

WEST RFA OTWAYS FMA

Timber Resource Analysis

This report summarises the Timber Resource Availability analysis (TRA) for Otway Forest Management Area (FMA), which has been undertaken as part of the West RFA.

Appendix 1 summarises the assumptions that form the basis of this analysis.

Note that the figures presented here are based on a combination of updated forest type data from SFRI and modified growth and yield information from the 1988-1990 FORPLAN model.

These results are indicative only and are not to be interpreted as a change in the sustainable yield rate. Growth and yield estimates are essentially unchanged from previous models, except where identified in this report. The sustainable yield rate can only be fully reviewed once complete SFRI data are available, and will be based on modelling which will incorporate significantly more detail than has been possible in this process, including testing of the spatial feasibility of the assumptions included in the model.

1. Background

A cooperative research project was undertaken in 1988 with the Centre for Resource and Environmental Studies (CRES) at the Australian National University to develop a forecasting model for productive forest in the Otways region. The model was based on the computer based FORPLAN forest planning model, which was developed by US Forests Service. The aim of the project was to provide analyses to assist with the preparation of the Forest Management Plan for this area, and has been well documented (Dargavel and Turner, 1989; Brinkman, 1990a; Brinkman, 1990b; Duguid *et al* 1990). This project involved the ANU importing the FORPLAN program from the US and adapting it to run on their computer system. This was operational by the end of 1988.

Resource information was obtained from FOREST25. The Statement of Resources report (Brinkman and Farrell, 1990) provides a detailed explanation of the resource information collected for the project. Dargavel and Turner (1989) note that the GIS information had to be prepared concurrently with the FORPLAN project. This could account for differences between the FORPLAN dataset and the current version of the FOREST25 layer.

Growth and Yield information for the Mountain Forest (ash and mountain mixed species) stratum defined for the FORPLAN model was derived using STANDSIM, utilising a recent inventory of regrowth.

There were no stand type maps, inventory, permanent yield plots, growth and yield model or treatment model available for the foothill mixed forests. Coarse estimates of possible future yields were made from notional mean annual increment figures for similar forest types in Victoria (Dargavel and Turner, 1989).

In addition to modelling timber resource availability, the FORPLAN model considered a range of forest uses, including water yield and quality, conservation of flora and fauna, preservation of rainforest and minimising soil erosion.

The FORPLAN data are available in a non-spatial form, and the Otways model has been successfully run using the Department's Integrated Forest Planning System (IFPS), incorporating Spectrum, which is the successor to FORPLAN.

2. Current Licence Commitments

The current legislated sustainable yield rate for Otway FMA is 44,000 m³/year D+ net sawlog.

Current commitments are 41,150 m³/year D+ net sawlog although the average harvest rate for the last 10 years has only been 33,000 m³/year D+ net sawlog.

3. Data available for analysis

A spatial coverage is required in order to assess the impact of the draft CAR reserve design developed for the RFA. New SFRI forest type and age class information has been used for this Timber Resource Analysis. This dataset has updated for fire and logging history to 30 June 1998, and is therefore a current description of the resource. It will be the basis of the final SFRI product which will be used to review sustainable yield.

The SFRI data have been aggregated into broad forest types, based on species codes and stand height. The forest types defined are mountain ash, mountain mixed species (mixed species stands greater than 40 m in height) and foothill mixed species (mixed species between 22 and 40 m in height). Two productivity strata were defined in each of the ash and mountain mixed species forest types. Three productivity strata were defined for foothill mixed species. These categories do not directly relate to the strata used in the FORPLAN model.

Although the original FORPLAN model is available and can be run using IFPS, the method of deriving the input data cannot be replicated as the source data are not available. Given the availability of updated resource data from SFRI, it was considered more appropriate to develop a new model rather than to attempt to recreate the original FORPLAN datasets.

Growth and yield information from the original FORPLAN model were used for the TRA, as no updated growth and yield information is available. Estimates of standing volume for some mature and overmature stands were derived from HARIS.

The RAINFOREST100 layer has been updated using SFRI mapping in conjunction with the existing layer.

4. Methodology for RFA Timber Resource Analysis

A spatial dataset is required to determine the impact of the draft CAR reserve scheme on timber resource availability. To ensure a consistent basis for comparison, a new base model was prepared, incorporating the following information:

- SFRI forest type and age class information, benchmarked to 30 June 1998
- Code of Forest Practices exclusions, including updated slope exclusions for catchments (15° or 25° in catchments specified in the Forest Management Plan)
- Forest Management Zones as published in the 1992 Forest Management Plan
- Updated rainforest data (amended using SFRI mapping) buffered to 40 m

Areas of available forest less than a minimum threshold size and surrounded by unavailable or unproductive forest were considered to be unavailable for this analysis. The threshold applied equates to a minimum area of 5 ha for ash, 8 ha for mountain mixed species and 15 ha for foothill mixed species.

The impact of the draft CAR reserve design was determined by replacing the forest management zones from the 1992 plan with the draft CAR reserve coverage. A new set of input data was produced and used to develop a second model.

