

EPA AUDIT REPORT – CROWN FOREST DAMPIER STATE FOREST, COMPARTMENT 3109

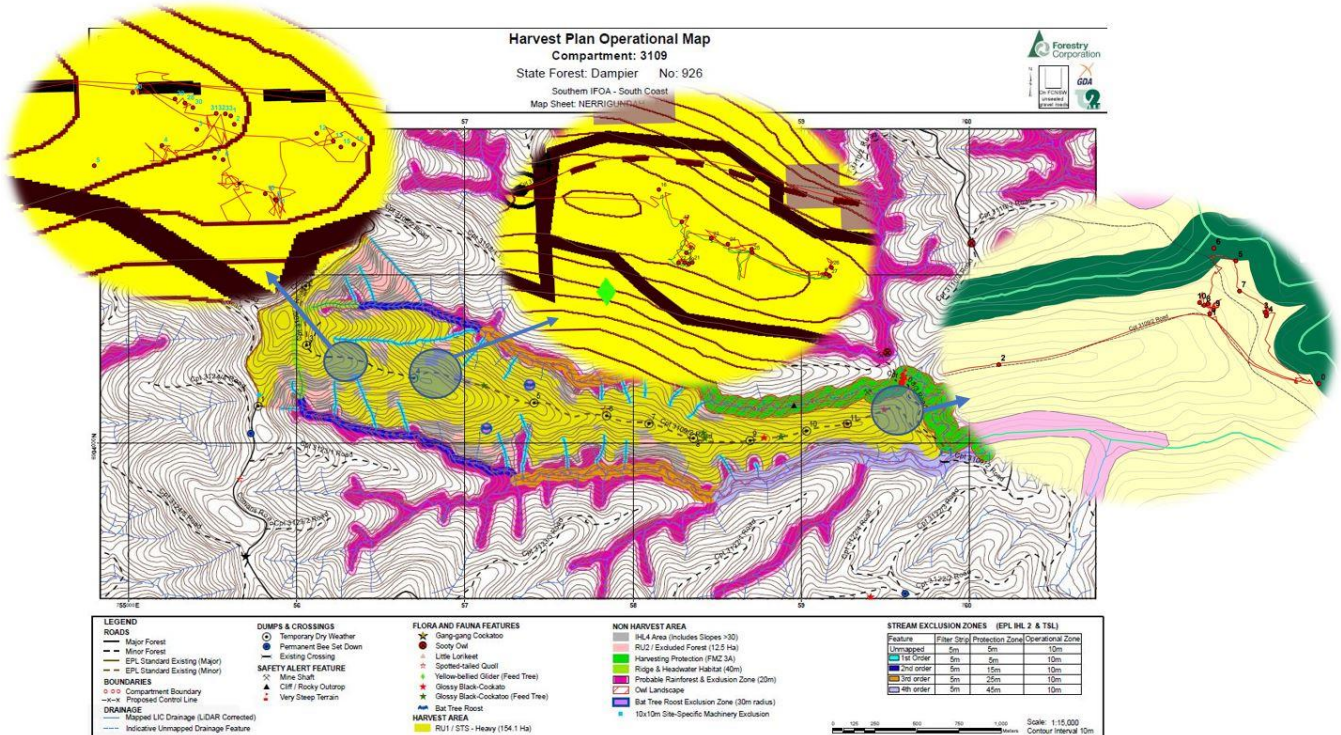
Auditee:	Forestry Corporation of NSW
Audit scope:	Dampier State Forest, compartment 3109 (see Map 1 , below). The field audit took 2 days to complete.
Region:	Southern Region
Date/Audit timing:	10 August 2017
Justification of audit:	Post-harvest audit focussing on EPA compliance priority areas
Audit objectives:	<ol style="list-style-type: none"> 1. Determine compliance with Southern Region IFOA conditions 2. Determine compliance with relevant planning conditions that relate to threatened species surveys 3. Communicate compliance and non-compliances to FCNSW. 4. Outline requirements for any necessary follow-up action.
Audit criteria:	<ul style="list-style-type: none"> • Condition 5.1E TSL (Marking-up of boundaries of environmentally sensitive areas – ridge & headwater habitat) • Condition 5.6 TSL (H&R retention, selection and protection) • Condition 5.8 TSL (Protection of Ridge & Headwater Habitat areas, amendment to boundaries of ridge and headwater habitat) • Part 5(11) IFOA (Basal Area Retention)
Summary of Operations	<p>From the harvesting plan:</p> <p>“Harvesting of Hardwood forest, using Single Tree Selection Silviculture subject to the Southern IFOA requirements will be undertaken within this planning unit. Timber harvesting and road construction will not be licensed under the EPL.</p> <p>The primary product of the harvesting is high quality large sawlogs (quota logs), small high quality sawlogs, veneer logs, girders, poles & piles where timber markets are available. Parts of felled logs that do not meet high quality log specifications are segregated and graded into other classifications such as salvage sawlogs, pulp logs & miscellaneous timbers e.g. split & round posts, firewood, mining timbers & craftwood. The availability of miscellaneous timbers depends mainly on forest types, log defectiveness & market conditions at the time of harvesting.”</p>

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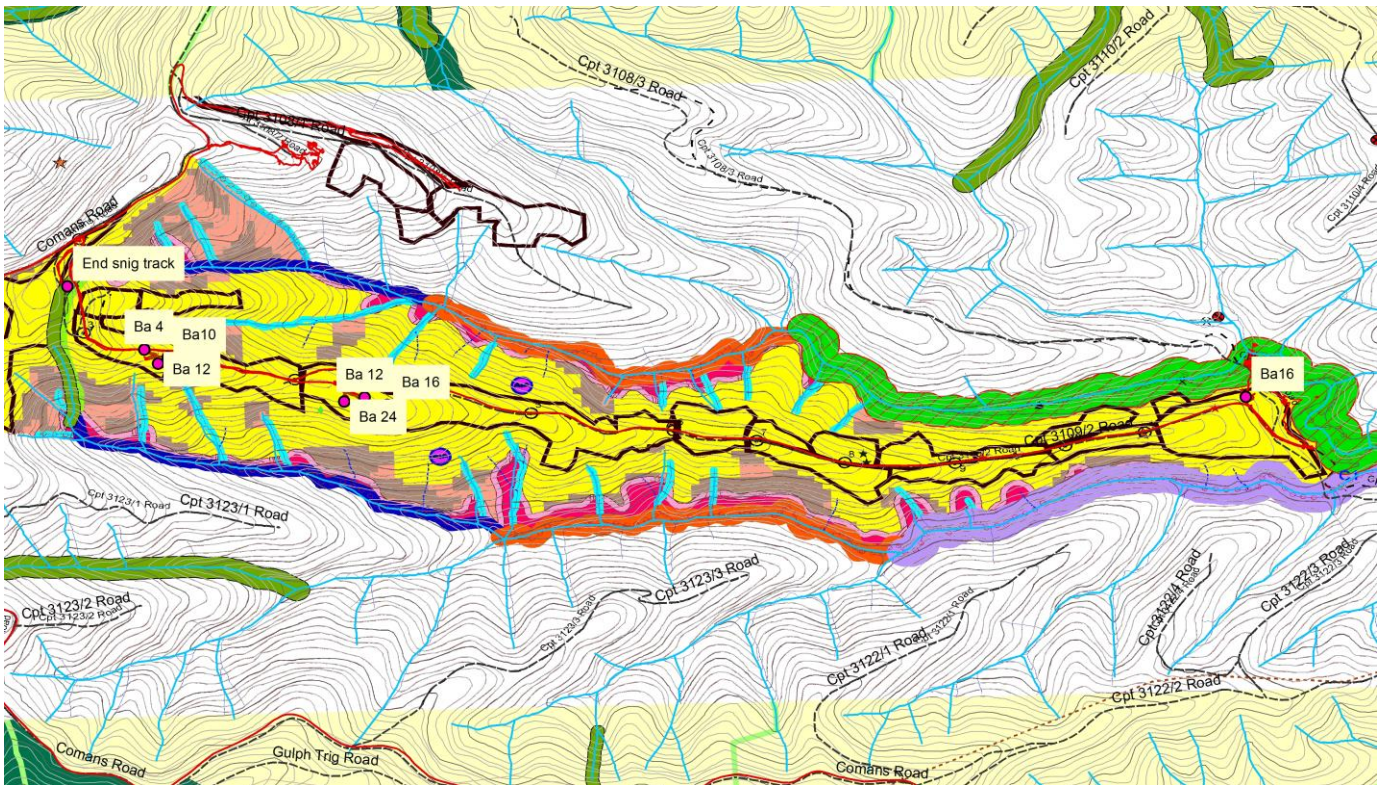
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MAPS OF AREAS ASSESSED:

