for the most intensive logging, well in excess of the legal limitations of the IFOA.

3.2. Lower North East Region

The Government has provided data under a GIPA request on areas intensively logged for the Lower North East region, showing that the Forestry Corporation undertook small areas of

clearfells in 2000, and started to systematically implement what they termed "Regeneration" Single Tree Selection (STS) in 2006, expanding their intensive logging to include "heavy" STS in 2008. After the first Australian Group Selection (AGS) cutting cycle, it appears from the data provided, that to date 1,900 ha of AGS areas treated on the 1st cycle have been converted to heavy/regeneration STS and 2,440 ha converted to STS medium.

The Forestry Corporation data identifies that they have created 1,153 intensively logged patches, ranging in size from 0.001ha up to 280ha in size. Of these 1,110 are bigger than the 0.25ha limit for gaps allowed under AGS, with an average size of 21ha. 110 patches are above 50ha in size. Similarly 2,217 patches have been subject to medium "STS" with patches up to 343ha, and an average size of 23ha and 283 patches above 50 ha in size.

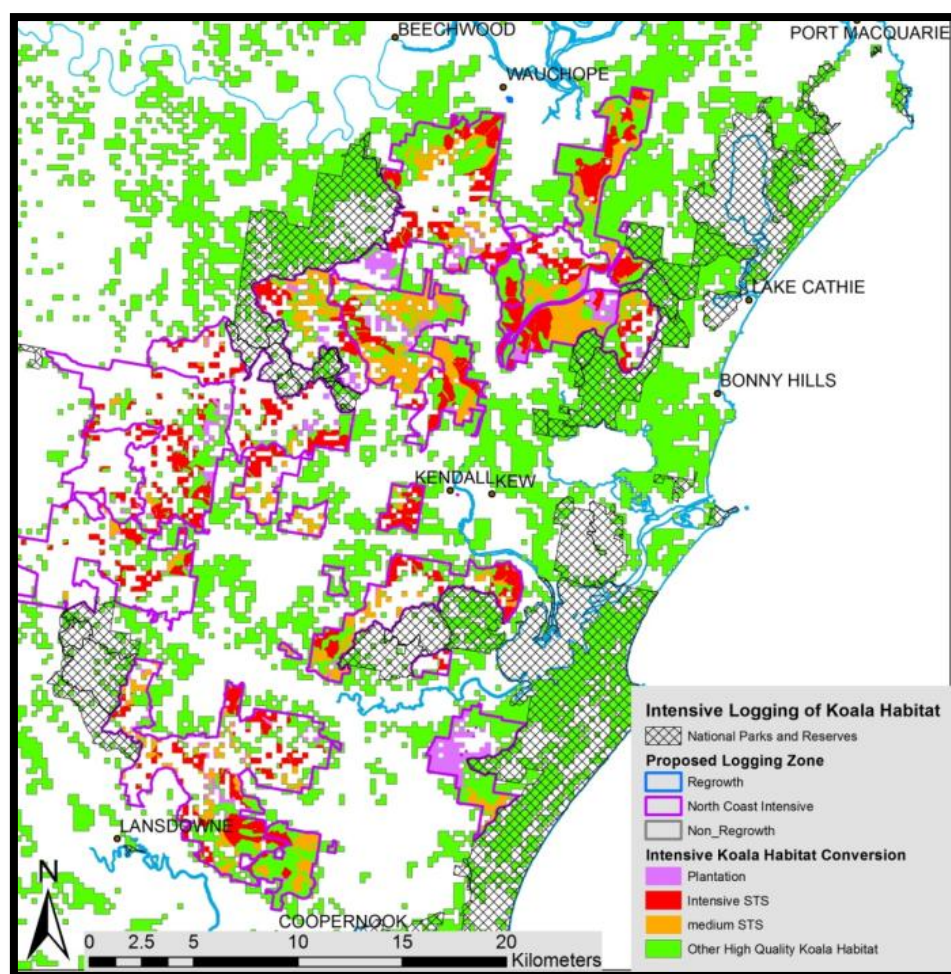
The use of the heavy and regeneration STS regimes reached a peak of 4,894ha being treated in 2011. The wind down of export woodchipping resulted in a decline in the areas being converted into "quasi-plantations", with 594ha in the Lower North East being treated last year. Use of "medium" STS has remained high, with a peak of 6,400 ha being treated in 2015. Data for the Upper North East has not been obtained.

A comparison of the mapped treated areas with modelled Koala habitat displays the same trend as other data, with the highest quality habitat subjected to the most intensive logging and conversion to quasi plantations. The "regeneration" and "heavy" STS treated areas are comprised of 39% high quality Koala habitat, with 244 koala records within treated areas. The "medium" STS treated areas are comprised of 28% high quality Koala habitat with 473 Koala records. While the patch clearfelling regime of Australian Group Selection is not allowed in Koala Intermediate Habitat because of its impacts. it is telling that 64% of the AGS treated areas are high quality Koala habitat.

Forestry Corporation records for intensively treated forests in the Lower North East region compared to modelled Koala habitat and records.

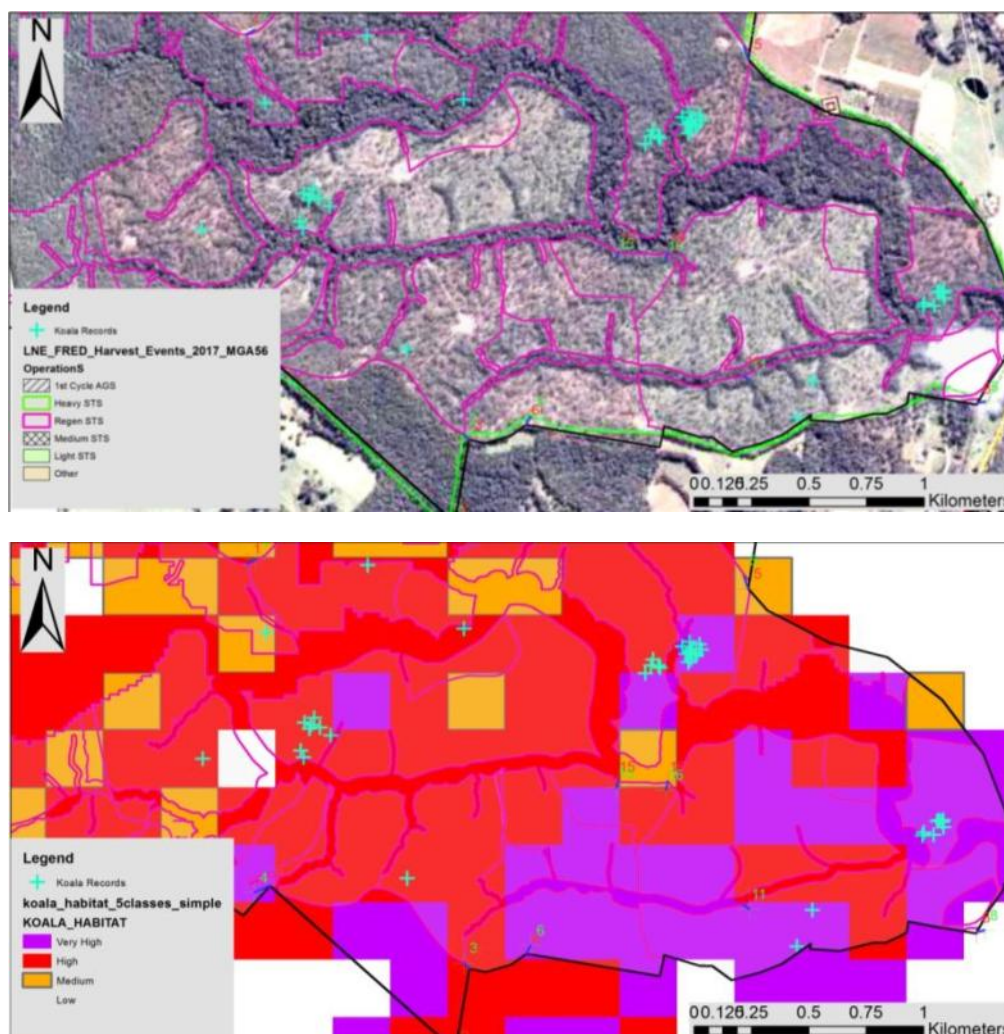
Intensity	Area (ha)	Koala habitat						Koala records (no)
		very high (ha)	%	High (ha)	%	Medium (ha)	%	
Regeneration-Heavy STS	23340	2113	9.1	6897	29.6	7071	30.3	244
STS Medium	51566	3492	6.8	11240	21.8	12948	25.1	473
AGS	5799	1164	20.1	2574	44.4	1279	22.1	70
Thinning	1083	165	15.3	511	47.2	214	19.7	12
TOTALS	81788	6934	8.5	21222	25.9	21512	26.3	799

Example of high (including very high) quality Koala habitat subject to intensive ("regeneration" and "heavy") and medium STS south of Port Macquarie over the past decade. It is no wonder that Koalas are rapidly declining in the area when it is considered that much of the high quality habitat outside State Forests has also been subject to intensive logging - including many areas incorporated into national parks in 1998 and 2003.



It is obvious from comparisons with satellite images available on Google Earth (see Appendix 2) that expansive areas of State Forests are being effectively cleared of native vegetation and subsequently planted with preferred timber species, particularly blackbutt. It is regeneration and heavy STS that are primarily being used for forest clearing. With the extensive removal of most overstorey trees, the clearing of small trees and understories, and the baring of the soil, these practices are a cynical perversion of the silvicultural practice of Single Tree Selection. It is also apparent that extensive and contiguous areas are being cleared over time, making it obvious that the claims of averaging basal area retention across a stand are just a pretence. The EPA have described these as quasi plantations and yet refuse to do anything to stop them.

Example of "regeneration" STS of high quality Koala Habitat in Cairncross SF, undertaken in 2012-13. There are 40 Koala records in this limited area dating back to 1980, with numerous records in 2011, 2012 and 2013 as it was being cleared. It is astounding that such obviously important Koala habitat was allowed to be virtually clearfelled. Even if no Koala High Use Areas were identified, the area qualified as an Intermediate Use area, with the intensive logging clearly illustrating the ineffectiveness of the current prescription.



It is clear that in the Lower North East region, since a tentative start in 2006, the Forestry Corporation have cleared (with up to >90% removal of basal area) some 23,340 ha of native forests using blatant perversions of Single Tree Selection (STS) termed "regeneration" and "heavy". They have been constrained in recent years by the collapse of the export woodchip industry. The IFOA limits basal area removal to less than 40%, so to allow unconstrained logging the Forestry Corporation have developed another perversion called "medium" STS whereby they can log whatever they like. A total of 51,566 ha has so far been subject to Medium STS. This unlawful logging is condoned and promoted by both the EPA and the Minister for the Environment despite their recognition that it is contrary to the IFOA silvicultural limits.

