

INTRODUCTION:

During the recent IAP negotiations for Eden Management Area considerable scrutiny was placed on the resource figures used in the Wood Resources Study. In particular two areas were highlighted -

1. Differences between the 1994 Eden EIS and the Wood Resources Study
2. Potential availability of retained trees (habitat and others) from the first cutting cycle during regrowth thinning.

Comments and explanations of these two issues will be outlined in this report.

1. WOOD RESOURCES STUDY AND EDEN EIS:

The differences between the Wood Resources Study and the 1994 Eden EIS were the subject of a separate paper tabled by SFNSW in the Eden negotiation. A copy of this paper is attached as Appendix 1 to this report. Further to this, Appendix 14 from the 1994 Eden EIS has been quoted by a number of stakeholders as evidence there are additional sawlog supplies available that have not been taken into account in the Wood Resources Study. The issue of difficulties in maintaining sawlog supplies was also dealt with in the EIS.

Section 3.6.5 (p 3-136) of the 1994 Eden EIS deals with factors relating to sustained yield and both acknowledges and discusses the current problems involved in predicting future yields given the uncertainty surrounding access to timber resources. Section 3.6.5.1 (p 3-136) outlines the factors that affect sustained yield; it shows that yields have been altered in the past due to the effects of such factors and identifies the factors that are currently creating such uncertainty in the prediction of timber availability.

Section 3.6.5.2 (page 3-137) deals with the calculation of sustained yield. The following extracts from this Section place the Appendix 14 report in its correct perspective and refute the claim that the EIS did not acknowledge difficulties in maintaining a sustainable sawlog supply.

- The short-, medium- and longer- term sustainability of timber products from the EMA has been assessed by SFNSW as part of ongoing assessments and by others (Streeting & Hamilton 1991; RAC 1992; Margules Groome Pöyry (Appendix 14)). Streeting & Hamilton's conclusions were challenged by SFNSW, and the conclusions drawn by the RAC in its final report reflected the additional information submitted by SFNSW. The South East Forests Agreement included an assessment of the volumes of timber products that could be sustainably yielded from the EMA forests based on the areas available as at 1 January 1991. **These assessments all indicate that yields to the year 2012 are sustainable at the current levels of harvesting, provided that the current area of forest available for harvesting and the yields per unit area harvested are maintained.**

Yields of sawlogs during the period 2013 to 2030 will be more problematic. The Margules Groome Pöyry study (Appendix 14) indicated that yields could be sustained if certain measures were employed to bring forward production of sawlogs from regrowth forests and, as part of current harvesting operations, to carefully identify and retain trees with the potential to yield sawlogs in the next cutting cycle. Other initiatives, including changing utilisation standards and changing sawmill technology, were also identified.

These measures are being implemented by SFNSW and the industry, including the thinning operations and tree retention specifications that form part of the proposal. **However, SFNSW's ability to maintain sawlog supplies during the period 2013 to 2030 is predicated on maintaining access to the resource base as it was at 1 January 1991.**

- At the time of writing this EIS, management of these moratoria in the medium term is not settled, and therefore the availability of resource within these areas is unknown. In addition, there may be implications for yields arising from the new erosion hazard control strategies, EPA licence conditions, NPWS Section 120 licence conditions and EIS approval and determination conditions. Consequently, **until the above factors are clarified, the levels of harvest that can be sustained cannot be accurately determined for the remainder of the first cutting cycle** (expected to end in 2012).

2. RETAINED TREE AVAILABILITY:

In order to address this perception a series of meetings were organised with the Eden Negotiation stakeholders to:

- outline respective positions.
- provide a detailed explanation of the assumptions underpinning the Wood Resources Database for Eden Management Area.
- consider an appropriate methodology to examine the availability of retained trees for sawlogs.

Present at these meetings were Tony Howe, Bob Bridges, Michael Bullen and Joe O'Gara - SFNSW; Tim Shepherd - NPWS; Robert Bertram and Mark Blecher - South East Conservation Council; Rebecca Ford - Commonwealth; Vince Phillips - FPA.