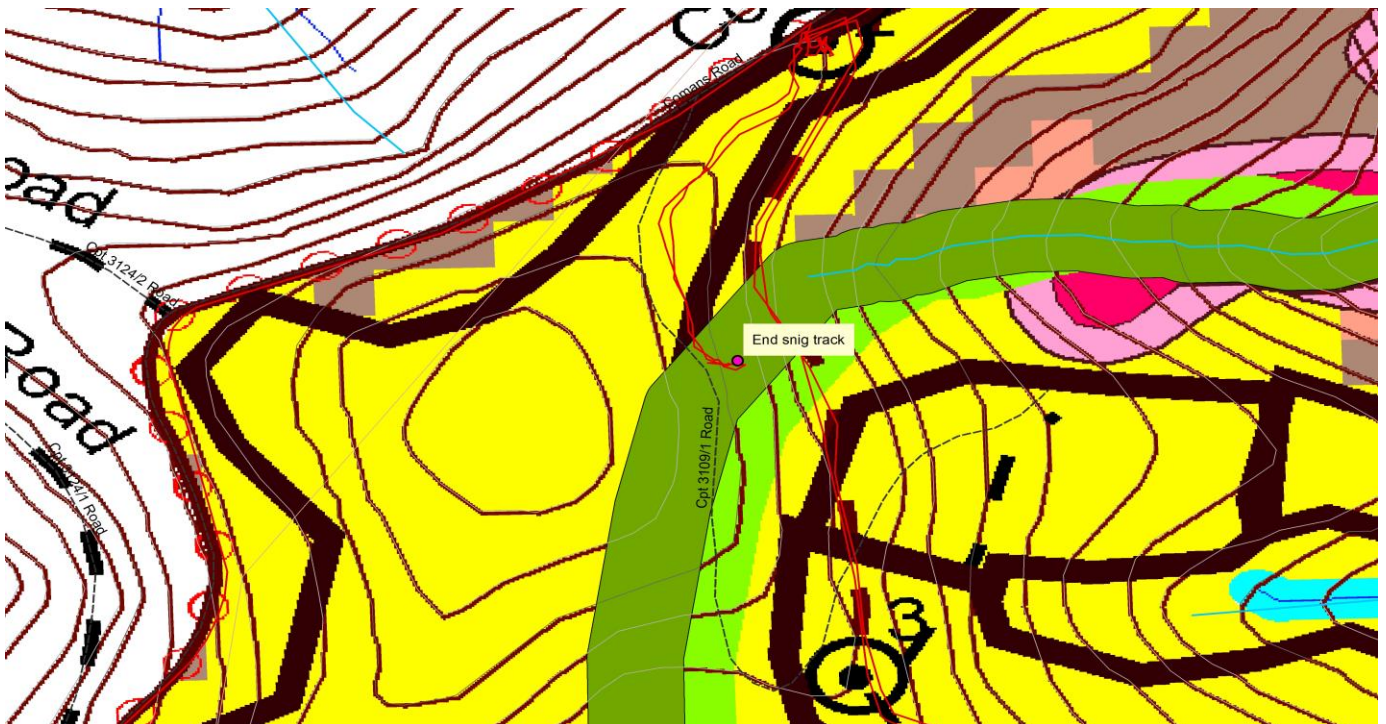
H & R PLOTS, BASAL AREA PLOTS, RIDGE AND HEADWATER



Map 1: Areas inspected during the EPA audit on 10 and 11 July 2017, compartment 3109, Dampier State Forest. The transparent blue circles show approximate locations where meanders were undertaken, and hollow-bearing and recruitment trees assessed. The inserts (oval shape) show the waypoints recorded at each location.



Map 2: Basal area sweeps undertaken in compartment 3109, Dampier State Forest during the EPA audit on 10 and 11 July 2017. All of the sweeps were in logged areas, with values ranging from 4m²/ha to 24m²/ha. This map also shows that logging did not cover all of the net (available) harvest area. Instead it was restricted to the areas outlined in black (information provided by FCNSW).



Map 3: Area of ridge and headwater habitat assessed by the EPA during the audit of compartment 3109, Dampier State Forest on 10 and 11 July 2017. The dark green is the current mapped layer of ridge and headwater habitat, while the light green is the boundary as mapped by Forestry Corporation of NSW (adjusted using LIDAR technology).

AUDIT FINDINGS - OVERVIEW

A summary of EPAs findings are shown in the table below.

IFOA condition	Non-compliances	Compliances	Not Determined
5.1E TSL - Marking-up of ridge and headwater habitat	1	0	0
5.6(b)(i) TSL – retention of H trees	0	1	0
5.6(c)(i) TSL – retention of R trees	0	1	0
5.6(h)(iii) TSL – mark-up of trees for retention	0	1	0
5.6(a)(i) and 5.6(b)(ii) TSL – selection of H trees	1	18	0
5.6(a)(ii) and 5.6(c)(ii) TSL – selection of R trees	2	17	0
5.6(h) TSL – protection of retained trees	7	23	0
Part 5(11) IFOA - Basal Area	0	0	1
5.8(g) – 5.8(l) TSL – protection of ridge and headwater habitat	2	0	0
TOTAL	13	61	1

AUDIT RECOMMENDATIONS

Action Details	Non-compliance Code*	Target/Action Date
5.1E Marking-up of environmentally sensitive areas (ridge & headwater habitat) The boundaries of ridge and headwater areas are mapped as an official layer. No amendments to this layer are allowed without EPA approval. FCNSW have marked an incorrect boundary of ridge & headwater in Dampier SF, after making an unauthorised amendment to the ridge & headwater mapped layer.	This non-compliance has an orange risk category. The likelihood of environment harm is likely, and the level of environmental impact is moderate.	The EPA is seeking a formal submission regarding the amendment of ridge and headwater boundaries, within 4 weeks of this audit report.

Action Details	Non-compliance Code*	Target/Action Date
5.6(h) Protection of retained trees The EPA notes that the issue is recurring and any actions taken have not been sufficient. FCNSW must take more active measures to (1) educate its contractors about the need to protect retained trees; (2) supervise logging operations more vigorously to ensure compliance; (3) improve systems processes and undertake any other changes necessary to address the problem of tree protection.	This non-compliance has an orange risk category. The likelihood of environment harm is likely, because large amounts of debris predispose trees to fire damage during future hazard reduction burning. The level of environmental impact is moderate, based on the number of breaches recorded.	Action on this issue must start immediately and must continue until the EPA is satisfied that there is no further risk of non-compliance.

AUDIT FINDINGS - FIELD COMPONENT

1. Tree Retention / Mark-up in non regrowth zone

Condition No.	Compliant? Yes/No/Not determined/Not applicable	Number of non- compliances / total (total = 1 possible compliance for each condition)	Area assessed	Risk Code	Action required by licensee
TSL 5.6(b)(i) (retention of H trees)	Compliant	0/1	5.9ha (3 separate meanders)	N/A	N/A
TSL 5.6(c)(i) (retention of R trees)	Compliant	0/1		N/A	N/A
TSL 5.6(h)(iii) (tree mark-up)	Compliant	0/1		N/A	N/A

Comment and Evidence

The EPA found that FCNSW was **compliant** with the above conditions in any of the areas assessed. There were sufficient numbers of trees marked as hollow-bearing (H) and recruitment (R) trees to satisfy the conditions of the Southern Region TSL listed above.

Initial data assessed by the EPA indicated that there was a non compliance, but further follow up following FCNSW submissions highlighted compliant findings.

FCNSW submission to draft audit report

The harvested area figure estimated by EPA of 100 hectares is incorrect. Using machine tracking data, FCNSW estimate that the actual harvested area in compartment 3109 was 42.8 hectares.

Therefore the retention rate of H trees was $357 \div 42.8 = 8.3/\text{ha}$. This is well in excess of the 5/ha trees required by the TSL for the non-regrowth zone.

Initial findings from the EPA:

1. data provided by FCNSW, showing all of the marked H and R trees in the compartment. The data shows 357 H trees and 350 R trees were retained inside a 100ha area (the EPA estimated this area based on the operational map that FCNSW provided following harvesting. The actual, available net harvest area was larger).
2. EPA field assessment, consisting of three separate meander surveys within the harvested areas (see chart below). The total area surveyed was 5.9 hectares. Within this area, the EPA counted eleven (11) marked H trees and twelve (12) marked R trees.

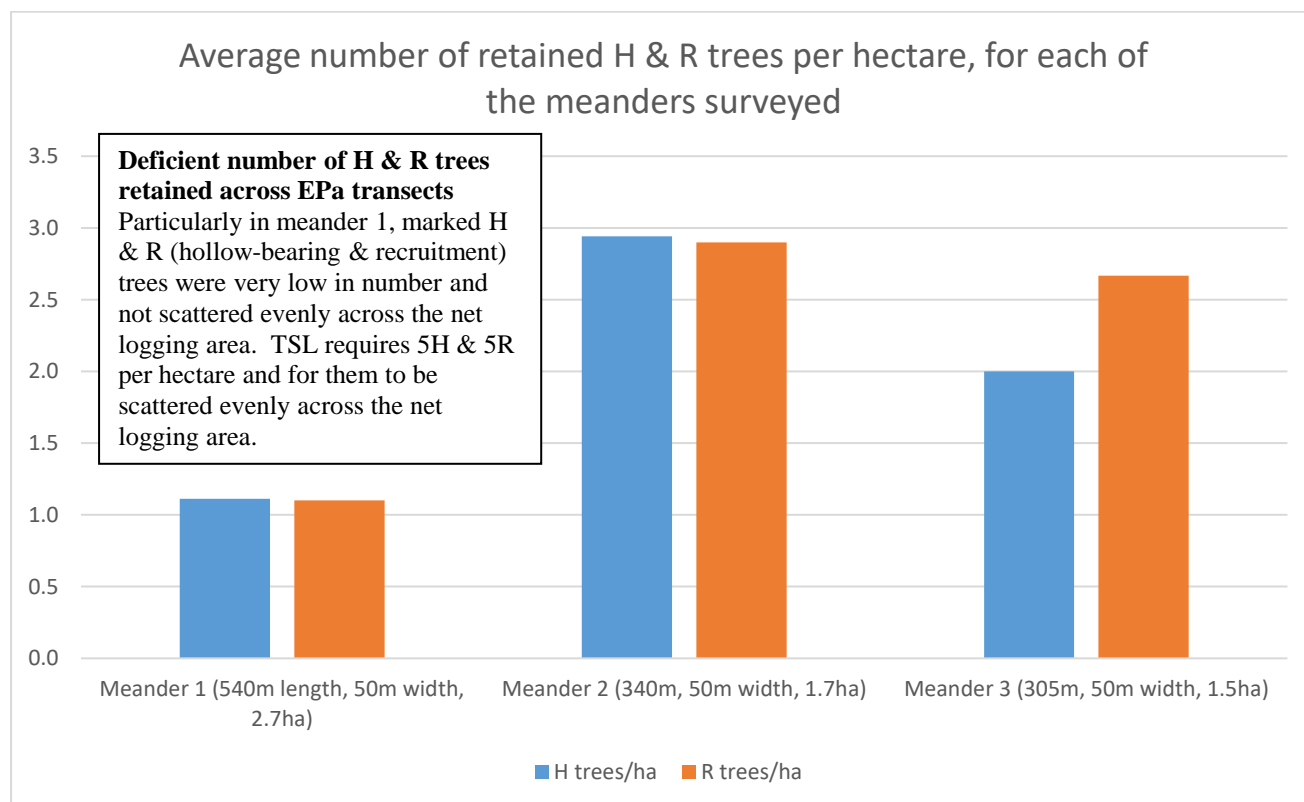
FCNSW data: The rate of retention based on the theoretical FCNSW desktop data was 3.5 H trees and 3.5 R trees per hectare, which is below the required 5 H trees and 5 R trees per hectare.