3.2.1. Offsetting Clearfelling.

Under the logging rules, when undertaking Single Tree Selection logging the aim is to maintain a self-sustaining forest of multiple age/size classes so the Forestry Corporation is not allowed to log any trees below 20cm diameter or remove any more than 40% of the basal area.

The Forestry Corporation claim that they can "offset" areas of intensive logging by leaving areas temporarily unlogged. They claim they can remove 80% of the basal area in one tract

Clearing Koalas Away

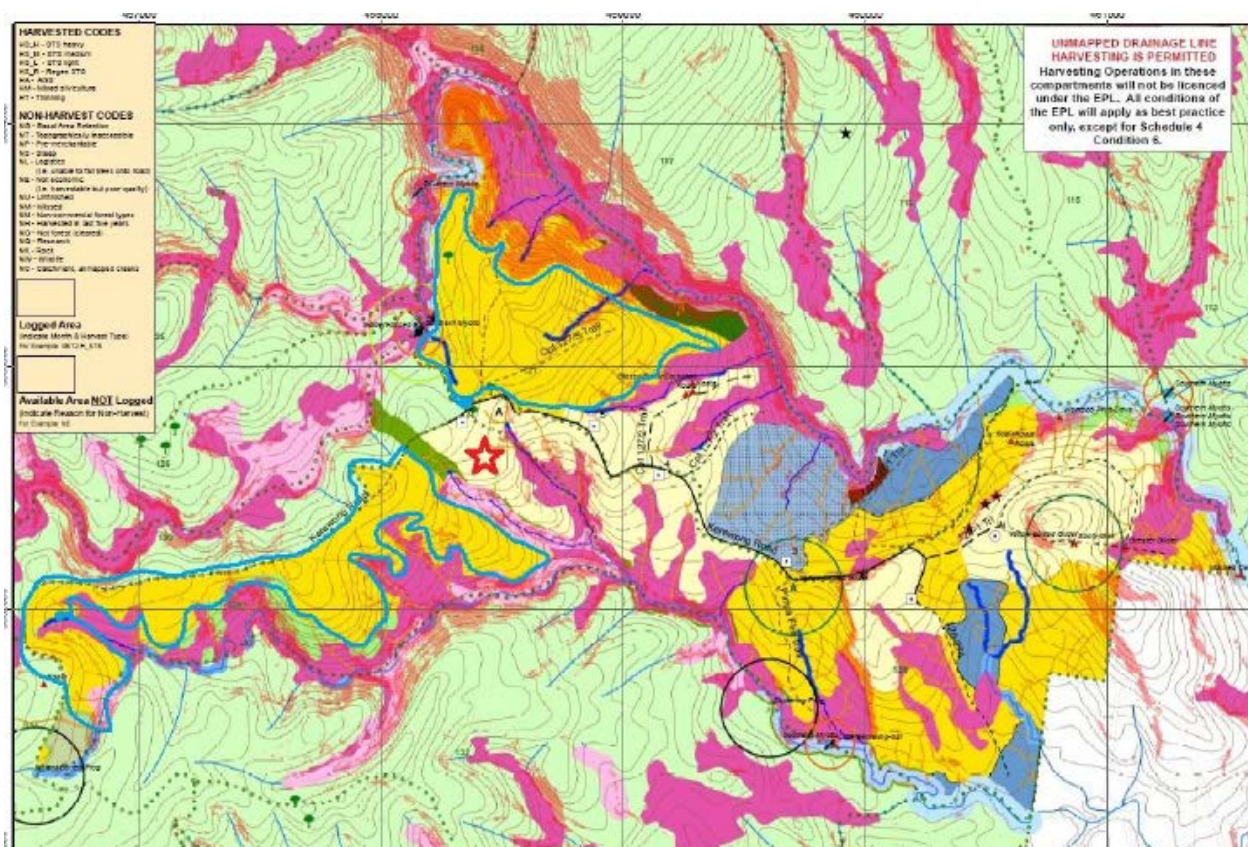
if they leave an equivalent sized area unlogged as an offset because the average basal area removal across both tracts is only 40%. They then return sometime later and log the "offset" area while claiming the area logged last time as the offset.

Lyn Orrego took the photo below of "medium" STS in Compartments 127-9 of Kerewong SF in 2016.

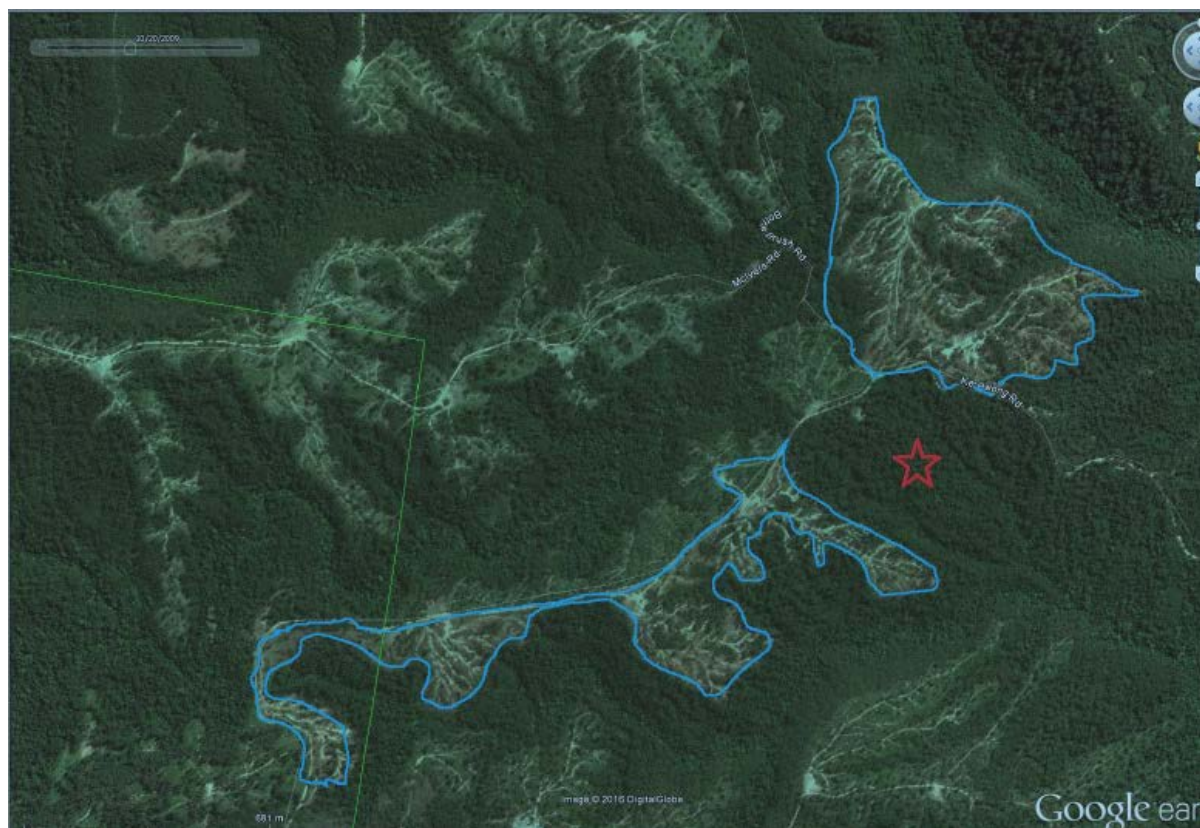
Person



Kerewong State Forest March 2016 Compartments 127-9 "Single tree Selection – Medium"
(Photo: Lyn Orrego).



An extract from the harvesting plan. The above photo was taken at the star on the harvesting plan. The light yellow area is the logging area, while the dark yellow area is the "offset".



A comparison with Google Earth from Oct 2009 found that a large part of the "offset" area had been intensively logged just 6 years before. The blue outlined area is replicated on the above harvesting plan as an offset area.

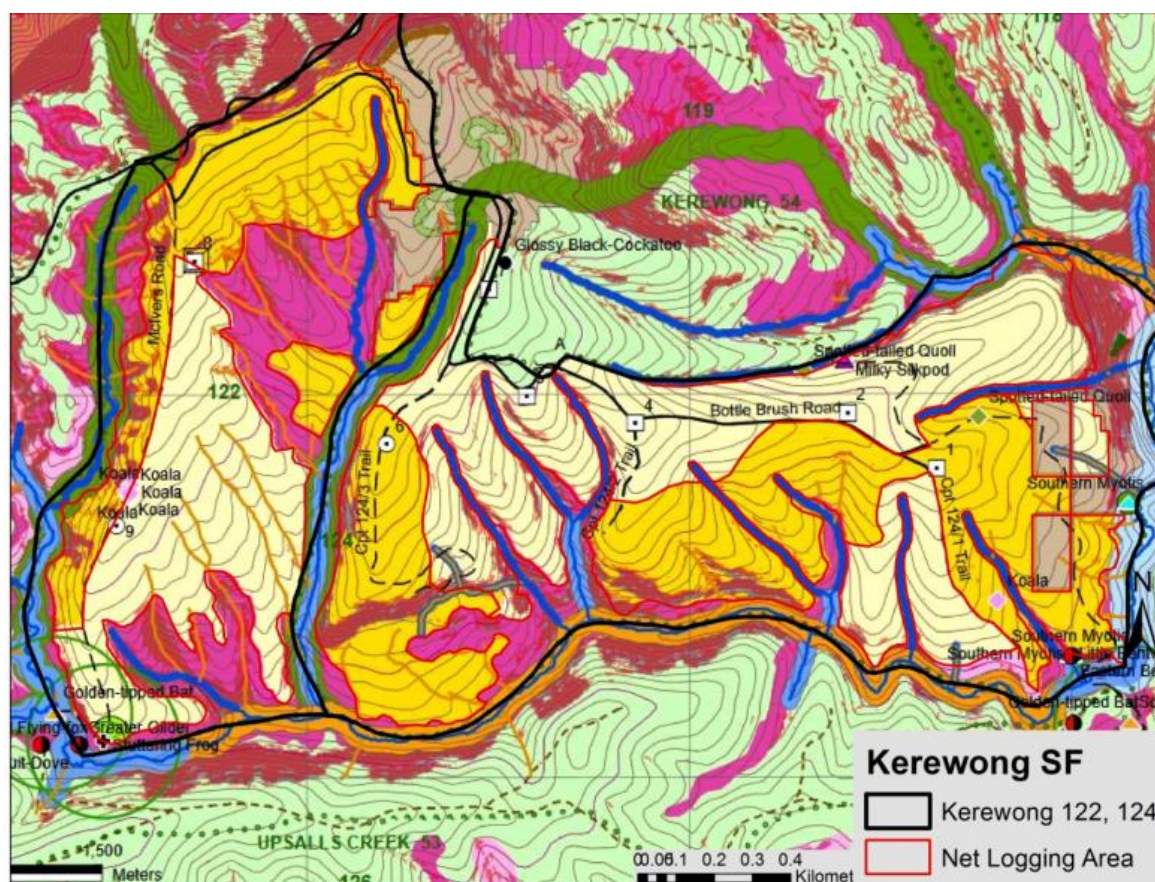
Under the guise of STS the Forestry Corporation are progressively clearfelling the forest and converting it to "quasi plantations" of young regrowth and plantings. This is a cynical perversion of the silvicultural practice of Single Tree Selection. To investigate it further, 2 of the harvesting plans for Kerewong SF currently online are explicit about the percentage of the Basal Area proposed to be removed in the logged area - under Regeneration STS 82% and 85%, and under medium STS 52%. These are all clearly well in excess of the 40% allowed for by the IFOA and should therefore be considered unlawful.