The following methodology was proposed to attempt to quantify the volume of retained sawlog trees and how much of this volume may be available at the time of first thinning.

Methodology:

Logged compartments were scheduled for first thinning according to the following thinning regimes:

Table 1: Regrowth Thinning Schedules:

Site Quality	First Thinning	Second Thinning	Regen. Harvest
High	25	45	65
Medium	30	55	80
Low	45	-	85

These thinning schedules have been derived from operational experience over the past 4 years primarily working in fire regrowth.

2. Review those compartments that are scheduled to be thinned between 1996 and 2020.
3. Select a 10% sample of these compartments for verification in a two stage process:
 - helicopter inspection to identify areas of retained trees
 - follow-up ground measurement of all retained trees.

This basic methodology was followed. Mark Blecher of the South-East Conservation Council selected the 10% sample on July 2, 1996. The Compartments selected are shown in Table 2.

Table 2: Compartments to be Sampled:

Year of First Thinning	Compartment
2001 - 2005	163, 959, 2326
2006 - 2010	142, 2324, 194, 288, 147
2011 - 2015	970, 1202, 1203, 2329, 184, 275, 300, 453, 1744, 2372, 255, 320, 1206, 111
2016 - 2020	399, 1764, 280, 485, 307, 708, 2402, 316, 309, 507.

Helicopter inspections were carried out on each compartment to identify the locations of retained trees within the compartments.

To determine standing volume ground based measurements were commenced on July 3, 1996. It soon became obvious that the above 10% sample could not all be measured in the available time-frame. Each coupe within a compartment was taking 1.5 days to measure.

A subset of the above compartments was derived using a random number generator then further broken down into coupes. The final list of areas sampled by ground measurement was.

Compartment	Coupe
2326	10
275	2
507	2
2324	13
2329	9
1764	1
316	2

Each coupe was assessed under the following criteria and the thinnable areas mapped. The current EPA licence prescriptions for drainage line filter and protection strips were applied. Every tree above 25cm (merchantable limit for pulpwood) was measured for diameter, height, sawlog length, and assessed for its potential for habitat value. The current (1994 Eden EIS determination) habitat tree prescriptions were then applied. These prescriptions require the retention of 6,4, or 2 trees per hectare for vegetation of high, medium and low habitat respectively.

Results:

For each coupe measured the plot information is attached as Appendix 2. The results have been summarised and are shown below.

Table 3: Summarised plot Information:

Cpt	Cpe	Area		Volume/ha		Tot. Volume		No. Trees	No. Habitat Trees	Avail. Volume
		WRS	Actual	WRS	Actual	WRS	Actual			
507	2	42.52	29	2.7	4.0	57	117	130	62	87
275	2	41.55	33	1.5	1.45	31	48	228	68	38
316	2	19.86	8.6	1.5	1.8	15	15	72	26	9
2326	10	12.44	10.3	7.5	5.1	47	52	92	62	12
2324	13	21.84	17.8	11.25	1.23	123	22	149	107	4
2329	9	13.24	10.6	5.4	2.23	36	24	39	64	0
1764	1	30.8	23.6	4.8	4.08	74	96	142	142	0
163		152.8		1.05		80	0			0
142		74.37		1.05		39	0			0
147		33.95		1.05		18	0			0
194		171.1		1.05		90	0			0
1202		131.3		6.3		414	0			0
1203		200.7		12		1205	0			0
1206		75.23		3.9		147	0			0
111		175.1		1.05		92	0			0

For compartments 163 -111 helicopter inspections indicated that no volumes of retained trees were present and hence ground measurements were not necessary.