EPA data and findings: Across the 5.9ha that EPA auditors assessed in the field, at least 29 H trees and 29 R trees should have been selected and marked for retention. Instead, only 19 H trees and 11 R trees were selected and marked in the field. The relevant rate of retention in this area was:

Retention rate (H trees): **3.2 trees per hectare**
 Retention rate (R trees): **1.8 trees per hectare**

How the EPA calculates non-compliances for tree retention

The EPA assesses retention rates across the whole of the harvested area to determine compliance. This is in line with the TSL condition which requires a rate of retention per hectare (in other words, averaged over the available logging area). The total available number of compliances is therefore one (1) for the whole of the compartment.



2. Hollow-bearing Trees: Selection

Condition No.	Compliant? Yes/No/Not determined/Not applicable	Number of non- compliances / total (total = number of marked H trees assessed)	Risk Code	Action required by licensee
TSL 5.6(a)(i) and (b)(ii) (selection of H trees)	Not - Compliant	1/ 19	Yellow	N/A

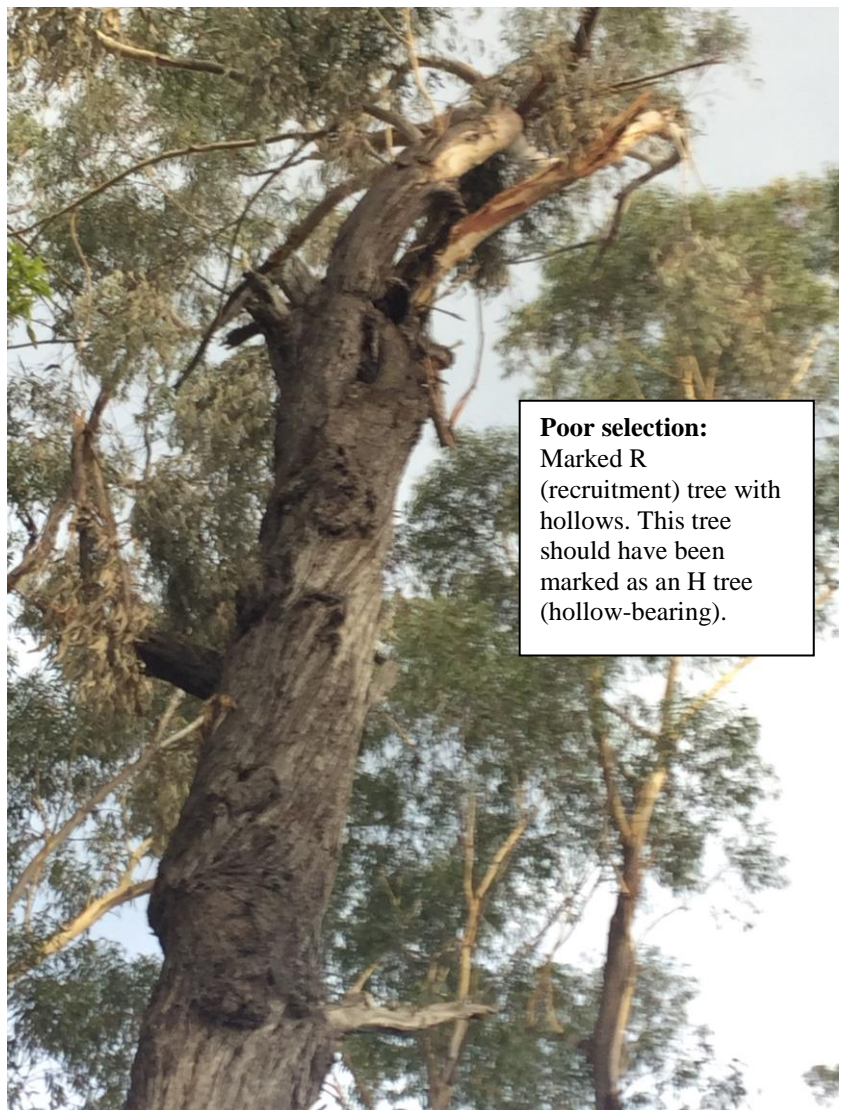
Comment and Evidence

The EPA found that FCNSW was **not compliant** with the above conditions in all areas assessed. This finding is based on the assessment of nineteen (19) marked hollow-bearing trees ("H trees").

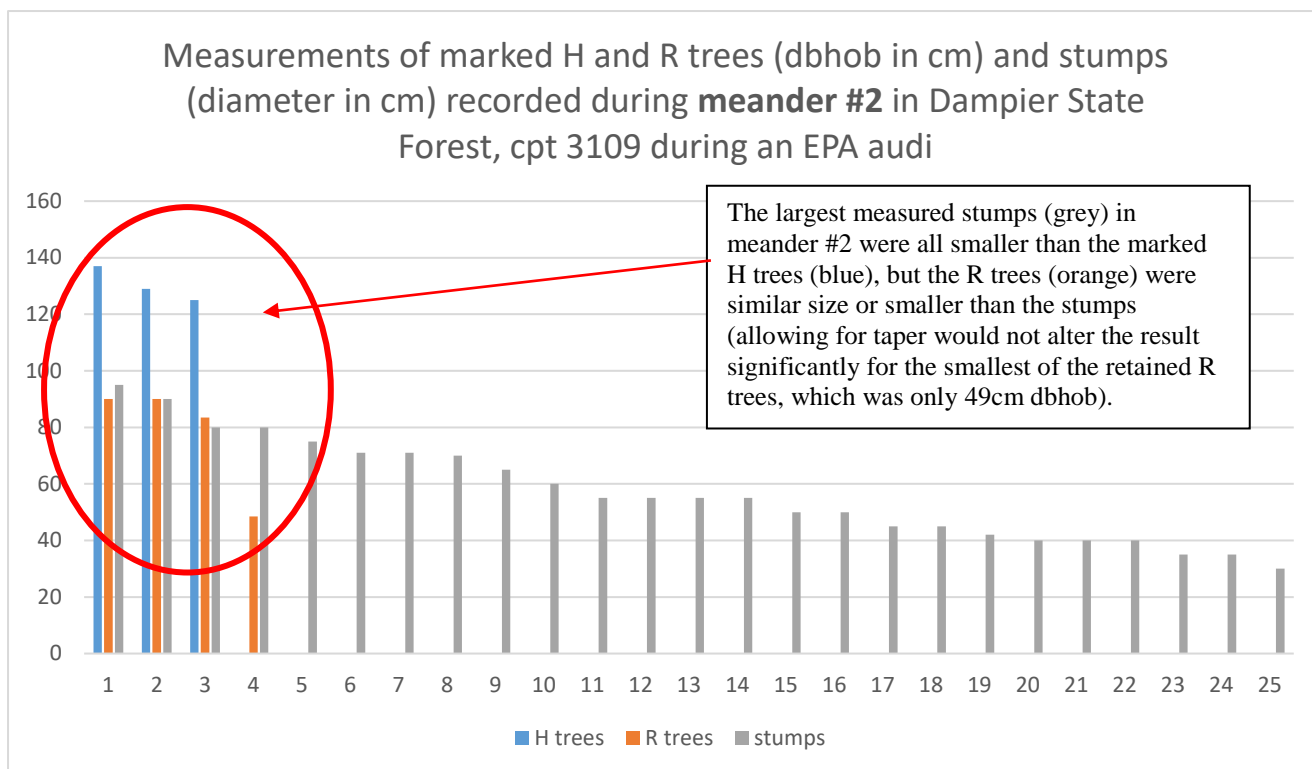
The EPA also recorded one marked R tree with clear visible hollows. This should have been marked as a H not an R. There were only five marked "H" trees with hollows. However, the EPA did not record a non-compliance against trees without hollows, because the logging area is in a non-regrowth zone where non-hollow bearing trees may have to be marked as "H" to satisfy the TSL requirements for retention (see attachment at the end of this report).

For the purposes of this audit the EPA recorded a total of one non compliance hollow-bearing tree marked as "R" instead of "H".