5. Changes to Net Available Area

In order to quantify the impact of changes resulting from the draft CAR reserve design, it has been necessary to develop consistent spatially-based models.

The following table summarises changes to the data sources and assumptions associated with the datasets.

	1990 FORPLAN model	New base“Plan92” model	Draft CAR model
Resource information	Non-spatial (derived from early GIS)	Full GIS dataset (preliminary SFRI)	As for “Plan92” model
Code of Forest Practices exclusions	Limited buffering of streams and steep slope exclusions	Full 1996 Code of Forest Practices exclusions (stream buffering and modelled slope exclusions)	As for “Plan92” model
Small area filter	None applied	Small area filter applied (ash 5ha, mountain mixed species 8 ha; foothill mixed species 15 ha)	As for “Plan92” model
Availability	Intermediate zoning layer	1992 Forest Management Plan zoning	Draft CAR reserve system
Growth and Yield	Mountain forest (ash and mountain mixed species) based on assessment reports, foothill forest notional MAI	As for 1990, updated with regional estimates and HARIS based records	As for “Plan92” model

The impact of these changes in terms of net available area are summarised below:

Forest Type	Source of Area		
	FORPLAN	SFRI	
	Net available area (1990)	Net Available (1992 plan)	Net Available (draft CAR)
Mountain Forest	25,732 ha	19,963 ^b ha	17,481 ^c
Foothill Mixed Spp	30,377 ^a	31,969	27,076
TOTAL	56,109	51,932	44,557

Notes:

^a includes 8,596 ha 15-28m Foothill Mixed species with minimal volume

^b includes 1,010 ha blackwood

^c includes 924 ha blackwood

The area reduction of 4,200 ha from the 1990 FORPLAN model to the new base (1992 plan) is a result of the factors outlined in the table above. The availability of forest stands is based on the zoning scheme published in the 1992 Forest Management Plan. The resource information derived from SFRI has been updated for timber harvesting and fire related disturbance to June 1998. Only productive forest, defined in terms of species and stand height, have been included. Stream buffers and steep slopes have been modelled and excluded in accordance with the 1996 Code of Forest Practices. The extent of rainforest and blackwood stands have been updated using SFRI data, and a 40 m buffer has been applied to all rainforest. Small areas of productive forest which are surrounded by unproductive or unavailable stands have been excluded. The threshold applied is equivalent to 5 ha for ash, 8 ha for mountain mixed species and 15 ha for foothill mixed species forest types. While forest stands with less than 30% crown cover are considered productive in the model, they do not contribute any volume to the current rotation.

Including the draft CAR reserves will result in a further reduction of 7,300 ha to the net available area.

6. Timber Resource Availability

Estimates of timber resource availability have been made utilising Spectrum based models in the Integrated Forest Planning System (IFPS). As outlined above, it was necessary to re-define the base model to ensure a consistent basis of comparison. The impact of draft CAR reserve design has been determined by comparing sustainable volumes as forecast by models developed with 1992 plan and the draft CAR zoning layers.

As no additional growth and yield information is available, existing FORPLAN yield curves have been used to define yield curves for the new aggregated SFRI forest types. The yield curves have been based on an average MAI weighted by area, with an approximate matching of FORPLAN and SFRI forest types based on forest type descriptions. High and low productivity yield curves were prepared for each of foothill mixed species and mountain forest (mountain mixed species and mountain ash). The yield curves developed for the mountain forest are consistent with projected growth rates contained within assessment reports for this area.

Estimates of standing volume for overmature mountain mixed species and mountain ash forests were derived from HARIS based records. A regional based estimate of standing volume has been applied to the lowest productivity (22-28m height class) foothill mixed species forest.

Stands of forest which formerly carried mountain ash, but which now are stocked with blackwood, are assumed to be harvested at a maximum rate of 20 ha per year, and regenerated as ash forest. Unstocked (< 30% crown cover) stands are assumed to be rehabilitated at the rate of 40 ha per year.

In the absence of fire risk data for this area, the MIRA fire risk allowance developed for the Central Highlands (1.62%) was applied in these analyses. This information will need to be updated for future forecasts, based on local records.

A contingency allowance of at least 10% should be applied to the available volume to allow for differences between modelled and actual available areas, and to allow for those factors that are not readily incorporated into existing models. A contingency allowance was not included in previous modelling for Otways FMA.

Examples of differences between modelled and actual available areas that are addressed by a contingency allowance are:

- Discrepancies between streams identified in the GIS hydrology layer and the actual stream network on the ground
- Allowance made for width of streams when buffering
- Allowance for saturated zone when buffering streams
- Reliability of modelled slope classes
- Positional accuracy or spatial precision of identified features which need to be buffered

Examples of areas which cannot be readily incorporated into models are:

- Strips of available forest between roads and streams which are theoretically available but are not practical to harvest because of their size and proximity to stream buffers
- Strips of available forest between roads and downslope areas which are not practical to harvest due to the problem of accessing felled trees
- Small areas within a coupe which are not identified as separate from the net available productive area, eg. rocky outcrops and localised slope variations.