Table 4: Comments on Each Coupe:

Cpt	Comment
507	High % of coupe <18 deg. Large dia trees remain, low habitat value
275	High % of coupe <18 deg. mix of tree dias remain, majority low habitat value
316	High % of coupe over 18 deg.
2326	High habitat value, small volume available
2324	High habitat value, small volume available
2329	High habitat value, retained trees <= required for habitat
1764	High habitat value, retained trees <= required for habitat
163	Helicopter retained volume along rainforest filterstrip or uncommercial species
142	Helicopter retained volume along rainforest filterstrip or uncommercial species
147	Helicopter retained volume along filterstrip, 1980 fire damaged
194	Helicopter Transition from whole Cpt to small alt. coupe logging, volume retained along filterstrip
1202	Helicopter Fire salvage from 1983 fire,ret. trees not sawlog quality, steep over 18deg.
1203	Helicopter Fire salvage from 1983 fire,ret. trees not sawlog quality, steep over 18deg.
1206	Helicopter. Fire salvage from 1983 fire,retained trees not sawlog quality, steep over 18deg.
111	Helicopter small alternate coupe 79, then fire salvage after 1980 fire

In Table 3 above the two area columns represent a comparison between the net area in the Wood Resources Study and the actual thinnable area as determined by ground survey.

The volume/ha columns are the sawlog volume estimates from the WRS and the actual measured volumes.

The total volume columns represent the volume/ha columns multiplied by the area columns. The WRS column has been reduced by a factor of 50% representing broad operational thinning accessibility over the whole compartment. This reduction is based on operational experience to date and is due to slope, rock and forwarder access problems.

The number of trees column represents the total number of trees identified on the coupe.

The number of habitat trees is the total number of habitat trees required to meet current specifications.

The volume available column represents the estimated total volume available following application of the current EPA and habitat tree prescriptions.

Table 4 above is a series of comments on each coupe relating to information obtained from the ground measurements and past logging practices.

CONCLUSION:

Due to time constraints the actual field measurements undertaken were extremely limited. Thus the results represent only a very small sample of the compartments scheduled for thinning up to 2020. No conclusions of statistical significance are able to be determined from results. However, a number of general observations can be made following the helicopter inspections, field measurement and knowledge of past logging practices.

- Compartments logged prior to 1983 in the coastal forests do not have retained sawlogs available. The trees retained during this logging period were concentrated in the drainage lines and/or were unmerchantable species. Appendix 3 shows an aerial photograph for Compartment 126 which was logged in 1978. As can be seen the large retained trees are concentrated in the gully locations with none across the remainder of the coupe. Such gullies are now protected by filter strip prescriptions.
- For compartments in Glenbog State Forest logged during the same period trees were retained across the coupe. Due to the high habitat classification of these forests a considerable number of these trees are required to meet current prescriptions. Therefore potentially available sawlog volumes contained in the WRS are an overestimate of actual availability. See Compartments 2324, 2326 and 2329 in Table 3.
- From the mid 1980's until 1990 more trees were retained across the coupe (for example, Compartment 507 in Table 3). Appendix 4 shows compartment 306 which was logged in 1983. This photo shows retained trees across the coupe as well as in the drainage lines.
- The 1990 RAC Report identified a potential shortfall in sawlog supplies late in the current cutting cycle. The Margules Groome Poyry Report indicated that this shortfall could be overcome by, amongst other things, not retaining sawlog trees for future harvest (when there is likely to be an adequate supply) but to harvest these trees for sawlogs now. Tree marking prescriptions were changed in 1990 to implement this proposal. The result is that areas harvested since 1990 do not contain trees retained as sawlogs.
- The summary result of the tree retention prescriptions, is that future sawlog trees were only retained in any large way for areas logged during the period from the mid 1980s to 1990. This was clearly observable from the helicopter filed inspections.
- The impact of changed habitat tree prescriptions since this period has a significant effect on tree retention rates to meet current prescriptions. For example in Coupe 2 in compartment 275 the habitat tree prescriptions applying when it was logged required only one habitat tree to be retained for the coupe. To meet today's prescriptions it requires 68 trees to be retained.