This non-compliance has a red risk category. The likelihood of environment harm is certain, because of the scarcity of resources in Dampier SF. The scale of harm is moderate, based on the number of trees affected.

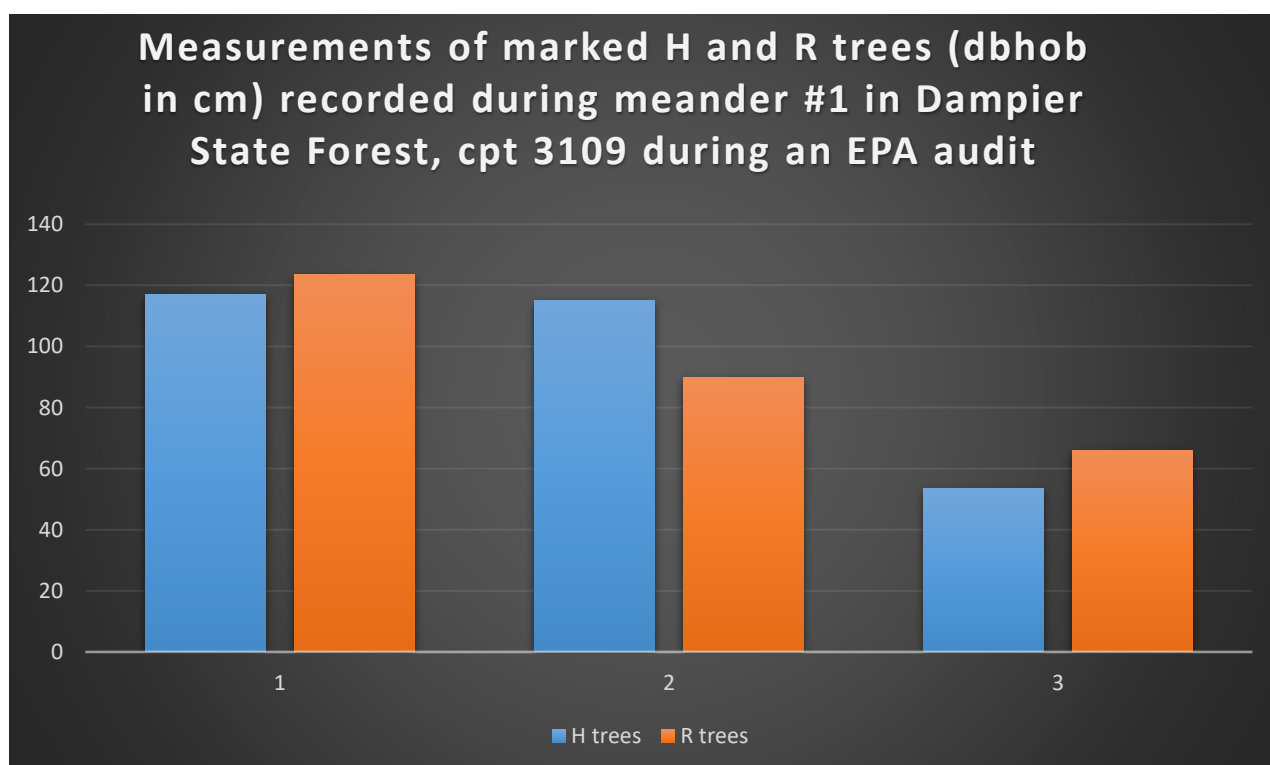


Poor selection:
Marked R
(recruitment) tree with
hollows. This tree
should have been
marked as an H tree
(hollow-bearing).

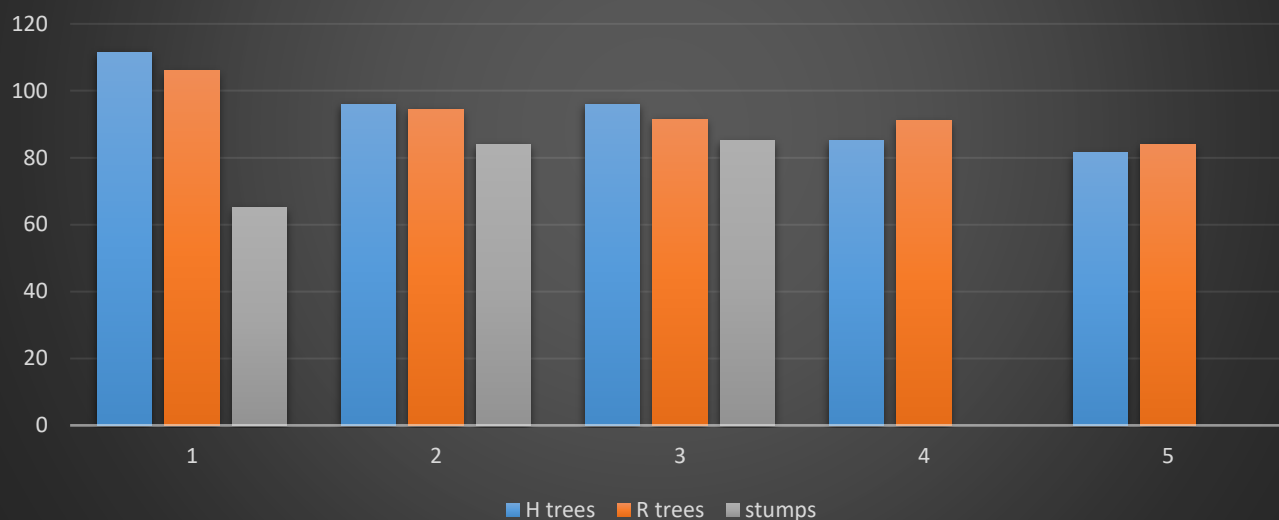


How the EPA calculates non-compliances for tree selection

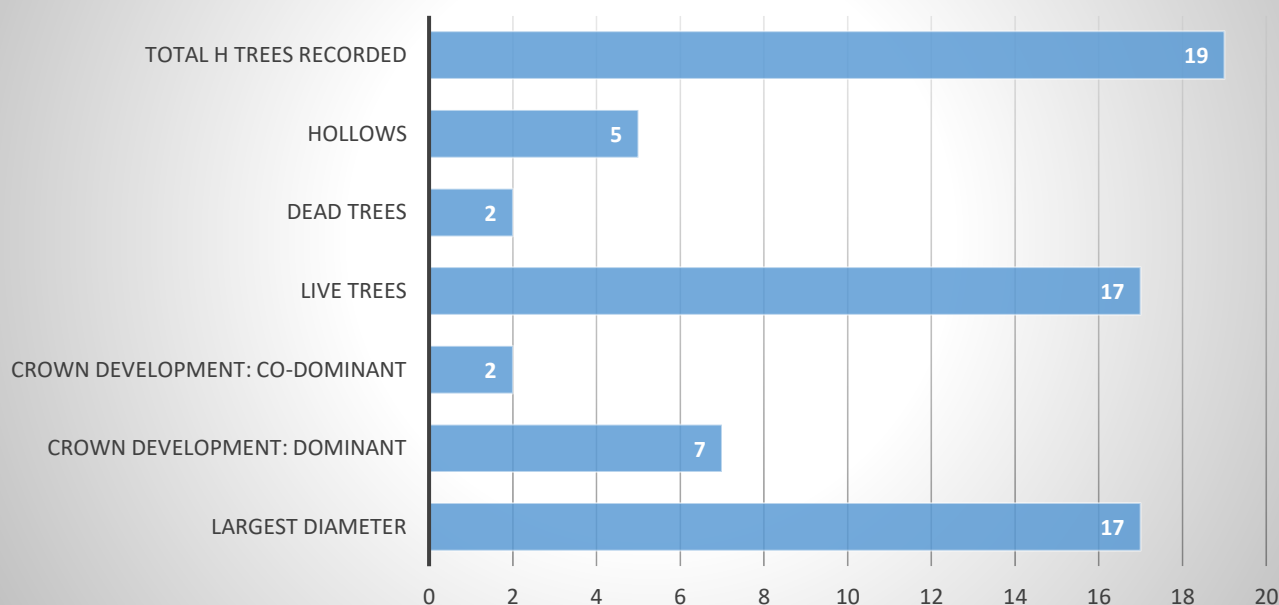
When assessing trees for selection criteria, the EPA records a separate finding of compliance / non-compliance for each tree assessed. This is in line with the TSL conditions that refer to individual trees.