In Compartments 122 and 124 of Kerewong State Forest the Forestry Corporation are currently logging the eastern part with a planned basal area removal of 82%, called "Regeneration STS", and the western part to be logged with a planned basal area removal of 52% called "STS Medium". To supposedly bring the basal area down to an average of less than 40% an "offset area" has been identified, though it was mostly heavily logged in 2009-10.

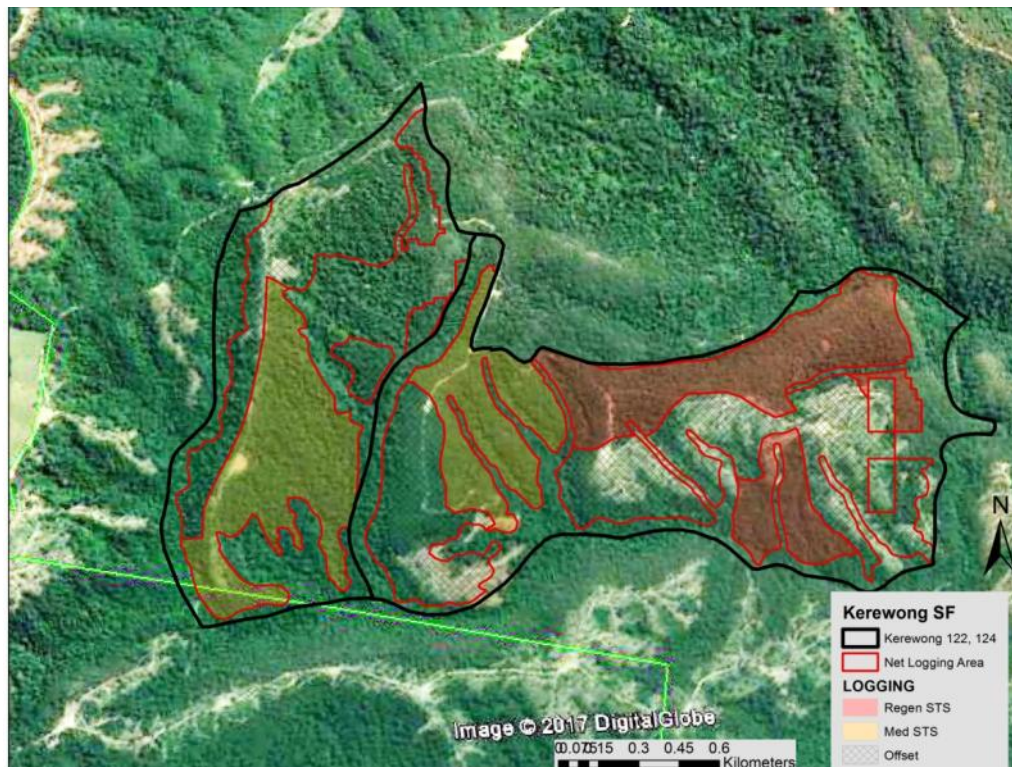
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IFOA Limits	Regen STS	STS Medium	Non-harvest	Total
	Mixed age, BBT forest types	Mixed-age, mixed spp forest types	Pre-merch, mixed aged BBT forest	
% of NHA	22%	30%	48%	
STS Tract (ha)	44	59	94	197
Pre-harvest BA/ha	22	22	12	
Pre-harvest BA	970	1300	1130	3400
Planned Removal	82%	52%	0%	40%
Post-harvest BA	175	750	1130	2055
Post-harvest BA/ha	4	13	12	

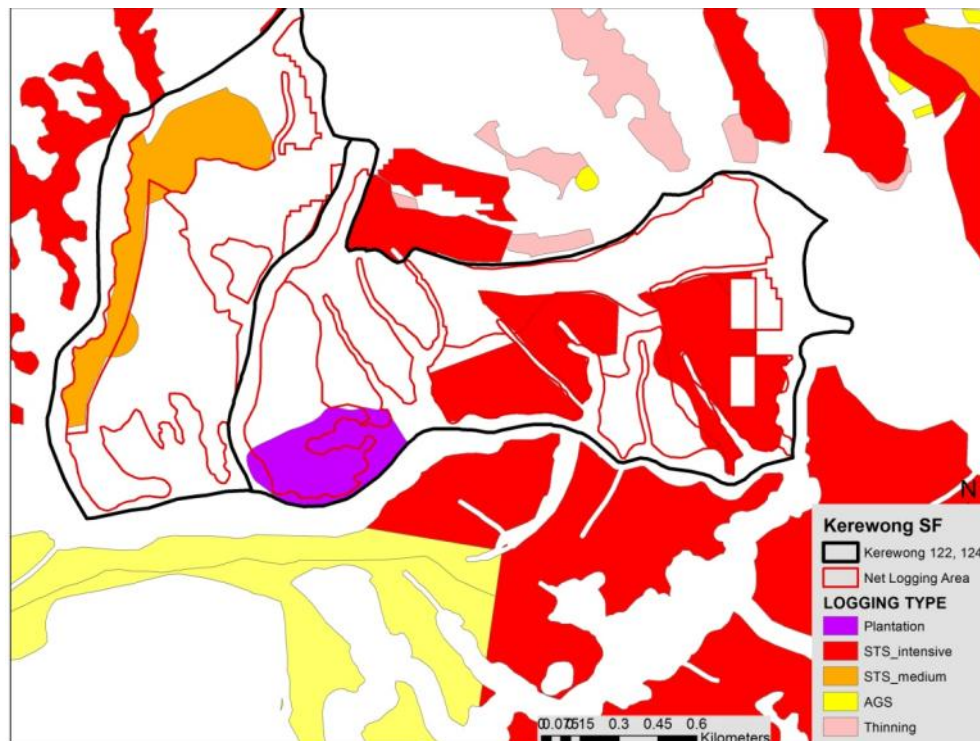
An extract from the harvesting plan showing the proposed logging intensity and the "offset" area.



Extract from current Harvesting Plan for compartments 122 and 124 showing exclusion areas, proposed logging area (pale yellow) and proposed "offset area" (dark yellow).



Logging area overlaid on Google Earth image dated 20 October 2009. Note that most of the offset areas were in the process of being logged at that time, and are now identified as medium and regeneration STS.



The hardwood plantation area is shown on the plantation map, but also in the logging history mapping as it being plantation and subject to STS medium. The "Regeneration STS" is given as being completed in June 2010, along with the plantation/medium STS, with the

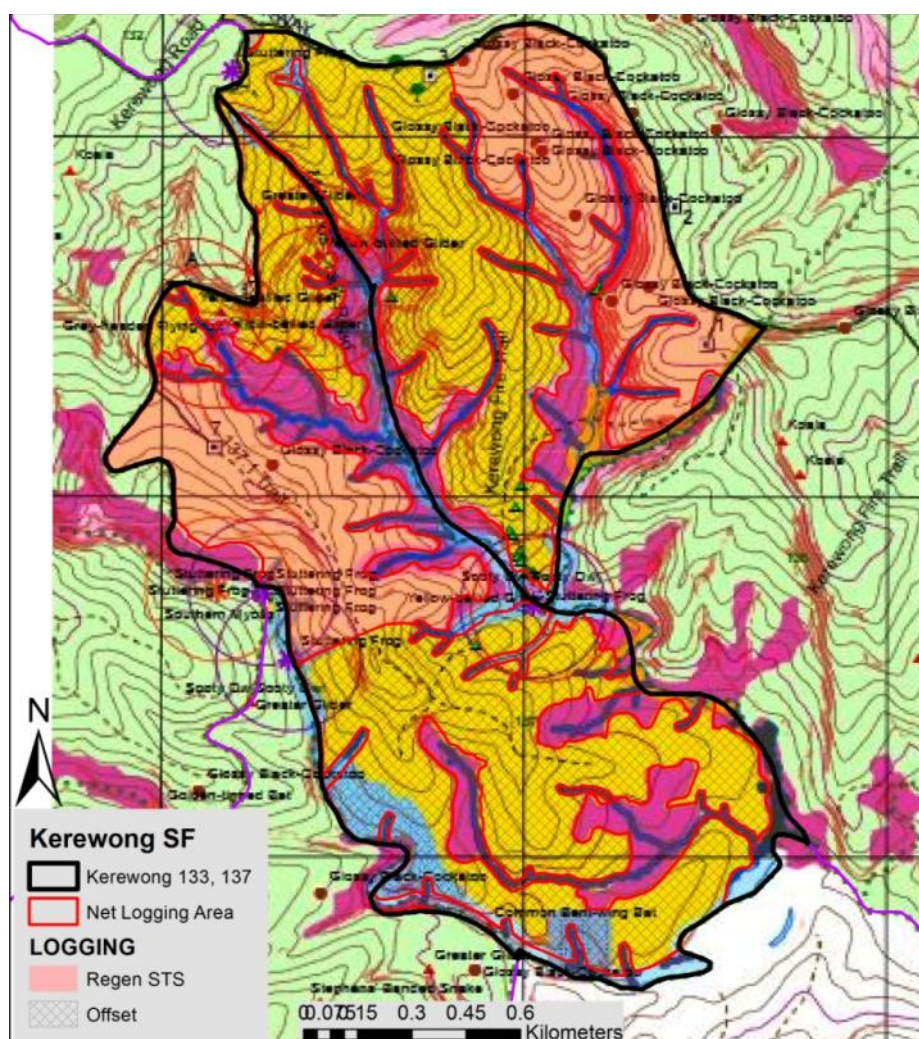
Clearing Koalas Away

medium STS completed in June 2009. It is clear that most of the "offset" area was largely cleared 7 years ago.

Compartments 133 and 137 in Kerewong State Forest are proposed to be subject to regeneration STS with a planned basal area removal of 82%. To supposedly bring the basal area down to an average of less than 40% two "offset areas" have been identified - one was mostly heavily logged in 2013 and most of the other was subject to medium STS in 2004.

