Investigation into the Logging of The Thomson Catchment

A 2006 report commissioned by
The Central Highlands Alliance Inc

TCHA
THE CENTRAL HIGHLANDS ALLIANCE

Logging and the Thomson Water Catchment

10.1 Introduction

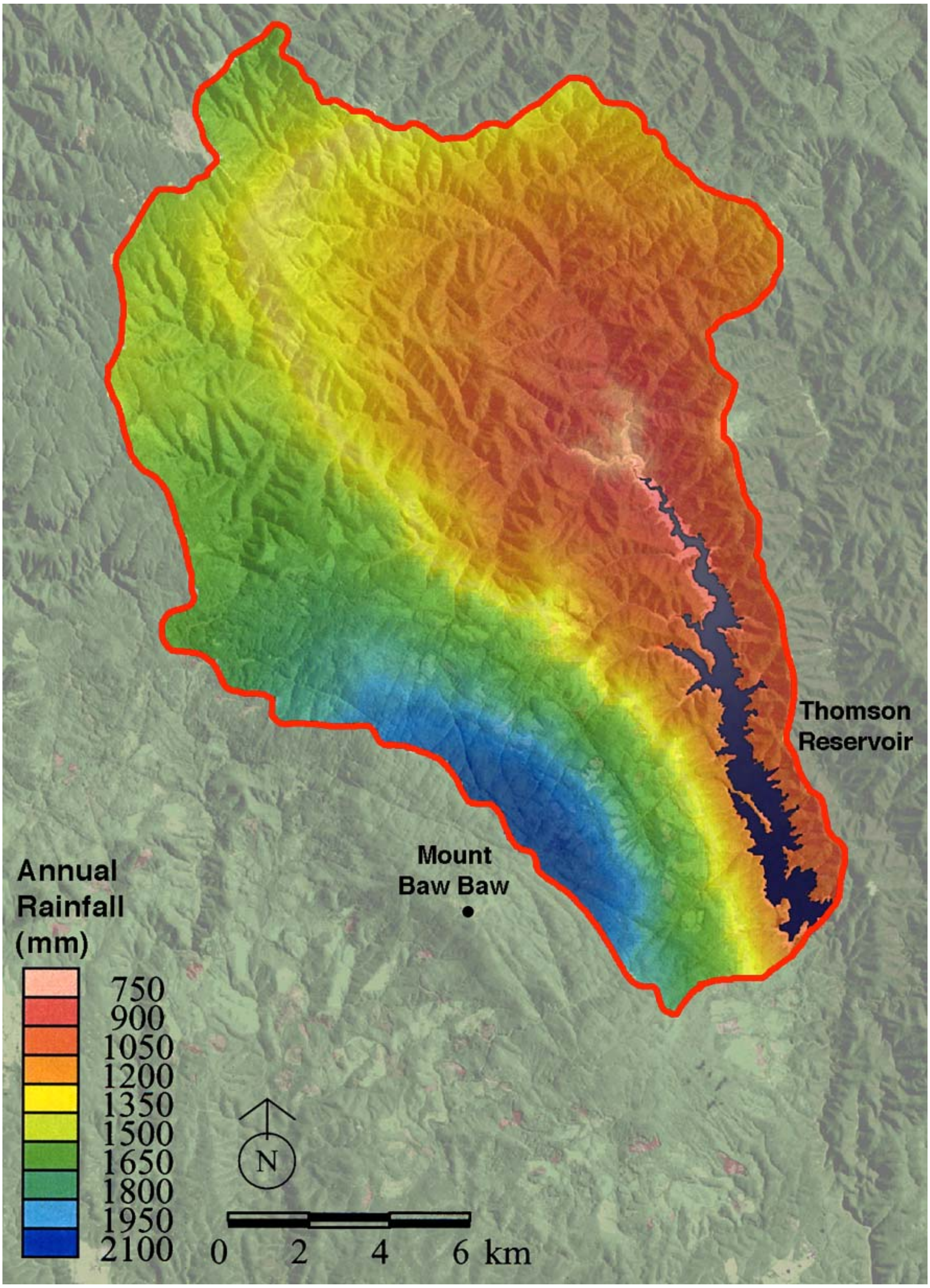
The Thomson Reservoir is situated along the eastern escarpments of Mount Baw Baw and carries approximately 60 percent of Melbourne's water storage capacity (Howe et al 2005). It is surrounded by 48,700 hectares of forested catchment that includes the northern and eastern slopes of Mount Baw Baw, the southern slopes of Mount Matlock on the Great Dividing Range and the western slopes of the Aberfeldy Range. The Thomson is the largest of four major water supply catchments for Melbourne, with the others being Maroondah, Upper Yarra and O'Shannassy. All are located within the Central Highlands of Victoria (Howe et al 2005). The Thomson is a major water supply catchment upon which logging is permitted. The forest industry considers the Mountain Ash, Alpine Ash and Shining Gum forests within the catchment as highly valuable for timber and pulp and targets these for logging. These forests cover 33.5 percent of the Thomson Catchment (Alaouze 2004) and occur within the high rainfall areas, mostly along the escarpments of Mount Baw Baw. When regenerating after logging, these species have been observed to double their use of water through having a higher Leaf Area Index (LAI) (Peel et al 2000, Vertessy et al 1998). The Strategy Directions Report stated that if logging were to be phased out of the Thomson Catchment by 2020, it is estimated that it will provide an additional volume of water in the order of 20,000ML (Water Resources Strategy Committee 2002). This chapter provides an overview of the issues concerning logging in the Thomson Catchment and implications for future management. These are covered in the following sections:

- Annual Rainfall within the Thomson Catchment (Section 10.2)
- Forests and Water Use (Section 10.3)
- Predicting Impacts on Water Yield within the Thomson Catchment (Section 10.4)
- Logging within the Thomson Catchment (Section 10.5)
- Global Warming and the Thomson (Section 10.6)
- Implications for Future Management (Section 10.7)

This chapter reveals significant problems with past and continued logging within the Thomson Catchment. **It reveals that logging Ash Forests results in the greatest water yield loss for any forest type in the catchment. 67 percent of the Ash forest area within the Thomson Catchment has been or will be logged. This exceeds the minimum of 20 percent for changes in the water yield to be detected.**

10.2 Water sourced from the Thomson Catchment

The highest rainfall area of the Thomson Catchment is along the top of the Baw Baw Plateau along the southwest boundary with an annual mean precipitation of 2475mm. Snow Gum Woodland *(Eucalyptus Pauciflora)* and alpine heathland are the dominant vegetation communities within this area (Peel et al 2000). These occur primarily within the Baw Baw National Park. The next highest area falls along the north and east escarpments of Mount Baw Baw below the plateau. These areas were found to receive a mean annual precipitation of up to 2220mm around the Upper Thomson River to around 1933mm along the 887m contour between Rocky Knob and South Cascade Creek along the eastern escarpments of Mount Baw Baw (Peel et al 2000). Alpine Ash *(Eucalyptus delegatensis),* Mountain Ash *(Eucalyptus regnans)* and Shining Gum *(Eucalyptus nitens)* are the dominant overstorey species for this area. The north and east of the catchment receive much less annual rainfall of around 1184mm. The majority of the reservoirs' yield is sourced from Mount Baw Baw and its associated escarpments. Refer to Map 10.2.1.



Map 10.2.1 Map of mean annual precipitation (synthetic) (in mm) for the Thomson Catchment based on 1962 precipitation data (Source – Peel et al 2000)