Measurements of marked H and R trees (dbhob in cm) and stumps (diameter in cm) recorded during meander #3 in Dampier State Forest, cpt 3109 during an EPA audit



Count of retained H trees displaying the characteristics listed in the TSL



3. Recruitment Trees: Selection

Condition No.	Compliant? Yes/No/Not determined/Not applicable	Number of non- compliances / total (total = number of marked R trees assessed)	Risk Code	Action required by licensee
TSL 5.6(a)(ii) and (c)(ii) (selection of R trees)	Not Compliant	2 / 19	Yellow	Review of procedures required

Comment and Evidence

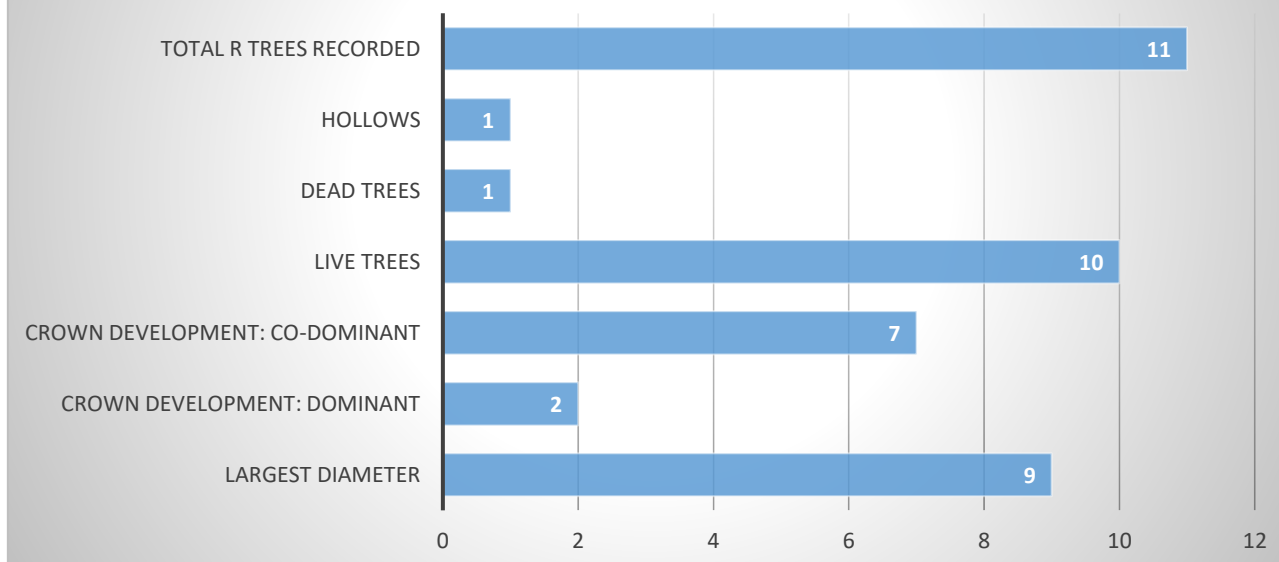
The EPA found that FCNSW was **not compliant** with the above conditions in the areas assessed. The EPA recorded a total of eleven (11) marked R trees. One of the marked trees was dead at the time of the audit. Another had obvious hollows and should have been marked as an H tree. The EPA recorded a total of two **(2) non-compliances** in relation to the quality of the selection of these marked R trees.

How the EPA calculates non-compliances for tree selection

When assessing trees for selection criteria, the EPA records a separate finding of compliance / non-compliance for each tree assessed. Additional non-compliances are recorded in relation to candidate trees that should have been marked for retention. This is in line with the TSL conditions that refer to individual trees (see attachment at the end of this report).



Count of R trees displaying the characteristics listed in the TSL (note: R trees should not have obvious hollows)



Why is it important?

The EPA considers it important that the required quantity **and quality** of recruitment trees are retained. Retention of recruitment trees – being the largest trees with the greatest potential to develop hollows, as stipulated in the TSL – is an important aspect of Ecologically Sustainable Forestry Management (ESFM). In a regrowth zone in particular, the principal aim of ESFM is to maintain an adequate level of forest structure and form, so as to ensure biodiversity values are maintained.



4. Protection of Retained Trees

Condition No.	Compliant? Yes/No/Not determined/Not applicable	Number of non- compliances / total (total = number of marked trees assessed)	Risk Code	Action required by licensee
TSL 5.6(h) (protection of marked and retained trees)	Not Compliant	7 / 30	Orange	Systematic change needed

Comment and Evidence

The EPA found that FCNSW was **not compliant** with the above conditions in all areas assessed. As seen from the pie chart below, the EPA recorded two instances of operator crown damage to marked trees, resulting in the death of the tree (one hollow-bearing and one recruitment), four instances of debris >1m within 5m (directly against the trees), and eight instances of soil disturbance within 5m.

In total, the EPA made a finding of six (6) non-compliances relating to protection of retained trees in the compartment. These non-compliances are of high environmental risk (orange risk code). The likelihood of environment harm is likely, because large amounts of debris predispose trees to fire damage during future hazard reduction burning. The level of environmental impact is moderate, based on the number of breaches recorded.

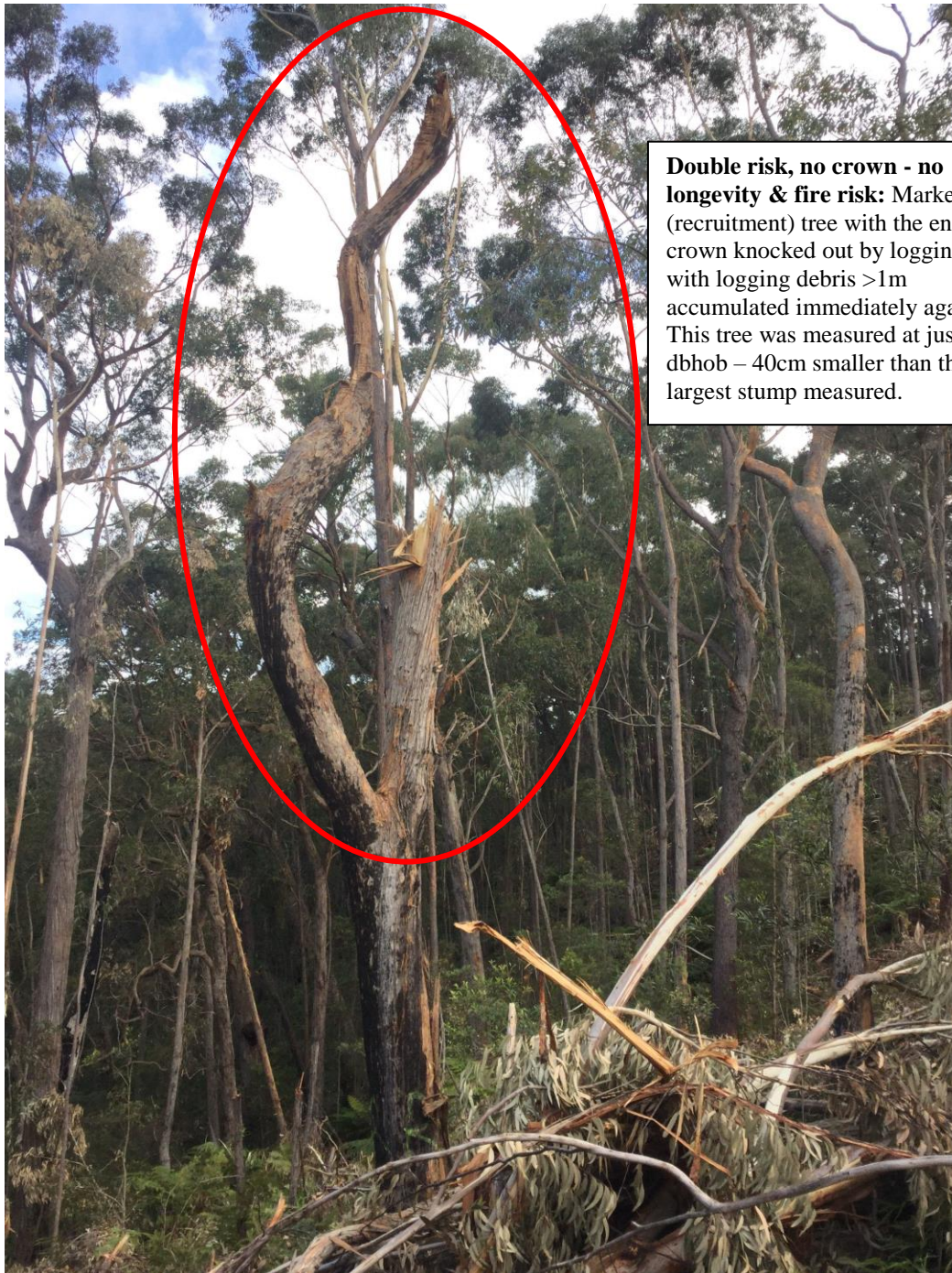
	Crown damage (operator)	Debris >1m within 5m	Used as a bumper	Soil disturbance within 5m	No damage, debris or disturbance	Total
H trees	2	2	0	4	11	19
R trees	1	2	0	4	4	11



Significant fire risk:
Marked H (hollow-bearing) tree with logging debris >1m accumulated directly against it.



Note: the above finding does not include ground disturbance in the form of snig tracks (**8 in total**), because the snig tracks could have existed prior to harvesting. The EPA notes, however, that the percentage of retained trees affected by ground disturbance is quite high (see pie charts on the next page). Accordingly, harvesting contractors should take care when constructing new snig tracks. Efforts should focus on ensuring that tracks are constructed at least 5m away from marked trees.



Double risk, no crown - no longevity & fire risk: Marked R (recruitment) tree with the entire crown knocked out by logging and with logging debris >1m accumulated immediately against it. This tree was measured at just 49cm dbhob – 40cm smaller than the largest stump measured.



Photo of H tree that is no longer alive with a missing crown. EPA Placemark 2.

How the EPA calculates non-compliances for tree protection

When assessing trees for selection criteria, the EPA records a separate finding of compliance / non-compliance for each tree assessed. This is in line with the TSL condition which requires that every retained tree is adequately protected from the effects of logging.

Why is it important?

The EPA considers it important that hollow-bearing and recruitment are adequately protected from both logging operations and post-logging risks, such as hazard reduction burns and wild fires. Excessive logging debris in the immediate proximity of hollow-bearing or recruitment trees increases the risk of damage to the retained trees – or tree death if the fire is very hot – in the occurrence of a fire. This has a flow on effect on the long-term availability of hollow-bearing and recruitment resources as key forestry structural values.