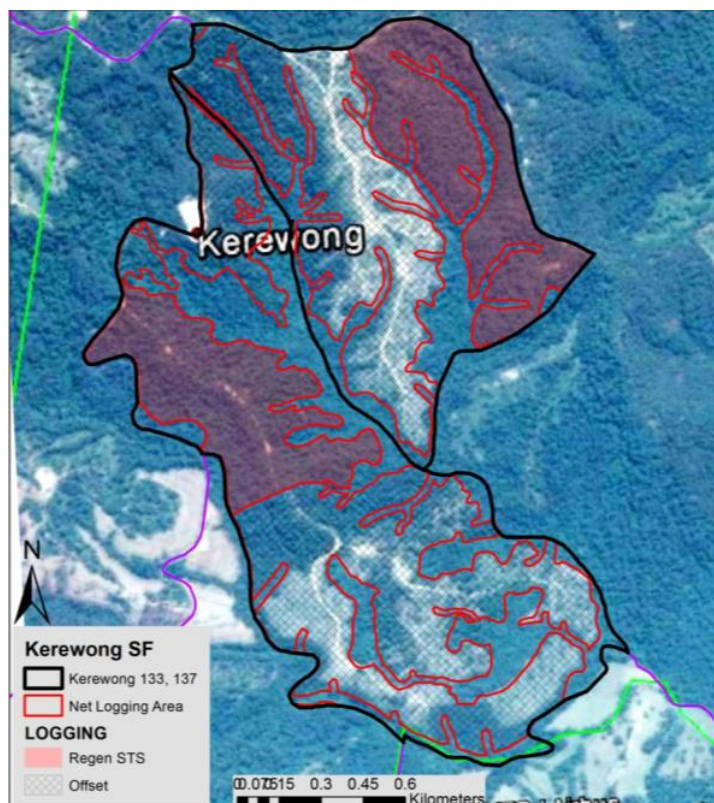
IFOA Limits	Regen STS	Future Treatment	BA offset	Total
% NHA	33%	21%	46%	100%
STS Tract (ha)	63 ha	40 ha	89 ha	191 ha
Pre-harvest BA	26.2	28	7.7	
Pre-harvest BA (ha)	1,651	1,120	689	3,460
BA removal total	1,399	0	0	1,399
Post-harvest BA	4	28	7.7	
Post-harvest BA (ha)	252	1,120	689	2,061
Planned BA Removal	85%	0%	0%	40%

An extract from the harvesting plan showing the proposed logging intensity and the "offset" area.

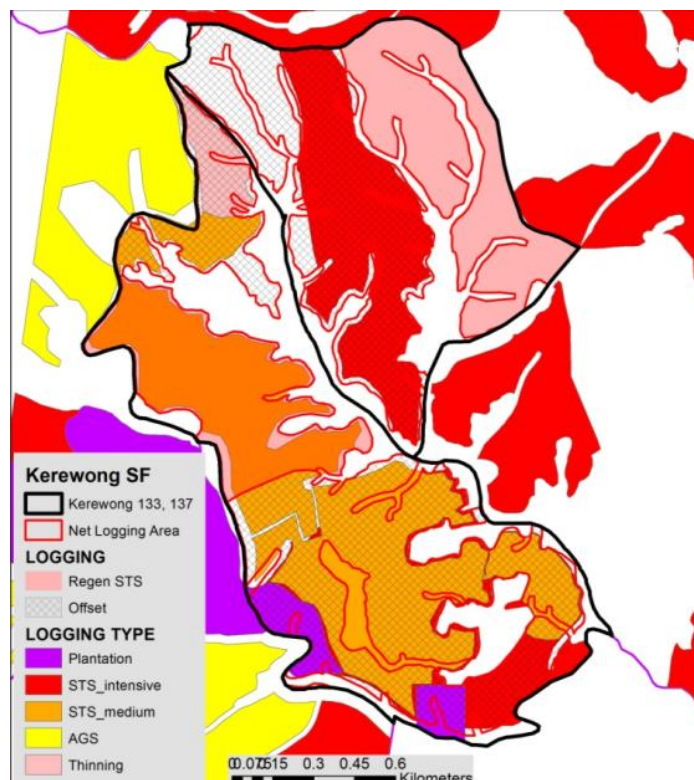


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Extract from the current Harvesting Plan for compartments 133 and 137 showing exclusion areas, proposed logging area (pale yellow) and proposed "offset area" (dark yellow).



Logging area overlaid on Google Earth image dated 7 November 2013, with the logging to the north apparently occurring after April 2013, though it is dated 2012. Note that a large part of the offset area being relied upon was subject to heavy STS at that time.



The area to the south-west was subject to Medium STS in 2004, a large part of this is being relogged now. The regeneration STS to the north was finished in 2012, most of the rest of that compartment is being logged now..

An assessment of mapped intensive logging in Kerewong State Forest shows 10% of the net logging area is claimed plantation and 43% of the logging area has so far been subject to unlawful medium and intensive STS. They are working their way through the forest.

Kerewong State Forest

	Kerewong SF	
	ha	% net area
Plantation	297	10
STS Intensive	1095	38
STS Medium	155	5
AGS	265	9
Thining	39	1
Other	1030	36
Exclusion	1139	
TOTAL	4020	

3.3. Proposed IFOA Zones

Within State Forests there has long been a division into "regrowth" forests encompassing the coastal lowlands and "non-regrowth" forests encompassing the more rugged escarpment forests. While the "regrowth" forests represent around 60% of the State Forest estate they encompass 90% of the very high and high quality Koala habitat. The Forestry Corporation and EPA are now proposing creating a new 140,000ha North Coast Intensive Zone which will be subject to the Eden style alternate coupe clearfelling regime whereby native forests are converted to what the EPA term "quasi-plantations".

The North Coast Intensive Zone is termed the "Regrowth B" zone. The intent is to limit the size of clearfelled coupes to an average of 60ha, allowing for a variation of 50-80ha. Existing landscape exclusion areas will be retained, though on the north coast a large proportion of these are rainforests or other areas that are not good Koala habitat. Most species specific exclusions for Koalas and other threatened species will be removed. There will be some requirements for the retention of scattered trees. As is currently the case, up to 90% of the net logging area will be clearfelled.

It is evident from the data from the Lower North East region that the Forestry Corporation are already well advanced with the conversion of forests in the proposed North Coast Intensive Zone to "quasi plantations" with 13% of the logging area converted to hardwood plantations, and 47% subject to unlawful medium and intensive STS.

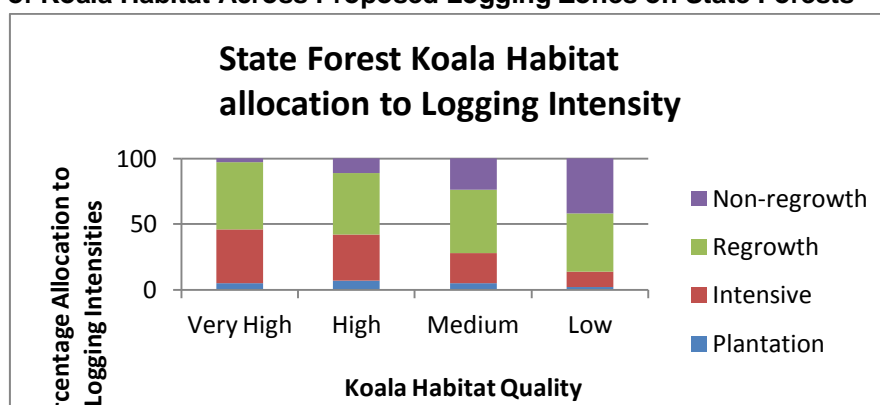
Over the past 10 years the Forestry Corporation have progressively and unlawfully converted half of the proposed North Coast Intensive Zone to "quasi plantations". By creating this zone the EPA are effectively giving retrospective approval to the Forestry Corporation's unlawful operations.

Lower North East: Intensive logging within Proposed Zones

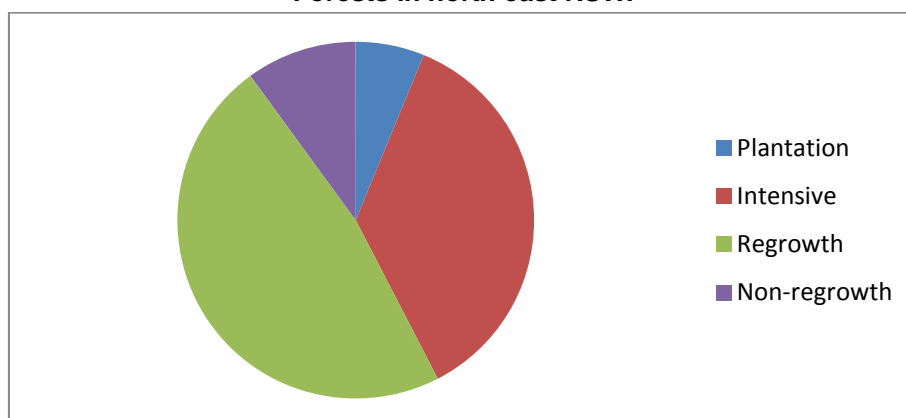
	North Coast Intensive		Regrowth A		Non-regrowth	
	ha	% net area	ha	% net area	ha	% net area
Plantation	8127	13	11343	9	508	0
STS Intensive	14856	24	4681	4	3789	3
STS Medium	14525	23	18002	14	17832	15
AGS	4669	7	992	1	0	0
Thining	540	1	125	0	30	0
Other	20390	32	93039	73	93150	81
Exclusions	22083		74551		90134	
TOTAL	85190		202733		205442	

It is also evident that as the logging intensity is proposed to increase so too does the quality of Koala habitat, with most of the high quality Koala habitat allocated to the North Coast Intensive and regrowth zones. The combined plantation and "quasi-plantation" intensive zones represent 18% of State Forests, yet encompass 42% of very high and high quality Koala habitat. It is apparent that large areas of the highest quality Koala habitat has been subject to the most intensive logging and is no longer likely to support many Koalas, emphasizing the importance of the remaining high quality with remnant Koala populations.