Figure 10.2.1 The Thomson Reservoir

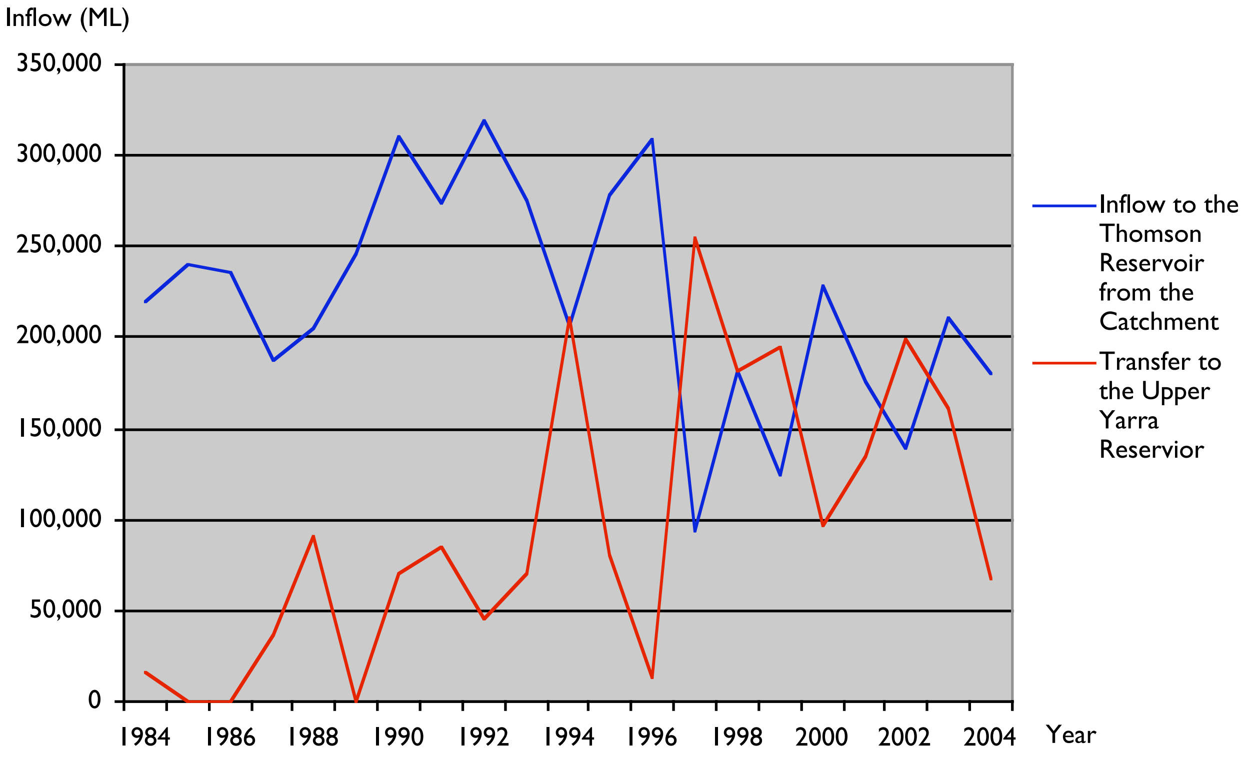


Figure 10.2.2 Thomson Reservoir inflow and transfer to the Upper Yarra Reservoir (Based on figures sourced from Melbourne Water).