5. Ridge and Headwater Habitat

Condition No.	Compliant? Yes/No/Not determined/Not applicable	Number of non- compliances / total (total = 1 possible compliance for each condition)	Area assessed	Risk Code	Action required by licensee
TSL 5.8(g) (amendment to the location of ridge and headwater habitat)	Not compliant	1	Single 100m transect (snig track)	Orange	Notify the EPA regarding all amendments to ridge and headwater boundaries, immediately.
TSL 5.8(h) – (l) (protection of ridge and headwater habitat)	Not Compliant	1		Orange	As above.
TSL 5.1E (marking-up of exclusion zones)	Not Compliant	1		Orange	As above.

Comment and Evidence

The EPA found that FCNSW was **not compliant** with the above conditions in all areas assessed.

During the field audit, the EPA assessed a ridge and headwater boundary near log dump 3 (**Map 3** at the start of this report). The EPA recorded the extent of a snig track near log dump 3, using a GPS Garmin. The snig track runs inside a mapped ridge and headwater boundary. The harvest plan operational map produced by FCNSW shows a different boundary for the ridge and headwater. However, to date the EPA has received no notification regarding such an amendment, and no justification for the amendment, contrary to condition 5.8(g) of the Southern Region TSL. The TSL states “Amendment to the location of Ridge and Headwater Habitat exclusion zones may not be made unless approved by EPA”.

A single non-compliance was recorded in relation to this breach, for each of the relevant TSL conditions.

How the EPA calculates non-compliances in relation to ridge and headwater exclusion zones

The EPA records a single finding of compliance in relation to each continuous (un-interrupted) segment of boundary assessed, where no breaches are recorded. The length of a segment may vary depending on the size of the exclusion, location within logging area, topography and accessibility. Multiple segments may be assessed along the boundary of a single ridge and headwater exclusion zone. For instance, EPA officers may walk away from the boundary in order to assess other areas nearby, and then return to assess another section of the rainforest boundary.

For each breach of the exclusion zone boundary the EPA records a single non-compliance. In other words, there can be multiple non-compliances associated with a single segment of boundary.

6. Basal Area Retention

Condition No.	Compliant? Yes/No/Not determined/Not applicable	Number of non- compliances / total (total = number of plots)	Risk Code	Action required by licensee
IFOA Southern Region, part 5(11)D (Single Tree Selection)	Not determined	0 / 6	Not applicable	Not applicable

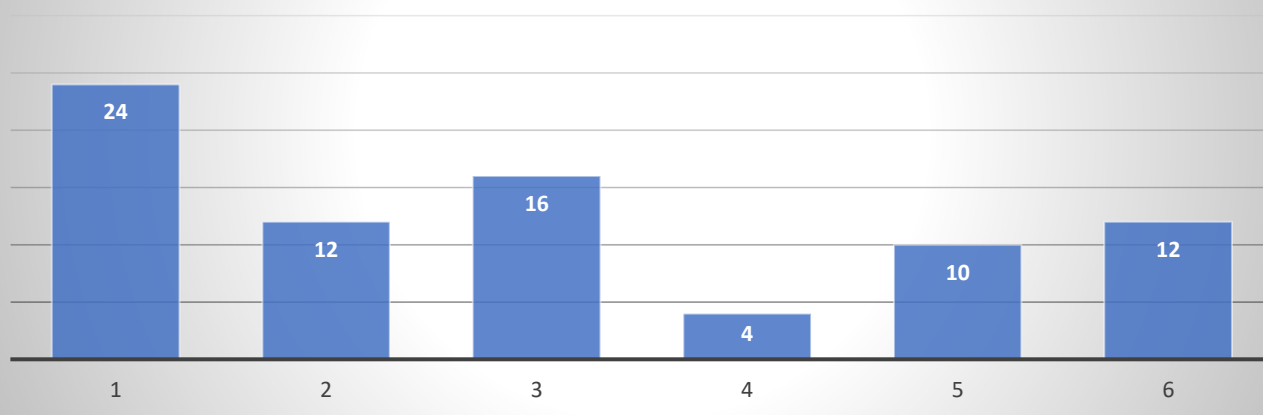
Comment and Evidence

Basal area measurements taken by FCNSW prior to harvesting are provided on p.6 of the harvesting plan. The measurements show the average basal area prior to harvesting in compartment 3109 was 28.1m²/ha. Under the relevant IFOA conditions (see attachment at the end of this report), a maximum basal area of 12.6m²/ha could be removed, leaving a minimum (average) basal area of 15.4m²/ha.

As shown in the diagram below, in one location the EPA recorded a basal area of just 4m²/ha, well below 10m²/ha. The average basal area recorded in logged areas was 13m²/ha, exceeding the maximum removal rate and of 15.4m²/ha required by the IFOA.

Owing to the small size of the sample, no actual finding could be made in relation to basal area. The EPA notes, however, that large tracts of net harvest area were excluded from logging. Taking this into account, it is likely that the overall average was higher than that recorded, and likely to satisfy the relevant conditions of the IFOA.

Basal Areas (m²/ha) recorded in six different locations at Dampier State Forest (post logging)



How the EPA calculates non-compliances in relation to basal area

The EPA make a single compliance / non-compliance finding in relation to Basal Area retention, for each net logging area. This is in line with the relevant IFOA conditions, which relate to the net harvest area as a whole. Where a sufficiently large sample can be obtained, the measurements can be averaged and compared to pre-harvest measurements provided by FCNSW. This enables a finding to be made.

Where the sample size is too small, such that it excludes large tracts of land that ought to be included in the assessment, the EPA makes a finding of “not determined”.



A logged area with a very low retained basal area: Although large tracts of compartment 1309 were excluded from logging due to low timber volumes, other parts were logged intensively – resulting in basal area removal greater than the IFOA guidelines.

RISK ASSESSMENT OF NON-COMPLIANCE

The significance of any non-compliances identified during the audit process are categorised. Following risk assessment of non-compliances, an escalating response relative to the seriousness of the non-compliance is determined to ensure the non-compliance is addressed by the enterprise.

The risk assessment of non-compliances involves assessment of the non-compliance against two criteria; the likelihood of environmental harm occurring and the level of environmental impact as a result of the non-compliance. After these assessments have been made, information is transferred into the risk analysis matrix below.

	Likelihood of Environmental Harm Occurring			
Level of Environmental Impact		Certain	Likely	Less Likely
	High	Code Red	Code Red	Code Orange
	Moderate	Code Red	Code Orange	Code Yellow
	Low	Code Orange	Code Yellow	Code Yellow

The assessment of the likelihood of environmental harm occurring and the level of environmental impact allows for the risk assessment of the non-compliance via a colour coding system. A red risk assessment for non-compliance denotes that the non-compliance is of considerable environmental significance and therefore must be dealt with as a matter of priority. An orange risk assessment for non-compliance is still a significant risk of harm to the environment however can be given a lower priority than a red risk assessment. A yellow risk assessment for non-compliance indicates that the non-compliance could receive a lower priority but must be addressed.

There are also a number of licence conditions that do not have a direct environmental significance, but are still important to the integrity of the regulatory system. These conditions relate to administrative, monitoring and reporting requirements. Non-compliance of these conditions is given a blue colour code.

The colour code is used as the basis for deciding on the priority of remedial action required by the licensee and the timeframe within which the non-compliance needs to be addressed. This information is presented in the action program alongside the target/action date for the noncompliance to be addressed.

While the risk assessment of non-compliances is used to prioritise actions to be taken, the EPA considers all non-compliances are important and licensees must ensure that all non-compliances are addressed as soon as possible.

RELEVANT LICENCE PROVISIONS

Tree Retention / Mark-up

This part of the audit focused on retention of hollow-bearing trees (H trees), recruitment trees (R trees), feed trees and any other trees that must be retained under the relevant IFOA / TSL conditions. Only marked trees are considered by the EPA when assessing retention rates in logged areas. Accordingly, where insufficient numbers of trees have been retained, this results in a non-compliance for tree mark-up.

Compartment 3109 Dampier State Forest is located within a **non-regrowth zone** as defined in the IFOA. For the purposes of this audit, the following requirements apply:

- **At least five hollow-bearing trees must be retained** per hectare of net logging area. Where this density is not available, the existing hollow-bearing trees must be retained **plus additional trees** must be retained as hollow-bearing trees, to meet the required rate (Condition 5.6(b)(i) of the Southern Region TSL);
- **A minimum of five recruitment trees** must be retained per hectare of net logging area. (Condition 5.6(c)(i) of the TSL);
- Retained H and R trees **must be marked** for retention (Condition 5.6(h)(iii) of the TSL).

Hollow-bearing trees: selection

This part of the audit focused on selection of hollow-bearing trees (H trees) that must be retained under [Conditions 5.6\(a\) and 5.6\(b\)\(ii\) – \(iii\) of the Southern Region TSL](#). For the purposes of this audit, the following requirements apply:

- “Hollow-bearing tree” means a live tree in the net logging area where the base, trunk or limbs contain hollows, holes and cavities that have formed as a result of decay, injury or other damage. Such hollows may not be visible from the ground; but may be apparent from the presence of deformities such as burls, protuberances or broken limbs, or where it is apparent the head of the tree has been lost or broken off (Condition 5.6(a)(i));
- In selecting hollow-bearing trees, priority must be given to those trees which exhibit evidence of occupancy by hollow dependent fauna and trees which contain multiple hollows or hollows of various sizes (Condition 5.6(b)(ii));
- Hollow-bearing trees must have as many of the following characteristics as possible:
 - Belonging to a cohort of trees with the largest dbhob
 - Good crown development
 - Minimal butt damage
 - Represent the range of hollow-bearing species that occur in the area
 - Located such that they result in retained trees being evenly scattered throughout the net logging area (Condition 5.6(b)(iii)).