Distribution of Koala Habitat Across Proposed Logging Zones on State Forests



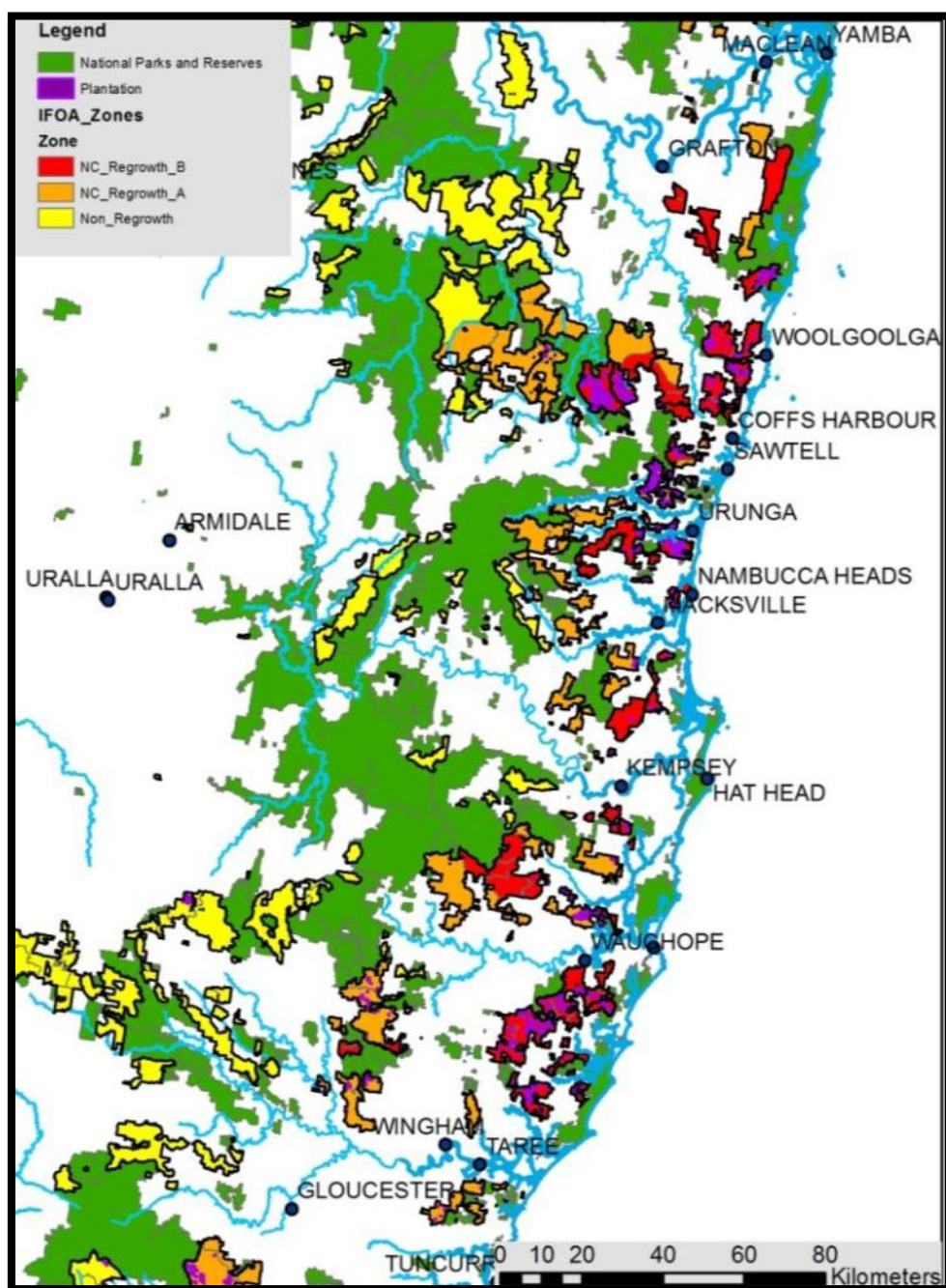
Proposed Allocation of High and Very High quality Koala Habitat to Logging Zones on State Forests in north east NSW.



Proposed Allocation of High and Very High quality Koala Habitat to Logging Zones on State Forests in north east NSW.

The EPA are intending to reward the Forestry Corporation for a decade of unlawful clearing of native forests by legitimising the practice by zoning 140,000 ha of native forests for alternate coupe clearfelling in a new North Coast Intensive Zone. Over the past 10 years the Forestry Corporation have progressively and unlawfully converted half of the proposed North Coast Intensive Zone to "quasi plantations". The combined plantation and "quasi-plantation" intensive zones represent 18% of State Forests, yet encompass 42% of very high and high quality Koala habitat. The agencies are also intending to increase logging intensity in the rest of the regrowth zone, covering another 48% of high quality Koala habitat.

EPA proposed new North Coast Intensive Zone. Regrowth B (red) is the proposed North Coast Intensive Zone.



4. Koala Population Trends

It is apparent that the DoI Forestry unit Koala modelling reflects the historical distribution of Koalas, primarily highlighting that they are either no longer present or have been severely reduced in many areas of what should be, or once was, the highest quality habitat.

Given that they have likely been subject to repeated surveys over the past 20 years, including recently, it should be of concern that there are no Koala records in numerous areas currently being logged despite their being comprised of large proportions of high quality habitat (Appendix 1): Broken Bago (90% high quality habitat), Lorne (a 75%), Landsdown (a 70% and b 67%), Orara East (51%), Clouds Creek (b 41%), Ewingar (27%), Gladstone (b 22%), Myall River (21%), and Marara (10%). Similarly the last records were 42 years ago in Lorne (b 17%), 22 years ago in Burrawan (82%), 19 years ago in Ellis (13%), and 9 years ago in Kerewong (26%) and Chichester (22%). None of these support the claim that they have significant Koala populations, instead supporting the contention that Koala populations are in major decline. It seems that because the model is based on historical records it is identifying areas that were historically important for Koalas, many of which have since been severely degraded by logging.

Overall in the areas currently being logged there have been no records of Koalas from 14 (41%) of the 30 areas encompassing high quality Koala habitat (Appendix 1), and no records for at least the past 9 years in 4 (12%) of the areas.

There are three areas currently being logged that have sufficient records from the previous logging to be able to ascertain some indication of trends. In Bagawa SF (780, 790, 791) in 1999 there were one call record and 24 scat records (including 2 >20) compared to one observation and 10 single scat records in 2014. In Buckra Bendinni SF (384, 385) in 1998 there were 15 observations and 78 scat records (including 11 >20), compared to one observation and 14 single scat records over the 3 years 2013-16. In Gladstone State Forest 228,231,232,233) in 1997 there were 68 scat records (including 5 >20), compared to 2 call records and 23 scat records in 2013. The indications from all 3 sites are of population decline.

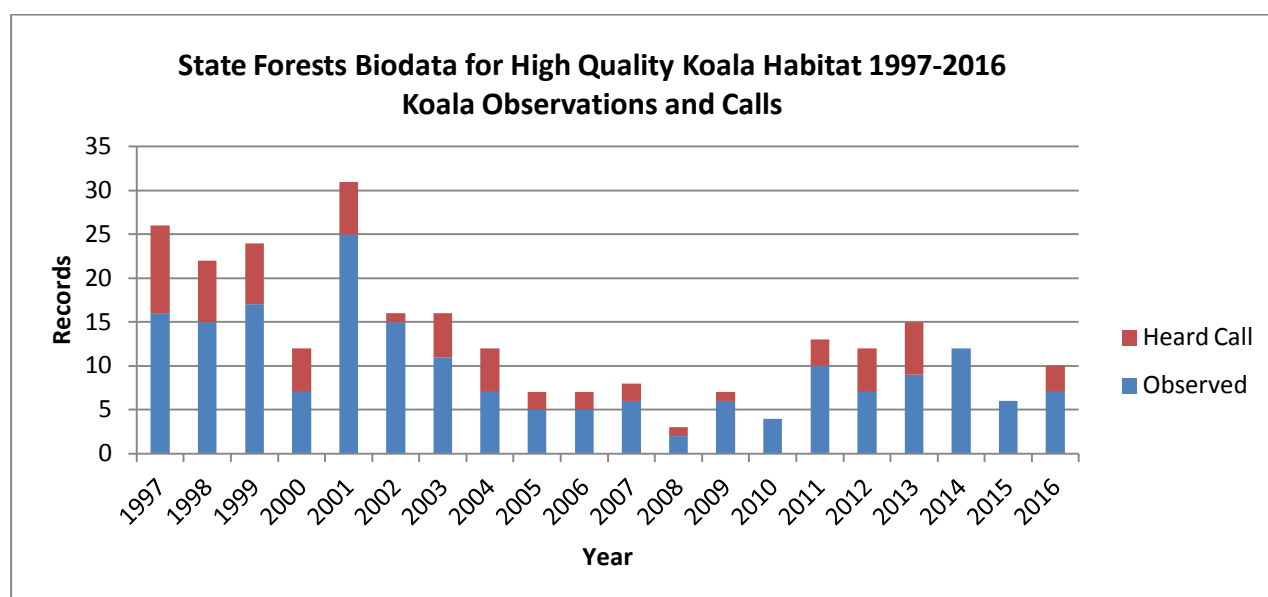
For DoI's (Law *et. al.* 2017) Koala model their verification involved undertaking scat searches for 1 minute within a 1 m radius of 40 trees (>20cm dbh) at each of 65 sites. No accumulations of pellets were found, with just one scat being recorded at 9 sites and 2 scats at 2 sites, finding single scats under 13 (0.5%) out of 2,600 trees searched. This represents an extremely low strike rate, particularly as 25% of sites were in high quality habitat.

There is no evidence from the records that any of the other sites have high density populations. These results are consistent with the EPA's (2016) findings that high quality habitat in Cloud's Creek and Maria River State Forests had low occupancy and that populations were in decline:

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.

The Forestry Corporation's more systematic pre-logging nocturnal surveys are probably the most reliable indicator of Koala occupancy and trends over the past 20 years. Scat counts should provide the most reliable assessment of habitat occupancy, though despite having clear pre-logging search requirements they are an unreliable indicator because they are often not undertaken, or inadequately done. For example, at their lowpoint, over the ten years 2001-2010 the State Forests Biodata only report finding a total of 194 trees (i.e. 19.4 a year) in high quality habitat with Koala scats under them. In their best year (1999) the Forestry Corporation only recorded 269 trees in high quality habitat with scats under them: 189 (70%) had one scat under them, 74 (28%) had 2-19 scats and 6 (2%) had 20 or more scats. By comparison in an assessment of logging operations in medium-low quality habitat in parts of 3 compartments in Royal Camp SF, involving some 7 days of surveys in 2012 and 2013, NEFA documented 245 trees with Koala scats under them; 103 (42%) had one scat under them, 77 (31%) had 2-19 scats and 65 (27%) had 20 or more scats.

State Forests Biodata (from Wildlife Atlas) records from observations and calls within high quality habitat across north-east NSW were analysed to identify both frequency of occurrence and trends over the past 20 years. The survey results (along with SFs incidental observations) indicate low population densities, with an average of only 13.2 Koalas observed or heard in high quality habitat each year. Most worrying is that the results of these surveys indicate that there may have been a significant decline in Koala numbers since 2001.



State Forests Biodata records (from Wildlife Atlas) for High and Very High quality modelled habitat for 20 years since standardised survey requirements were implemented. The decline in records after 2001 should be a significant worry.

It is apparent that Koalas have a distinct preference for larger trees and this is a key determinant of habitat suitability. 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). For example Hindell and Lee (1987) found "*that koalas favoured large trees and forest in which large trees were most abundant*".

There can be no doubt that reductions in the abundance of mature individuals of select feed species will affect the availability of food and thus the density and abundance of Koalas.

There are compounding affects resulting from the loss of trees used for other purposes, changes in understories and the spread of dieback. Once populations drop below sustainable levels they can become sink populations, where reproduction no longer exceeds mortality. Given the length of tree's lifestages, restoration of high quality habitat is a lengthy process.

There can be no doubt that intensive logging and the conversion of forests to quasi plantations is having significant impacts on Koala populations, apparently converting large areas of source habitat into sink habitat. The available evidence supports the proposition that the 50% decline in north coast Koala populations over the past 15-20 years applies to State Forests, with the increasing intensification of logging in high quality habitat primarily responsible.