- Therefore for forest of high habitat classification all of the trees retained will be required to meet present prescriptions. For low and medium habitat classification forest logged during 1984-90 some sawlogs may be available at first thinning. An estimate of this volume using the Wood Resources Data and the above general observations was derived. This was done by filtering the database to only include areas of low and medium habitat classification and logged between 1984-90. This indicates approximately 3000m³ - 5000m³ total volume depending on IAP outcomes. This volume only occurs in the period 2016 - 2020. Given the limitations of the data the above methodology of the Wood Resources Study, and the period the volume is scheduled the reliability of this volume is questionable.
- It should be appreciated that this conclusion is based on limited field investigation, forced by the constraints of time and cost. Additional field work could be carried out, and the WRS data and thinning schedules refined. However it is most likely that the observations as outlined would be confirmed.
- During the series of meetings the question of timing and quantity of sawlog availability from 2nd thinnings was raised. This information will be provided under separate cover to all participants.

In conclusion it would appear that application of current EPA and habitat prescriptions will require considerably greater tree retention than when the compartments were first harvested. This will limit the likelihood of the retained trees contributing major sawlog volume at the time of first thinning.

Appendix 1:

COMMENTS ON YIELD INFORMATION FROM THE WOOD RESOURCES STUDY

EDEN MANAGEMENT AREA

INFORMATION PREPARED BY STATE FORESTS OF NSW

BACKGROUND:

Estimation of Unit Area Volumes

The unit area volume figures recorded in the Wood Resources Study database have been derived from a number of sources as described in the following extract from the 1994 Eden EIS which outlines the background for estimation of timber resources in Eden Management Area.

Estimates of the timber resources of the study area were derived from three assessments conducted between 1967 and 1972, namely a pulpwood assessment in 1967, the Bermagui sawlog assessment in 1970 and a further pulpwood assessment in 1971/72.

In 1967, a pulpwood assessment was carried out to determine if sufficient timber was available to support a proposed pulpwood export industry. The assessment covered an area of 71,000 ha, being the areas then dedicated as Nullica, Timbillica, Nadgee, Bruces Creek and East Boyd State Forests, Forest Reserve No. 52336, and Crown lands between Nadgee and East Boyd State Forests. The constraints applied meant that only 35,000 ha were classified as suitable for pulpwood logging. The volumes assessed on this suitable area were 2.7 million tonnes of pulpwood and 0.5 million m³ of sawlog. The 1971/72 pulpwood assessment covered approximately 75% of the State forests within the study area and involved 1260 aerial photographic points and 83 measured field plots. The assessed volumes were reviewed in 1982, and extrapolations were made to estimate the timber resource over all State forests in the study area, with adjustments made to allow for management exclusions and boundary rationalisations that had occurred since 1971/72. The revised volumes were used to derive the yield estimates for the Eden Native Forest Management Plan (FCNSW 1982).

Although the above assessments provided adequate timber resource information for planning at the SFNSW District level and for medium- to long-term yield prediction, the information lacked the specificity needed for short-term planning. No facility was available for refinement, adjustment and manipulation of the resource information at the compartment or coupe level. These requirements were met by developing compartment-based registers during the late 1980s. Resource information for compartments and parts of compartments was derived from mapped information, from compartment-specific assessments, including air-photo volume estimation, and from estimates based on actual yields obtained from harvesting adjacent areas. The knowledge of SFNSW staff familiar with particular forest areas was used to check and adjust the predicted yields.

Compartment-specific assessments included the interpretation of aerial photographs to estimate timber volume. The interpretation process involved the measurement of 0.25-ha plots in the forest areas and the calculation of pulpwood and sawlog volumes to confirm estimates and to provide standards to assist interpretation. About 35% of the State forests in the study area has been assessed in this way.

Resource Unit Areas

The area of all resource units in the Wood Resources Study has been calculated by GIS from digitised maps of the units. This represents a complete change in the method of deriving area data from that previously used in the Management area. The compartment and part compartment area data used in the resource registers was obtained from manual area measurements made on 1:25 000 scale maps. The time frame associated with the Wood Resources Study did not provide sufficient time for a reconciliation of the area data between the two systems.