Recruitment trees: selection

This part of the audit focused on selection of recruitment trees (R trees) that must be retained under [Conditions 5.6\(a\)\(ii\) and 5.6\(c\)\(ii\) of the Southern Region TSL](#). For the purposes of this audit, the following requirements apply:

- The TSL defines a Recruitment tree as “a live tree of a mature or late mature growth stage within the net logging area that is not suppressed prior to harvesting and has **good potential for hollow development** and long term survival.” (Condition 5.6(a)(ii)). This definition implies that recruitment trees should not have hollows, merely the potential for hollows;
- Recruitment trees must have as many of the following characteristics as possible:
 - Belonging to a cohort of trees with the largest dbhob
 - Good crown development
 - Minimal butt damage
 - Represent the range of hollow-bearing species that occur in the area
 - Located such that they result in retained trees being evenly scattered throughout the net logging area (Condition 5.6(c)(ii)).

Protection of retained trees

This part of the audit focuses on protection of hollow-bearing trees (H trees) and recruitment trees (R trees) that have been marked for retention. [Condition 5.6\(h\) of the Southern Region Threatened Species](#) Licence (TSL) requires damage to trees to be minimised using directional felling. Further to this:

- Debris must not be accumulated higher than 1m within 5m radius of the retained trees,
- Mechanical disturbance to ground and understorey must be minimised to the greatest extent practicable within this five metre radius, and
- Retained trees must not be used as bumper trees during harvesting.

Ridge and Headwater Habitat

This part of the audited focuses on the marking-up and protection of ridge and headwater habitat areas ([Condition 5.8](#) of the Upper North East TSL). The TSL sets out the precise conditions regarding the location of ridge and headwater habitat (Condition 5.8a – g). Relevantly, condition 5.8(g) provides:

g) Amendment to the location of Ridge and Headwater Habitat exclusion zones may not be made unless approved by EPA. When applying for an amendment, FCNSW must provide reasons for the proposed amendment and options considered and must address the following matters:

- i. the continuity with exclusion zones applied in any preceding logging operations;
- ii. the habitat values and forest types of areas linked by the proposed exclusion zones compared to those previously in place;
- iii. the tenure of the land linked by the proposed exclusion zones compared to those previously in place; and
- iv. the landuse of areas linked by the proposed exclusion zones compared to those previously in place.

During the field audit, EPA officers assess conditions 5.8(h) – (l), which provide as follows:

- h) The felling of trees across the boundary of a Ridge and Headwater Habitat exclusion zone is prohibited except where no more than six (6) trees containing timber logs are felled across the boundary in any 200 metre length of the boundary of the Ridge and Headwater Habitat exclusion zone.

- i) Condition 5.8 (h) is not breached where a tree is accidentally felled into a Ridge and Headwater Habitat exclusion zone.
- j) A tree that is accidentally felled into a Ridge and Headwater Habitat exclusion zone may be removed from the zone, but only if the tree contains a timber log.
- k) A tree that is felled into a Ridge and Headwater Habitat exclusion zone may be removed only in accordance with the following rules:
 - the crown must be cut off from the trunk and left where it has fallen, except where the whole of the tree is lifted out of, or lifted and moved within, the zone using a mechanical harvester; and
 - in removing the tree (or any logs into which it is cut), any disturbance to the ground and soil must be minimised as far as practicable.
- l) Except as provided by conditions 5.1 and 5.8 (h)-(k), specified forestry activities *other than road construction and road re-opening where there is no other practical means of access*, are prohibited in these exclusion zones.

Note that the above conditions do not permit the construction of snig tracks through ridge and headwater habitat.

Basal Area Retention

This part of the audit focuses on the retention of basal area and general compliance with the silvicultural prescriptions for Single Tree Selection. The Southern Region IFOA defines Single Tree Selection (STS) in part 5(11) D. Under the IFOA, the silvicultural practice of STS contains the following elements:

- in the South Coast Sub-Region, trees are selected for logging or culling with the objective of ensuring that the sum of the basal areas of trees removed or destroyed comprises **no more than 45% of the sum of the basal areas** of all trees existing immediately prior to logging or culling within the net harvestable area of the tract, and
- the sum of the basal areas of trees remaining after logging or culling as a proportion of the net harvestable area of the tract existing immediately prior to logging or culling is **at least 10m² per hectare**.

The document “Implementation of IFOA Silviculture in the Southern Forest Agreement Region: Operational Guidelines for Harvesting” provides further guidance for forest workers in the correct implementation of STS.

AUDITEE SUBMISSIONS – DAMPIER STATE FOREST, COMPARTMENT 3109

Condition / Audit finding reference / page No.	EPA draft finding / risk category	Location – description GPS	FCNSW evidence submission	EPA final finding / risk category	EPA response to FCNSW submission
TSL 5.6(b)(i)	Retention of H trees / RED	Transects shown on Map at the front of the audit report / p.7 of the report	<p>The harvested area figure estimated by EPA of 100 hectares is incorrect. Using machine tracking data, FCNSW estimate that the actual harvested area in compartment 3109 was 42.8 hectares.</p> <p>Therefore the retention rate of H trees was $357 \div 42.8 = 8.3/\text{ha}$. This is well in excess of the 5/ha trees required by the TSL for the non-regrowth zone.</p> <p>FCNSW request that the EPA review this finding and amend the final audit report accordingly.</p> <p>FCNSW was unable to investigate the results of the 3 meanders fully because location details were not provided. In the future, is EPA able to provide accurate shapefiles of the meanders and details of the methodology used? From the shapefiles provided (i.e. p.7 of the report) it is unclear which lines represent the actual meander. The provision of this information would allow FCNSW to properly investigate any alleged breaches and rectify any issues.</p>	Compliant	The EPA accepts the FCNSW submission. The EPA has further reviewed the mapping of retained trees and logging machinery tracks. The EPA considers it is acceptable that retained trees are marked and retained within and surrounding the actual harvested area. Accordingly, the EPA has changed it compliance finding.
TSL 5.6(c)(i)	Retention of R trees / RED	Transects shown on Maps at the front of the audit report / p.7 of the report	<p>The harvested area figure estimated by EPA of 100 hectares is incorrect. Using machine tracking data, FCNSW estimate that the actual harvested area in compartment 3109 was 42.8 hectares.</p> <p>Therefore the retention rate of R trees was $350 \div 42.8 = 8.2/\text{ha}$. This is well in excess of the 5/ha trees required by the TSL for the non-regrowth zone.</p>	Compliant	The EPA accepts the FCNSW submission. The EPA has further reviewed the mapping of retained trees and logging machinery tracks. The EPA considers it is acceptable that retained trees are marked and retained within and surrounding the actual harvested area. Accordingly, the EPA has changed it compliance finding.

			<p>FCNSW request that the EPA review this finding and amend the final audit report accordingly.</p> <p>FCNSW was unable to investigate the results of the 3 meanders fully because location details were not provided. In the future, is EPA able to provide accurate shapefiles of the meanders and details of the methodology used? From the shapefiles provided (i.e. p.7 of the report) it is unclear which lines represent the actual meander. The provision of this information would allow FCNSW to properly investigate any alleged breaches and rectify any issues.</p>		
TSL 5.6(h)(iii)	Marking-up of trees for retention / RED	All of net harvest areas (trees <u>not</u> marked)	<p>The harvested area figure estimated by EPA of 100 hectares is incorrect. Using machine tracking data, FCNSW estimate that the actual harvested area in compartment 3109 was 42.8 hectares.</p> <p>Therefore the retention rate of H trees was $357 \div 42.8 = 8.3/\text{ha}$. This is well in excess of the 5/ha trees required by the TSL for the non-regrowth zone.</p> <p>The retention rate of R trees was $350 \div 42.8 = 8.2/\text{ha}$. This is well in excess of the 5/ha trees required by the TSL for the non-regrowth zone.</p> <p>FCNSW request that the EPA review this finding and amend the final audit report accordingly.</p>	Compliant	The EPA accepts the FCNSW submission. The EPA has further reviewed the mapping of retained trees and logging machinery tracks. The EPA considers it is acceptable that retained trees are marked and retained within and surrounding the actual harvested area. Accordingly, the EPA has changed its compliance finding.
TSL 5.6(a)(i) and (b)(ii)	Selection of H trees / ORANGE	See attached data tables / p.9 of the report	<p>On the 18th of May 2018 FCNSW visited compartment 3109 to investigate the alleged breaches referred to in the draft audit report.</p> <p>The EPA recorded 2 dead trees marked as H trees. FCNSW found 1 of these trees (placemark 2). It was significantly damaged during harvesting, however now has many green epicormics and certainly is not dead. No location information for the 2nd dead tree was included in the audit report. FCNSW request that EPA review their</p>	Not - Compliant Yellow	<p>The EPA has amended its final report. One of the crown damaged H trees has been removed from this section and added to section TSL 5.6(h) protection conditions.</p> <p>The EPA has also reviewed the tree retention analysis. The review identified that FCNSW have achieved compliance with its selection of H trees, including when compared against stumps. Meander 2 highlighted that H trees were significantly larger than stumps.</p> <p>The EPA has retained one non-compliance for marking and selecting a tree as an "R" tree when it had clear</p>