5. References

- Attwill, P., Burgman, M., and Smith, A. (1996) 'Gaps and Clusters silviculture: How well does it balance wood production and biodiversity conservation?' A report by the Review Panel to the Ministerial Committee established to review the Principles and Application of the Gaps and Clusters Technique. Unpublished report.
- Environment Protection Authority (2016) Koala Habitat Mapping pilot, NSW State Forests
- EPA (2016b) Letter from Gary Whytcross Director South and Forestry Environmental Protection Authority on behalf of Minister for the Environment, the Hon Mark Speakman SC MP to Ms Orrego of Nambucca Valley Conservation Association May 5 2016.
- Forestry Corporation (2013b) Comments on Koala Mark-up surveys. Unpublished letter to EPA.
- Hindell, M. A., and Lee, A. K. (1987). Habitat use and tree preferences of koalas in a mixed eucalypt forest. *Australian Wildlife Research* **14**, 349–360.
- Law, B, Caccamo, G, Wimmer, J, Truskinger, A, McConville, A, Brassil, T, Stanton, M and Gonsalves, L. (2017) A predictive habitat model for Koalas *Phascolarctos cinereus* in north-east New South Wales: Assessment and field validation. NSW Department of Industry—Lands and Forestry.
- Lunney, D., Moon, C. and Ferrier, S. (1991) An ecological assessment of the Koala population, Koala habitat and Koala movement corridors of North Bonville, Coffs Harbour. National Parks and Wildlife Service, unpublished report.
- Moore, B. D., Wallis, I. R., Wood, J. and Foley, W. J. (2004b) Foliar nutrition, site quality and temperature affect foliar chemistry of tallowwood (*Eucalyptus microcorys*). *Ecological Monographs*, **74**(4), 2004, pp. 553-568
- Moore, B.D. and Foley, W.J. 2005. Tree use by koalas in a chemically complex landscape. *Nature* **435**, 488–490.
- Smith, A.P. 2004. Koala conservation and habitat requirements in a timber production forest in north-east New South Wales. In *Conservation of Australia's Forest Fauna* (2nd ed.), pp. 591-611. Mosman, New South Wales: Royal Zoological Society of New South Wales.
- Sullivan, B. J., Baxter, G. S., and Lisle, A. T. (2002). Low-density koala (*Phascolarctos cinereus*) populations in the mulgalands of south-west Queensland. I. Faecal pellet sampling protocol. *Wildlife Research* **29**, 455–462. doi:10.1071/WR00110

Clearing Koalas Away

State Forest	Compartments	Area (ha)	Modelled Koala Habitat		Total Koala Records (most recent record)		Koala Protection in Harvesting Plan		Intensive STS (highest BA removal)
			High	Medium	See/hear	other	High Use Area (ha)	Inter. Use (%)	
BAGAWA	780, 790, 791	790	364	177	7 (2014)	34 (2014)	0.5ha	31%	
BALLENGARRA	78,80,81,82	573	308	170	2 (2016)		0	0	Y (85%)
BILLILIMBRA	667	292	19	124			0	0	
BRIL BRIL	1,2,3	808	511	229	2 (2015)	7 (2010)	0	0	Y
BROKEN BAGO	40	128	115	6			0	0	Y
BROTHER	78.79.80.81	1100	0	2			0	0	
BUCKRA BENDINNI	384,385	443	63	96	15 (2015)	101 (2016)	0	100%	
BURRAWAN	32	141	115	28	1 (1995)		0	0	Y (AGS)
CHICHESTER	26,27	614	133	162	1 (2008)		0	0	Y (67%)
CLOUDS CREEK	136,137,138	726	594	105	3 (1999)	17 (2016)	0	32%	
CLOUDS CREEK	164,165	242	99	43			0	0	
DALMORTON	468,469,478,479	821	4	26			0	0	
ELLIS	53,54,55,56,71,72	1093	140	249	3 (1998)	2 (1997)	0	100%	
EWINGAR	668	219	59	62			0	0	
GIRARD	389,390,391,392	896	39	146		1 (2015)	0	0	
GIRARD	393,394,395,396,397	940	6	113			0	0	
GLADSTONE	215,216,217,218	716	84	186	5 (1999)	13 (2015)	0	0	
GLADSTONE	221	236	53	73			0	0	Y (60%)
GLADSTONE	228,231,232,233	677	149	217	2 (2013)	91 (2013)	0	26%	
KEREWONG	122,124	322	85	105	1 (2008)	5 (2008)	0	0	Y (82%)
LANSDOWNE	192,196	318	214	82			0	0	Y (69%)
LANSDOWNE	199,200	213	150	64			0	0	Y (AGS)
LORNE	79,80	244	184	52			0	0	Y (70%)
LORNE	90,91	380	65	147	2 (1975)		0	0	Y (86%)
MARARA	287,288,291,292,294	970	101	125			0	0	
MOONPAR	94,95,104,109,110	713	411	213	2 (2000)	6 (2014)	0	0	
MYALL RIVER	53,56	432	90	167			0	0	Y (57%)
ORARA EAST	585	201	102	57			0	0	Y
RAMORNIE	650,676,678,680,688,689	1312	0	10		5 (2015)	0	0	

Clearing Koalas Away

RIAMUKKA	155,156,341	521	0	19			0	0	
STYX RIVER	525,526,527	986	0	50	1 (1949)		0	0	
STYX RIVER	540,541,542,552,553,555, 556,562,563	3328	94	682			0	0	
TUCKERS NOB	51,52,53,54	736	270	229	7 (2016)	8	0	0	
WANG WAUK	118	455	46	314	4 (2015)	9 (2016)	0.7ha	0	
TOTALS		22586	4663	4530	58	291	1.2ha	12%	

A REVIEW OF ACTIVE LOGGING AREAS (JUNE 2017)

Notes on table:

Modelled Koala habitat is based on a categorisation of DoI's Koala models, with "very high" combined with "high".

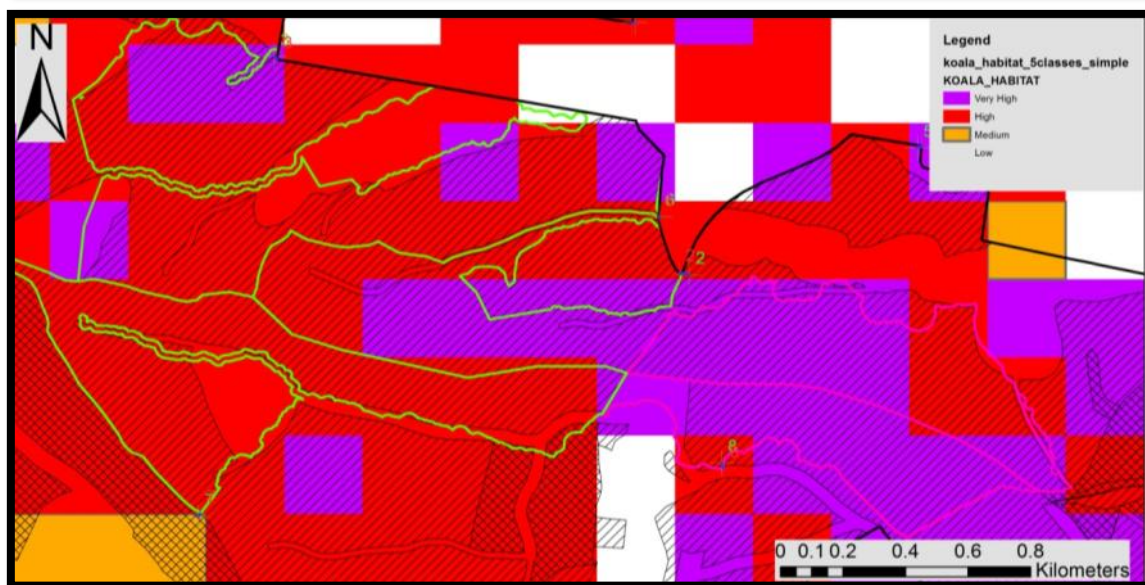
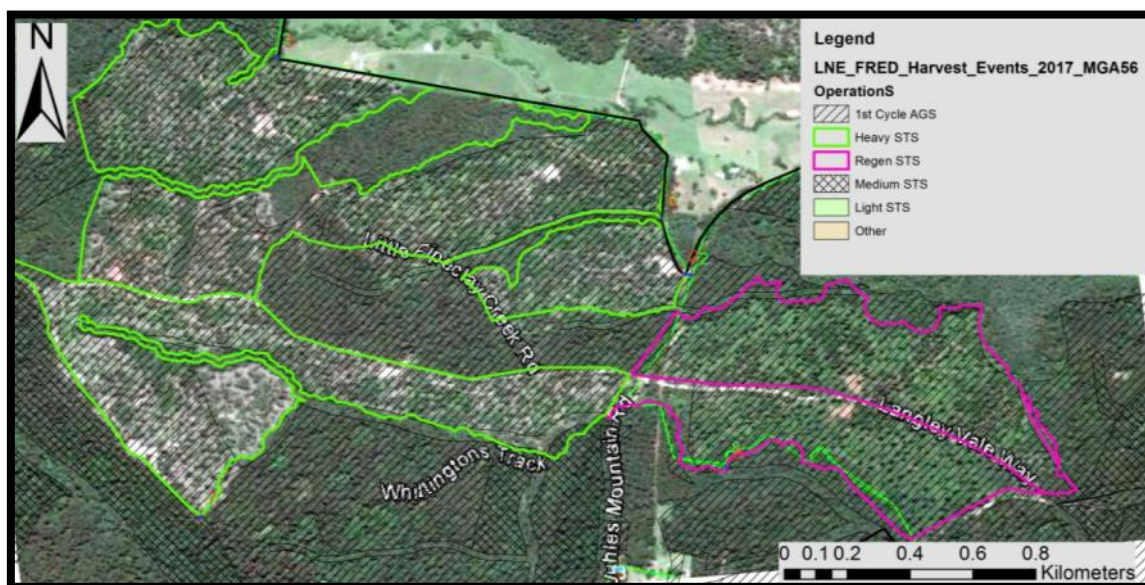
Koala records are from OEH Wildlife Atlas, with the last date of a record in brackets.

Harvesting Plan information (Koala protection and logging intensity) is derived from relevant Harvesting Plans, it is recognised that additional Koala scats may be found in Koala Mark Up surveys and trigger additional protections, though this is rare.