CALCULATION OF NON-DECLINING YIELD:

The methodology for calculating non-declining yield in the Wood Resources Study will be detailed in a separate paper prepared by State Forests.

For the Eden MA the objective of the yield calculation in the Wood Resources Study was to fully integrate predicted yields from both the multi-aged forest and the regrowth forest. However within the time constraints on the study and due to the huge size of the resource unit database this proved technically impossible to achieve.

As a result the database was sorted, to identify the group of resource units that contribute to meeting sustained yield over the next 25 years. These are the units which have not been logged by integrated logging since 1970. This group of resource units was then analysed using the yield scheduling model, to calculate a non-declining yield for a 25 year period (to 2020).

The year 2020 was selected to provide a level of certainty that the non-declining sawlog yield that was calculated and which is likely to be used as the basis for legally binding timber supply commitments, can be maintained through the “phase-in” period to the regrowth resource. The year 2020, fixes the even-flow sustainable yield at a realistic level, provides for flexibility in the phasing in of regrowth thinning and does not make even-flow sustainability dependent on the regrowth resource till after 2020.

- There is a high level of uncertainty associated with yield prediction over long time periods and when it is likely that calculated yield will be the basis of legally-binding term agreements for the supply of timber, it is necessary to apply a precautionary approach in the calculation of the yield and the assumptions that are made in its calculation. The yields calculated by the Wood Resources Study have not undergone a detailed review, there has only been limited verification of the base attribute data, and the area data derived from the GIS have not been reconciled with other sources of area data for the Management Area.
- There is considerable uncertainty about the future availability of timber resources:
 - ◊ large areas of State Forest are affected by moratoria

- ◇ the effect of providing for the current level of prescription remains an unknown that will influence the predicted timber resources in the regrowth stands
- ◇ a maximum of 75% of the regrowth stands will be available for thinning, due to operational constraints such as slope limits of current machinery of 18 degrees.
- ◇ important issues involving the scheduling of operations and the approved yields of pulpwood production remain to be clarified; these will influence the time at which thinning can be commenced on an operational scale

COMPARISON OF January 1991 SUSTAINABLE YIELD AND WOOD RESOURCES STUDY NON-DECLINING SAWLOG YIELD

As part of the South East Forest Agreement, the committed sawlog yield was reduced in proportion to the area of State Forest that was identified for transfer to National Park; this new committed yield of 59 000 m³ became effective in January 1992.

In January 1991 it was estimated that the multi-aged forests in Eden Management Area had a sawlog resource of 1,247,800 m³. At an annual rate of harvest of 59 000 m³, this resource would be harvested by 2012.

If the January 1991 sawlog resource was harvested over a period to 2020, the annual harvest rate would be 41 590 m³.

The yield model in the Wood Resources Study has calculated an average non-declining yield of 40 100 m³ (16 May 1996 recalculation, which removed the minimum sawlog volume constraint at the time of logging) over a 25 year period to the year 2020.

There is a 3.6% difference in these two figures; the Wood Resources Study figure is 3.6% less than the January 1991 figure.

- A difference of this magnitude is within the order of accuracy that can be expected from the respective sources of data

SUSTAINABILITY OF SAWLOG YIELD

The results of a yield scheduling analysis undertaken for State Forests by Margules, Groome and Poyry Ltd were presented to and reviewed by the Resources Assessment Commission Forest and Timber Inquiry in 1992. This analysis demonstrated that 59 000 m³ of sawlog was sustainable as an even-flow yield through a transition from harvesting in multi-aged forest to harvesting in regrowth forest.