A contingency allowance of 10% is proposed at this stage until the impact of these contributing factors can be quantified. Given the variable nature of native forest, it may be necessary to revise this allowance when additional information becomes available.

Including a 10% contingency allowance and fire risk buffer results in a baseline value of 30,300 m³/year D+ net sawlog for the new base “Plan92” model, and around 27,000 m³/year D+ net sawlog once the draft CAR reserve system has been included.

The reduction in available volume to the new baseline figure of 30,300 m³/year is a result of a number of factors.

The most significant factor is the fact that this modelling approach provides for a balanced wood flow within each of the three main forest types. This condition was not applied to the 1990 FORPLAN model, with only the overall constraint of non-declining yield being applied. If this condition is not applied, there can be large fluctuations between the area harvested in each forest type. Re-running of the 1990 model to produce balanced wood flows reduces the forecast availability by 11,500 m³ D+ net sawlog per year.

Other factors which have contributed to the reduction in available volume are

- Use of SFRI based resource information, which provides a better and updated definition of forest types, forest productivity and age classes
- Updated definition of available area using the 1992 Forest Management Plan and modelling of the 1996 Code of Forest Practices exclusions
- Updated mapping of rainforest and blackwood forest areas based on SFRI
- Detailed modelling in catchments, including definition of slopes and available area and the application of harvesting constraints
- Exclusion of small isolated areas of productive forest
- Inclusion of a contingency allowance and fire risk buffer

The further reduction in volume is due to changes in net available area resulting from the application of the draft CAR reserve design. All other factors are consistent with the baseline model.

The results from these Timber Resource Analyses can only be considered indicative, although the range of key issues has been addressed in these analyses, utilising currently available data. Growth and yield information has not been updated since 1990 as new information from SFRI is not yet available.

A statewide review of sustainable yield is required in 2001 and will utilise SFRI based resource data wherever possible. This review will also incorporate regionally defined prescriptions and constraints, and will provide opportunity for community input.

REFERENCES

- Brinkman, R. (1990a) *Wood, water and wildlife yields of the Otways forests*. Otway Project Working Paper 1990/1, CRES, Canberra
- Brinkman, R. (1990b) Advanced forest planning in the Otways. *Aust.For.* **53**(4), 290-294
- Brinkman, R. and Farrell, S. (1990) *Statement of Resources, uses and values for the Otway Forest Management Area*. Victoria: Department of Conservation and Environment
- Dargavel, J.D. and Turner, B.J. (1989) Integrated forest management: First lessons from a planning project in the Otways. *Proc.13th Biennial Conf of Institute of Foresters of Aust, Leura, NSW*:
- Duiguid, A., Turner, B and Dargavel, J. (1990) *The Otway Forest Planning Model: a FORPLAN model fir the Otway Forest Management Area of Victoria*. Otway Project Working Paper 1990/2, CRES, Canberra.

Appendix 1: Assumptions

- Non declining yield constraint applies from period 1 onwards
- Planning horizon of 200 years, comprising 20 ten year periods
- Areas of available forest less than specified threshold which are surrounded by unavailable or unproductive forest are considered to be unavailable for this analysis. Threshold values are equivalent to:

Mountain Ash	5 ha
Mountain Mixed Species	8 ha
Foothill Mixed Species	15 ha

- Wood flow smoothed by forest type, allowing –5%/+10% fluctuation between periods.
- Limit harvesting of mature and overmature Mountain Mixed Species and Mountain Ash to 10 ha per year
- Limit harvesting of 22-28 m Foothill Mixed Species to 50 ha per year.
- Unstocked (<30% crown cover) stands rehabilitated at 40 ha per year
- Blackwood stands harvested at 20 ha per year and regenerated as ash forest.
- Harvesting constraint for each catchment set to limit specified in Forest Management Plan
- Yields based on 1990 FORPLAN model, with the following adjustments –

Foothill Mixed Spp 22-28 m	20 m ³ /ha ^a
Late Mature/Senescent/Uneven age Foothill Mixed Species	15 m ³ /ha ^a
Mountain Ash – mature	110 m ³ /ha ^b
Mountain Ash – overmature	30 m ³ /ha ^b
Mountain Mixed Spp – mature	50 m ³ /ha ^b
Mountain Mixed Spp – overmature	10 m ³ /ha ^b

^a based on regional input using historical harvest figures

^b based on HARIS.

- 1996 Code of Forest Practices buffering applied.
- 40m buffer applied to rainforest
- Minimum rotation age

Existing	Foothill (> 28 m, higher productivity)	80 years
	Foothill (> 28m, lower productivity)	90 years
	Foothill (22-28 m)	120 years
	Mountain Mixed Species	60 years
	Mountain Ash	60 years
Regrowth	Foothill ((> 28 m, higher productivity)	120 years
	Foothill ((> 28m, lower productivity)	120 years
	Foothill (22-28 m)	120 years
	Mountain Mixed Species	100 years
	Mountain Ash	80 years