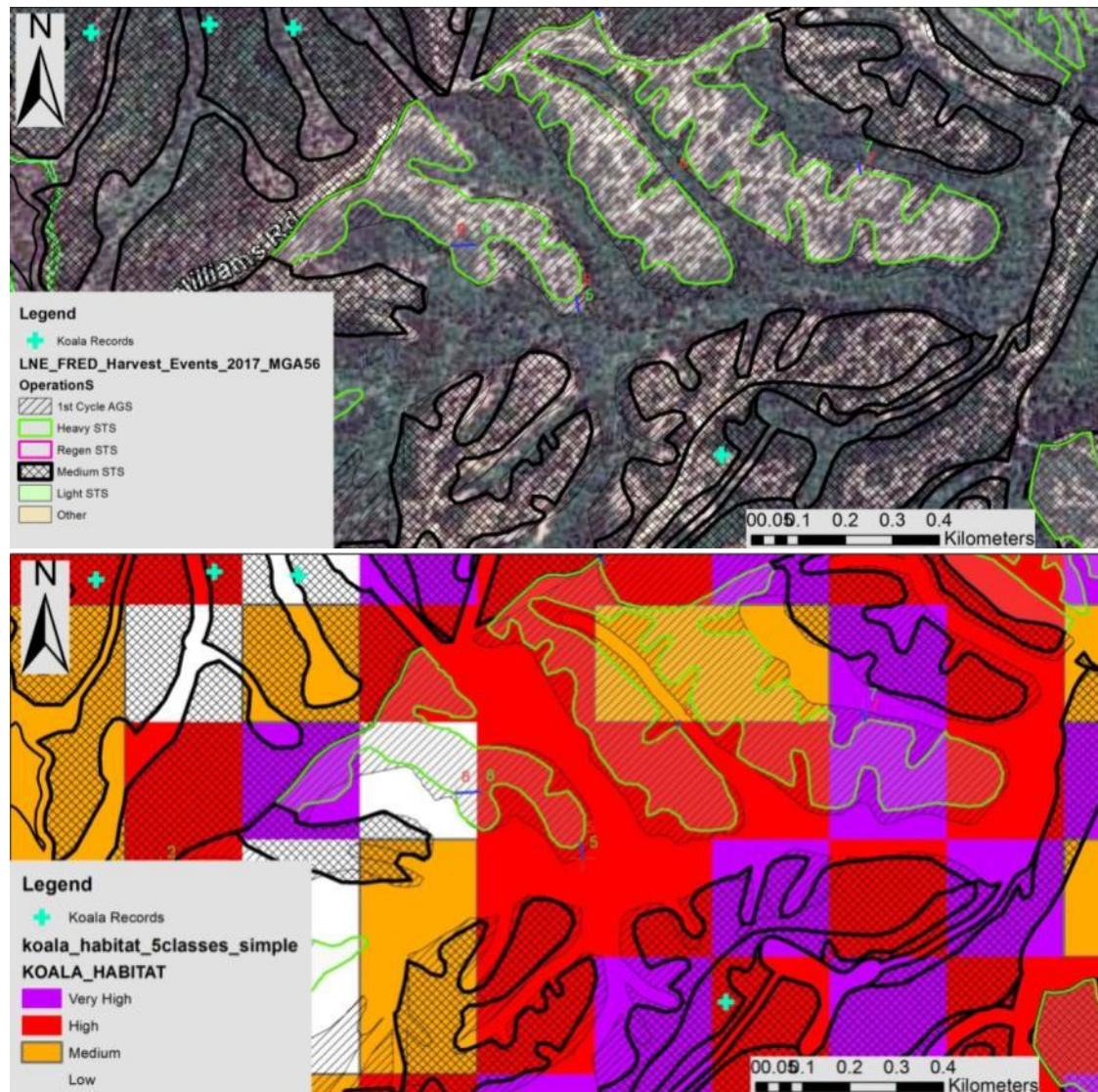
Appendix 2. Examples of unlawful clearing of native forests and conversion to quasi plantations.

Below are examples of clearing operations undertaken by the Forestry Corporation under the guise of "medium", "heavy" and "regeneration" Single Tree Selection (STS), in contravention of the limiting of tree removal to 40% of basal area under STS. The data provided by the Government is overlaid on Google Earth images from the most appropriate date, and compared to the DoI Koala Habitat mapping.

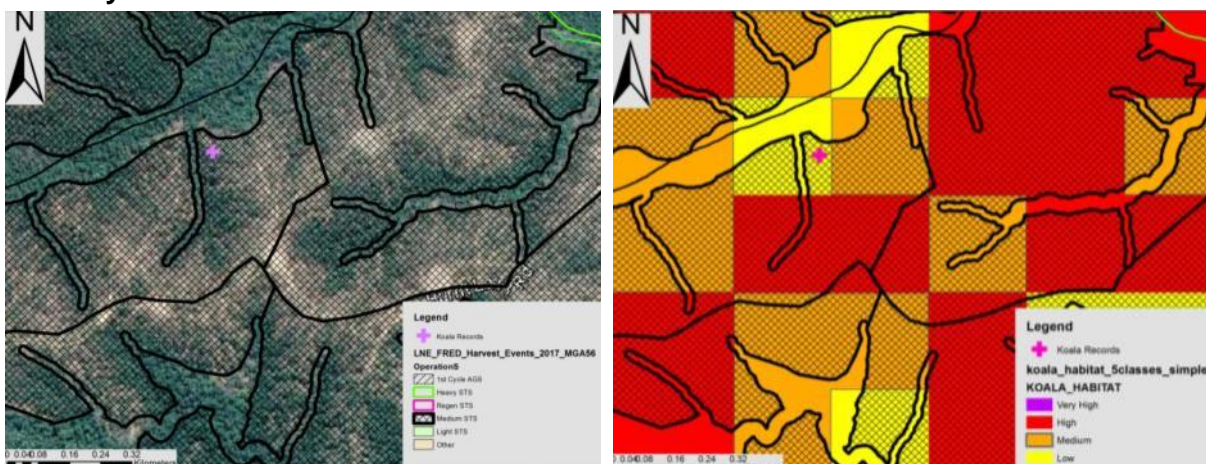
Example of "heavy" and "regeneration" STS of high quality Koala Habitat in Cooperbrook SF. The area was subject to AGS in 2005-8, "regeneration" STS in 2012 and "heavy" STS in 2015.



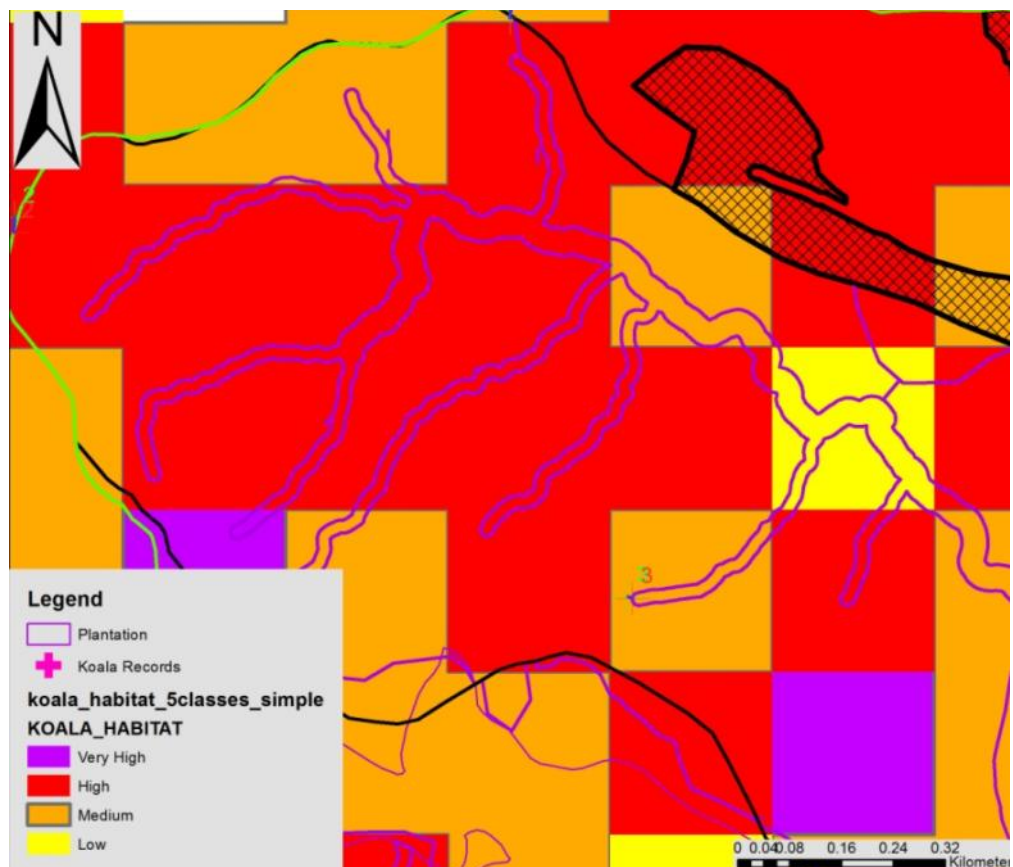
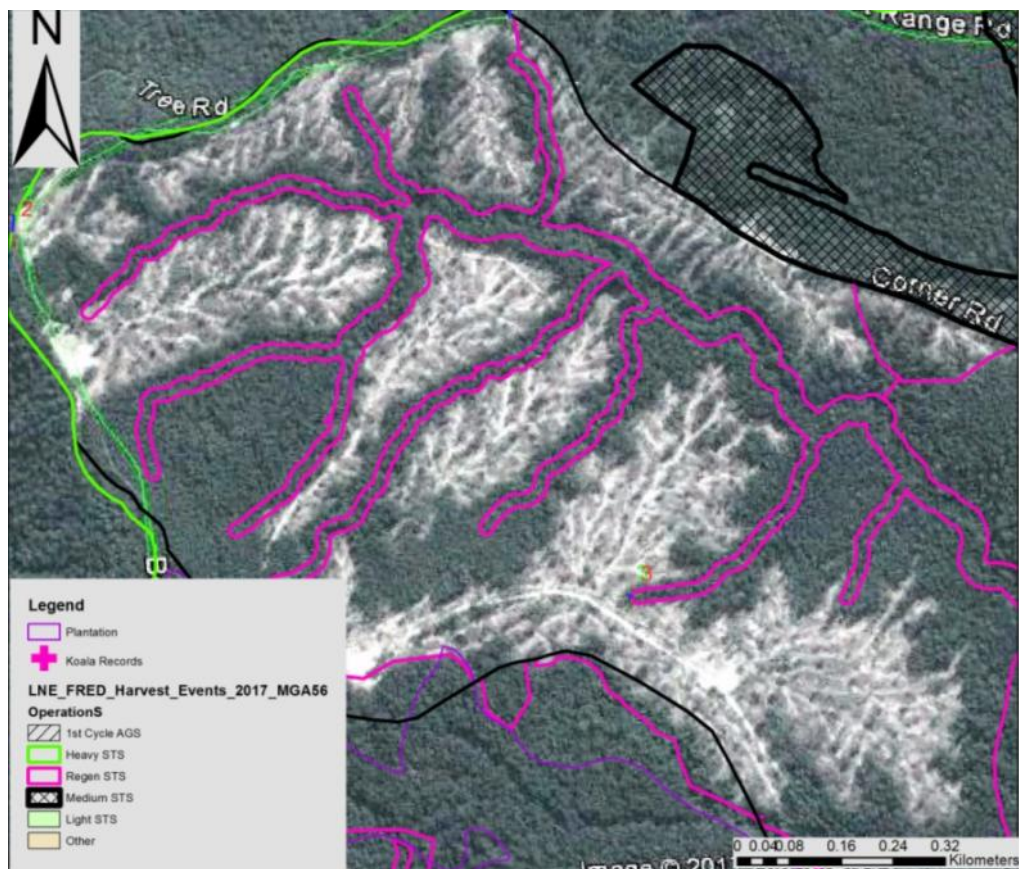
Example of "heavy" and "medium" STS of high quality Koala Habitat in Newry SF. The areas were subject to AGS in 2002, then STS operations in 2013. There are a number of Koala records nearby in the valley from 1996-8, with the record in the 2013 "medium" STS dated 2012.