Assumptions made in the Margules study included:

- that it would be operationally feasible to commence thinning on-time according to the schedule used in the study (that is, first thinning would commence at an average age of 30 years across the Management Area)
- that it would be feasible to thin 80% of the regrowth area in the Management Area
- that the availability of the retained sawlog component would not be constrained by any conditions or prescriptions at the time of first thinning

ISSUES TO BE CONSIDERED WHEN REVIEWING THE NON-DECLINING YIELD DERIVED FROM THE WOOD RESOURCES STUDY

- The trees retained during the initial logging will not be available in the future as they will be required to meet current wildlife and EPA conditions.

The stands that will be the first to become available for thinning will be those that were logged during the first decade of integrated logging. During the initial years of integrated logging, no habitat trees were retained and then for many years the prescription was 3 habitat trees per 15 ha, with the trees being retained in specified forest types. Current habitat tree retention rates are 2, 4 or 6 per hectare depending on forest type, and there is an additional requirement to provide recruit habitat trees. At the time of first thinning, the trees that will be most suitable as habitat trees and potential habitat trees will be those originally retained as future sawlog trees. These will be the largest trees in the stands and consequently are the trees that will most rapidly produce hollows and other mature tree characteristics.

Furthermore the current EPA conditions affect a wider area adjacent to water courses and the requirement to avoid felling trees into the prescribed areas means many retained trees cannot be logged.

- The time at which first thinning will commence is uncertain.

The phasing-in of first thinning is dependent on the volume of pulpwood that can be produced from the Management Area. The present situation is that the volume of pulpwood is constrained to the volume that is produced by integrated logging in the multi-aged forest; that is, it is fixed by the sawlog/pulpwood ratio in the multi-aged forest. This means that producing the committed sawlog yield from integrated logging in the multi-aged forest will, by definition, produce the permissible pulpwood yield. First thinning in regrowth forest will yield mainly pulpwood, which means that phasing-in first thinning will be dependent on having the operational flexibility and the necessary approvals to produce an increased volume of pulpwood. While-ever such flexibility and approvals are not available, first thinning will need to be limited to avoid producing excess pulpwood.

- The yields derived by the Wood Resources Study do not allow fully for losses in unit area yields that are associated with the precautionary prescriptions that have been applied in the S120 fauna licencing in recent years. The basis of the reserve area identification in the Interim Assessment Process has been to ensure that areas of high biological diversity and specific areas of critical habitat (areas of high conservation value) are included in the reserve system. In estimating unit area yields in the Wood Resources Study it has been assumed that the highly precautionary prescriptions will be modified. If this assumption is not realised the unit area yields will overestimate the actual yields that are available
- The yields derived by the Wood Resources Study do not allow for areas that are included in the extention of filter strips and the creation of buffer strips that are part of the more recent EPA licencing process under the Clean Waters Act. There is also a further loss of resource caused by the need to avoid felling trees into buffer and filter strips.
- The yields derived by the Wood Resources Study do not make allowance for areas that are included in moratoria in Eden Management Area. Some parts of the moratoria are included in the various Reserve options that have been developed in the negotiation process. The moratorium areas that are the most difficult to take account of, to quantify the effect of and which affect the largest area are those associated with large forest owls.

The area affected by moratoria in February 1994 are shown below. These moratoria still apply and since February 1994, the area affected by moratoria has increased as a result of additional moratoria associated with prescriptions for large forest owls and other Schedule 12 fauna.

◇ Tantawangalo catchment:	7 900 ha
◇ Koala:	26 400 ha
◇ Long-footed potoroo:	11 000 ha
◇ Large forest owls:	46 000 ha
◇ Other Schedule 12 fauna:	5 400 ha

TOTAL AREA: 96 700 ha

CONCLUSION:

- The non-declining yield for the Wood Resources Study has been calculated for a 25 year period using the currently available timber resources in the multi-aged forest that has not been logged since 1970.
- This approach has been taken as a result of the high level of uncertainty that exists in relation to the availability of the timber resource and particularly the uncertainty associated with future availability of the timber resource. It is considered that 2020 is a realistic, "indicative" end-point for the transition of harvesting to regrowth forest. However it is not a definitive end-point, as the transition to harvesting in regrowth forest will be a phased process spread over many years.