			<p>findings regarding these 2 trees and amend the final report accordingly.</p> <p>The EPA recorded 2 marked H trees as belonging to a “smaller size cohort”, however the audit report does not identify which 2 trees. Unfortunately FCNSW was unable to investigate this properly in the field and are unable to provide comment.</p> <p>Page 10 of the draft audit report suggests that FCNSW is “Logging big trees and retaining small”. However after reviewing data provided by EPA on 14th of May 2018 FCNSW note that the average DBHOB of retained H trees was 104.2cm and the average DBHOB of retained R trees was 88.2cm. The compares with an average STUMP diameter of 59.6cm for all measured harvested trees. This indicates that the retained trees have been selected from a cohort of trees with the largest DBHOB.</p> <p>We have to remember conditions 5.6(b)/(c) do not necessarily require FCNSW to retain the largest trees in a given area. Retained H and R trees must belong “to a cohort of trees with the largest DBHOB”. Different age cohorts will have a range of diametres and often the life history of a smaller tree will be more conducive to the development of hollows that a larger tree.</p> <p>The audit report also refers to 1 hollow-bearing tree marked as an R instead of a H (placemark 31). This non-compliance is recorded twice in the report under both section 2: Hollow-bearing Trees: Selection and section 3: Recruitment Trees: Selection. FCNSW agrees that this tree should have been marked as a H, however do not believe that it should be recorded as 2 separate non-compliances in the audit report. FCNSW request that it be removed from section 2, but retained in section 3 because it relates to a tree that was selected as a recruitment tree.</p>		<p>hollows. This tree should have bene selected as a “H” tree.</p>
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TSL 5.6(a)(ii) and (c)(ii)	Selection of R trees / ORANGE	See attached data tables / p.13 of the report	<p>The draft audit report identifies 2 non-compliances relating to the quality of selected R trees. The first is a marked R tree with obvious hollows (placemark 31). FCNSW agrees with this claim. The second is a dead tree marked as an R (placemark 14). During an inspection on the 18th of May 2018, FCNSW noted that this tree was significantly damaged during harvesting, but was certainly not dead. Fresh green leaves were observed on the branches. FCNSW request that this non-compliance be removed from the final report.</p> <p>The draft report also records 8 non-compliances relating to a shortfall of R:H trees identified during the 3 meanders. It is not appropriate to assess retention rates at a plot level when data is readily available for the entire compartment. Actual retention rates were 8.3 H trees per hectare and 8.2 R trees per hectare. This shows that we have retained extra R trees beyond the TSL requirements.</p> <p>These 8 non-compliances should be removed from the final audit report.</p>	Not compliant Yellow	<p>The EPA has amended is final report. One of the crown damaged R trees (dead on inspection) has been removed from this section and added to section TSL 5.6(h) protection conditions.</p> <p>The EPA upholds one non-compliance for marking and selecting a tree as an “R” tree when it had clear hollows. This tree should have been selected as a “H” tree. We note FCNSW agrees with this finding.</p> <p>The EPA accepts FCNSW submissions for the assessment of retention of R trees, which influence selection. The EPA has amended the findings and removed the eight non compliances for this section.</p>
TSL 5.6(h)	Protection of retained trees / ORANGE	See attached data tables / p.15 of the report	<p>Section 4 of the draft audit report identifies 11 retained trees that were inadequately protected during harvesting, however the accompanying tracking sheet only includes 7 of these trees. FCNSW queried this and the response from EPA was that this may be explained by some trees being inadequately protected by having both logging debris and crown damage. If this is the case FCNSW does not believe that these trees should be double-counted as non-compliances.</p> <p>During an inspection on the 18th of May 2018, FCNSW inspected each of the 7 trees and found that 5 of these were not adequately protected. 2 trees were found to have excessive crown damage/debris accumulation and a</p>	Not compliant/ ORANGE	<p>The EPA has amended the audit report. The findings are now limited to the six (6) non compliances as identified in tree retention tables (now attached). It is important to note that there are two separate conditions in the TSL as they relate to crown damage and logging debris. If a retained tree has both operator crown damage and also logging debris exceeding the licence limit, then two non-compliances will be recorded.</p>

			<p>further 3 trees were found to have excessive debris accumulation within 5m.</p> <p>FCNSW requests that EPA review the findings and reduce the number of non-compliances referenced in this section of the report to 5.</p> <p>FCNSW was unable to investigate the results of the 3 meanders fully because accurate location details were not provided. In the future, is EPA able to provide accurate shapefiles of the meanders and details of the methodology used? From shapefiles provided (i.e. p.7 of the report) it is unclear which lines represent the actual meander. The provision of this information would allow FCNSW to properly investigate any alleged breaches and rectify any issues.</p> <p>Protection of retained trees is an ongoing compliance focus for FCNSW. During active harvesting FCNSW conducted 3 separate tree retention audits to monitor protection. The average compliance rates for these audits was 76%. While these results show that improvement is needed, it is not as high as the 63% quoted in the draft report.</p> <p>FCNSW note that there has been a long delay between the date of the audit, and FCNSW receiving the draft audit report (>10 months). In the future FCNSW would appreciate more timely receipt of audit findings so that any issues can be investigated and rectified as quickly as possible.</p>		
TSL 5.8(g) – (l), TSL 5.1E	Unauthorised amendment to ridge and headwater boundaries, failure to mark correct boundaries,	Map 3 / p.17 of the report	<p>A major benefit of the acquisition of LiDAR is that FCNSW are now able to accurately map the real-life location of drainage features. This has improved our ability to accurately apply the appropriate buffers/exclusions to drainage lines. Previous LIC drainage layers have been found inaccurate across much of the FCNSW estate, so the LiDAR derived drainage is now used when creating the Harvest Plan Operational Map (HPOM).</p>	Not compliant / ORANGE	<p>The EPA upholds its findings. The audit identified that FCNSW failed to follow the correct procedure within the TSL. The TSL is clear under 5.8(g) which states that “Amendment to the location of Ridge and Headwater Habitat exclusion zones may not be made unless approved by EPA”. The EPA did not approve these amendments. Consequently, the original exclusion zone is required to be protected as per the TSL requirements.</p>

	<p>failure to protect ridge and headwater areas /</p> <p>ORANGE</p>		<p>A requirement of Ridge & Headwater Habitat exclusion zone network design is that exclusions follow 1st or 2nd order streams. The development of LiDAR derived drainage has also better enabled FCNSW to protect Ridge & Headwater Habitat.</p> <p>During harvest planning the location of the Ridge & Headwater Habitat exclusion is reviewed and amended based on the location of LiDAR derived drainage. This is done on a compartment by compartment basis as they come up for harvest. Prior to the acquisition of LiDAR drainage, operational outcomes would have been similar (although far less accurate) because the boundary would have been marked as found in the field rather than as mapped. There is no doubt that by amending the Ridge & Headwater Habitat exclusion zone for the HPOM we are better protecting for the intent of the TSL condition.</p> <p>Where FCNSW encounter a compartment that has had a Ridge & Headwater Habitat exclusion zone applied to a previous harvesting event (i.e. since the commencement of the current TSL) we take steps to ensure that the proposed exclusion zone matches the previously applied exclusion. This is done using LiDAR canopy height models and aerial photography during harvest planning and during on-ground pre-harvest mark-up survey assessments.</p> <p>In compartment 3109, Ridge & Headwater Habitat exclusion zones have not been applied in a previous harvesting operation. Therefore there is no risk that a previously excluded area would be harvested this time around.</p> <p>In compartment 3109, the actual Ridge & Headwater Habitat exclusion area that was protected totalled 3.6 hectares. This compares to the 3.6 hectares that would</p>		
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			<p>have been protected had the exclusion been applied exactly as per the mapping on the official layer.</p> <p>FCNSW argue that environmental outcomes are improved after applying an exclusion zone that has been modified based on LiDAR drainage. FCNSW request that this not be considered a non-compliance and that this be recognised in the final audit report and during future auditing.</p> <p>Both the EPA audit (12/07/2017) and a subsequent site inspection by FCNSW on the 18th of May found no evidence of specified forestry activities within the Ridge & Headwater Habitat as mapped on the HPOM.</p> <p>Therefore FCNSW assert that there has been no non-compliance and request that any reference is removed from the final audit report.</p> <p>FCNSW no longer physically marks all boundary types. The Exclusion Zone Management standard operating procedure (SOP) stipulates which boundaries require field mark-up. Ridge & Headwater Habitat exclusion zones do not require physical marking under this SOP.</p> <p>The introduction of iPads has enabled us to display the current approved HPOM in conjunction with the current GPS location. These have been mounted in contractor machines and boundary location (for certain exclusion types) is undertaken by the operator. Operators receive inductions and training on the use of the technology and must first demonstrate proficiency working around physically marked boundaries.</p> <p>FCNSW has previously written to Gregory Abood from the EPA (25/11/2016) regarding this move to GPS boundary identification and location. No response was received from the EPA.</p> <p>Using the iPads to locate boundaries allows us to improve safety, gain operational efficiencies and apply</p>		
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			the necessary exclusions more accurately. This technology has allowed FCNSW to shift effort from physical boundary marking to the monitoring of boundary compliance. Results from FCNSW boundary audits show that this is an effective way to manage certain boundaries.		
IFOA 5(11)D	Basal Area retention / not determined	Map 2 / p. 19 of the report	<p>When undertaking BA assessments to determine average removal rates it is necessary to also place BA sweeps in unharvested sections of the tract.</p> <p>FCNSW agree that the overall average BA across the tract would satisfy the relevant conditions of the IFOA.</p>	Not determined	The EPA upholds its finding of not determined.