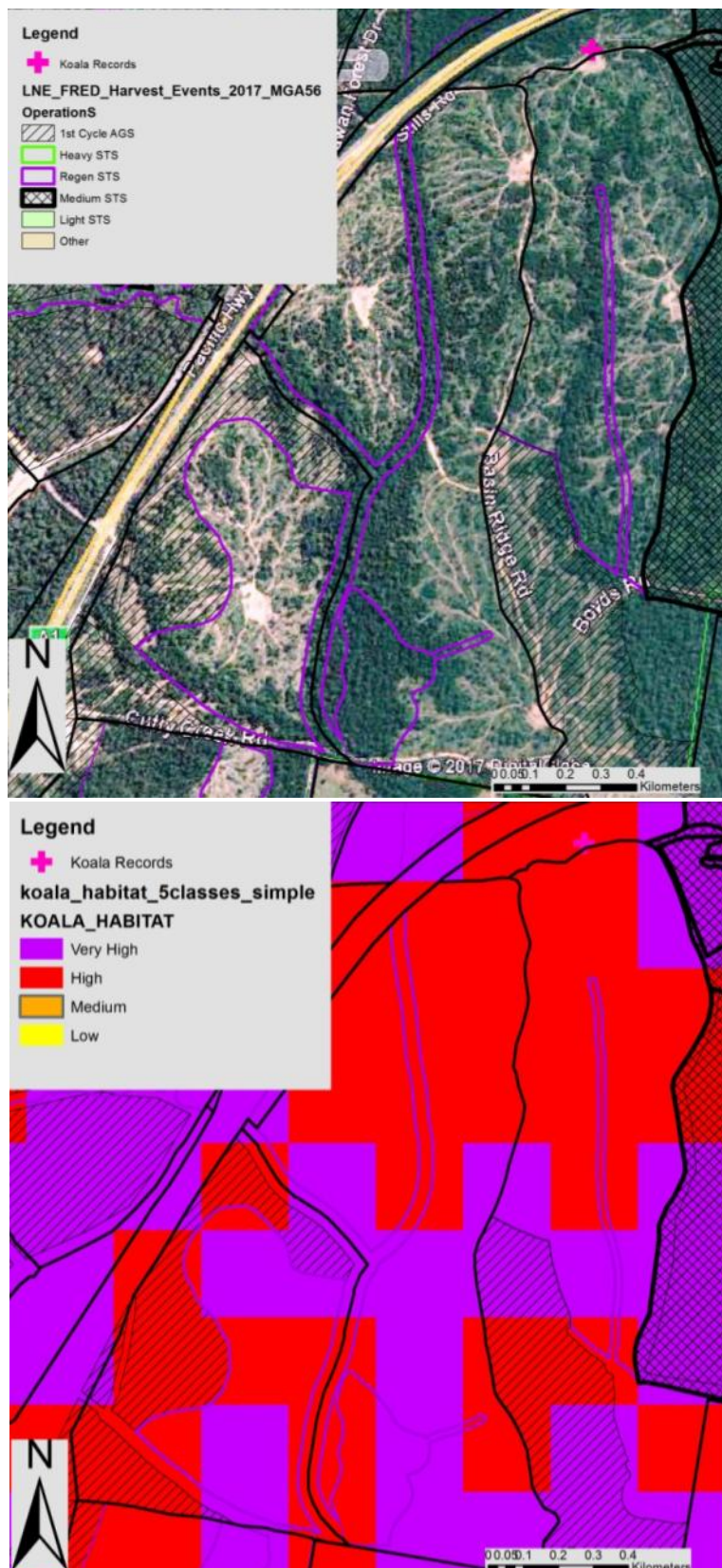
Example of "medium" STS in medium to high quality Koala habitat in Kiwarrak SF in 2013, The only Koala record is 2004.



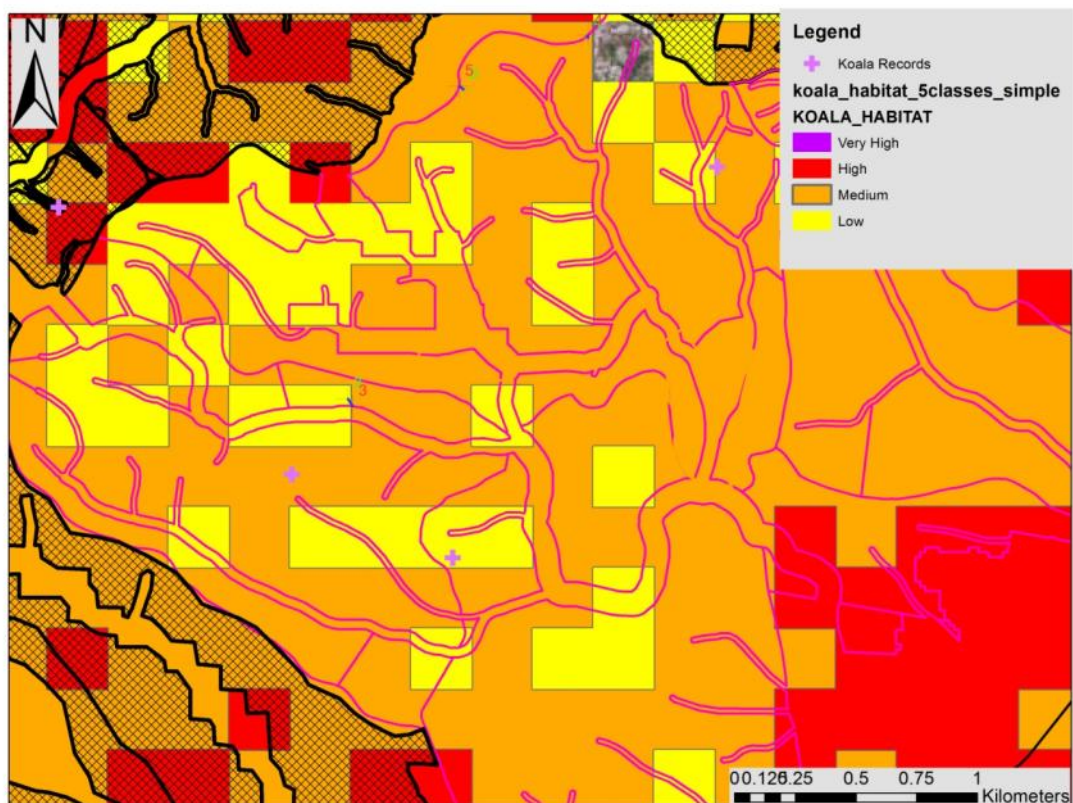
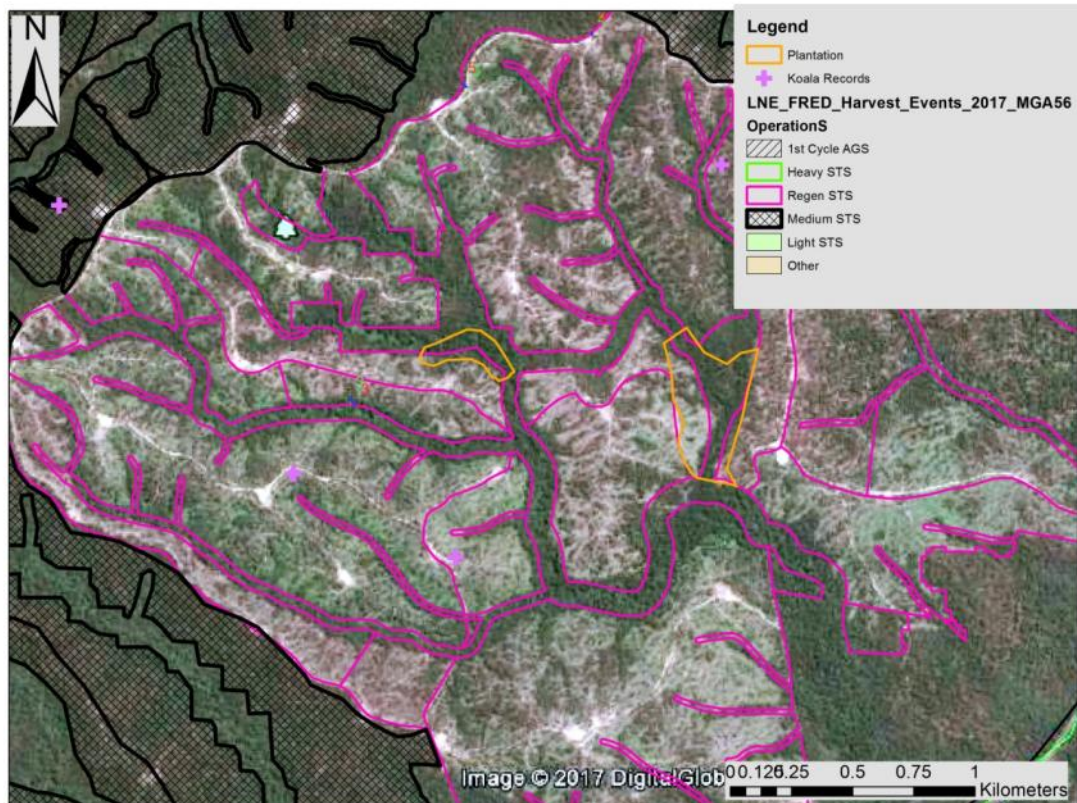
Example of "regeneration" STS of high and medium quality Koala Habitat in Lorne SF in 2011.



Example of "regeneration" STS (and theoretically AGS) in high and very high quality Koala habitat in Burrawan SF in 2008-9. Note the poor match between the mapped data and what is observable, particularly with 2 areas to the south-east and south-west recorded as AGS treated in 2008 that were obviously intensive STS treated. The location of the Koala record is given as 1980-2006.



Example of "regeneration" STS of moderate quality Koala Habitat in Tamban SF, undertaken in 2011. Surrounding areas were subject to medium STS in 2004, 2005, 2008 and more recently in 2015. There were 3 Koala records within this stand, one from 2001 and 2 from 2008.



Example of Newry State Forest, showing plantations (pink), intensively treated forests (grey), AGS areas yet to be re-logged (mauve), and existing exclusion areas - largely rainforest and wetlands which are not Koala habitat (blue), and areas yet to be intensively logged (pale green). These show that the offsetting of areas to justify intensive logging is a temporary sham, as they are quickly reallocated to intensive logging. Minimal patches of high quality Koala habitat will be left once the conversion to quasi plantations is complete.