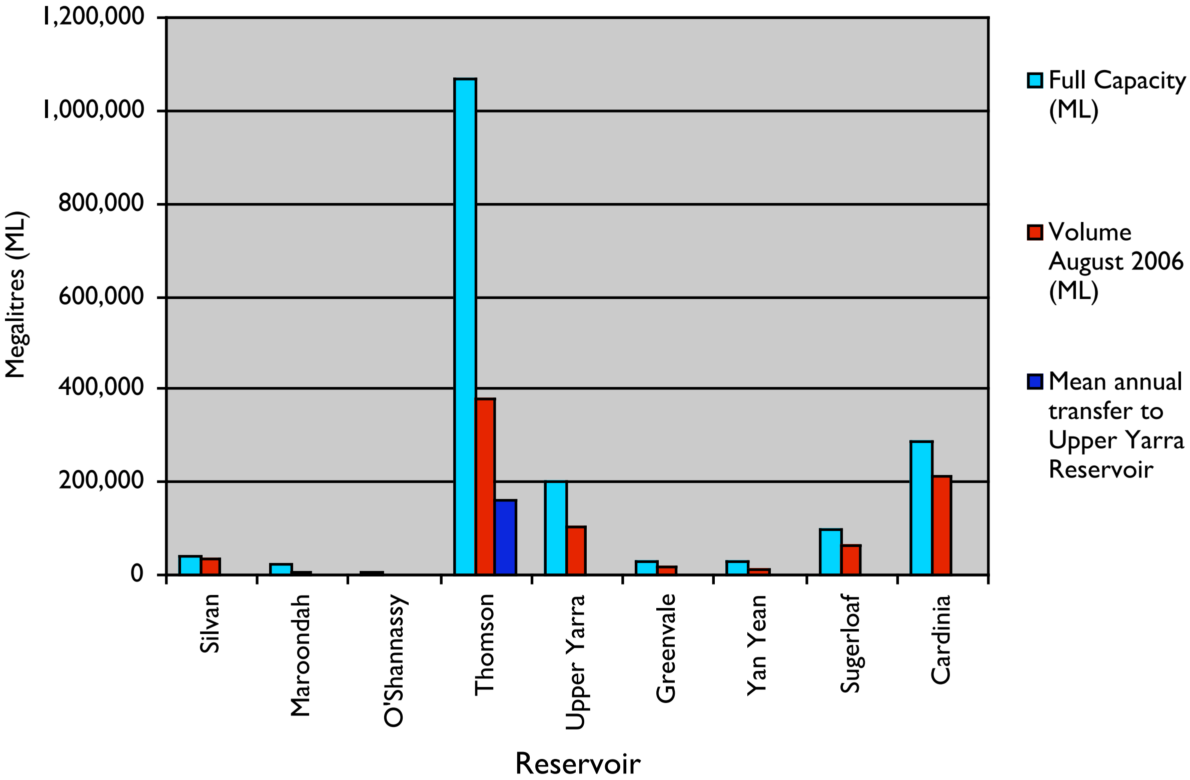


Figure 10.2.3 Graph showing capacity of Melbourne's Water Storage and volume as of 25.08.2006 (www.melbournewater.com.au - accessed 25.08.06).

From its catchment, the Thomson Reservoir has received a historical inflow between a high of 319,000 ML in 1992 and a low of 93,500 ML in 1997 (Melbourne Water Fact Sheet). The Thomson can hold 1,068,000 Megalitres (ML) or 60 percent of Melbourne's total water storage capacity. As of the end of August 2006, the Thomson was holding 379,353 ML or 46 percent of the total current supply (www.melbournewater.com.au - accessed 25.08.06). As the Thomson is the highest reservoir above sea level in the Melbourne Water Supply system, water is gravity fed through an underground tunnel to the Upper Yarra Reservoir, which then feeds into Melbourne's domestic water supply (refer to figure 10.2.5). Since the mid to late 1990's, the transfer of water to the Upper Yarra Reservoir has increased up to 254,500 ML. Between 1997 and 2004, a period of reduced rainfall, the mean average transfer has been in the order of 161,000 ML. This is over 80 percent of the Upper Yarra Reservoir's full holding capacity. Figure 10.2.3 reveals that the transferral from the Thomson makes a significant contribution to Melbourne'

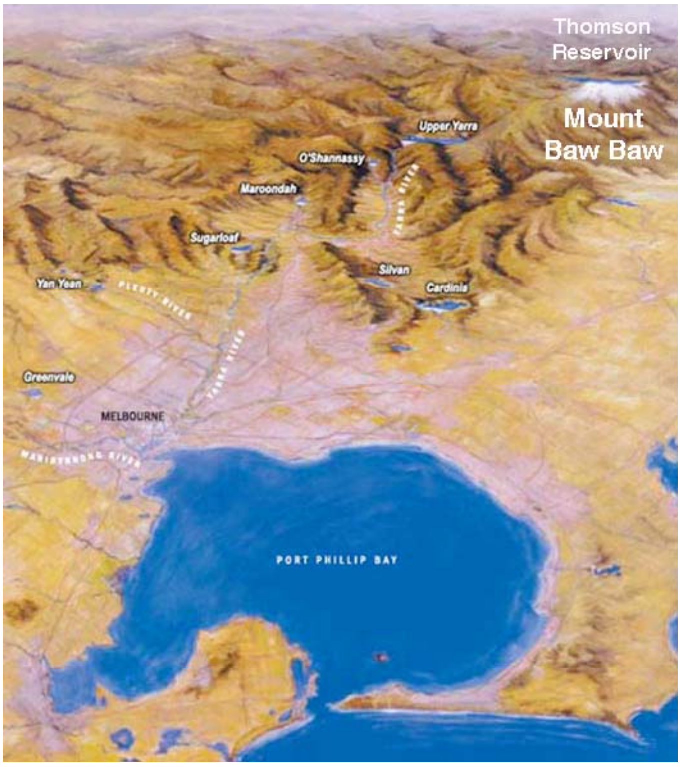


Figure 10.2.4 Location of water from the Reservoirs supplying Melbourne (Melbourne Water 2006)

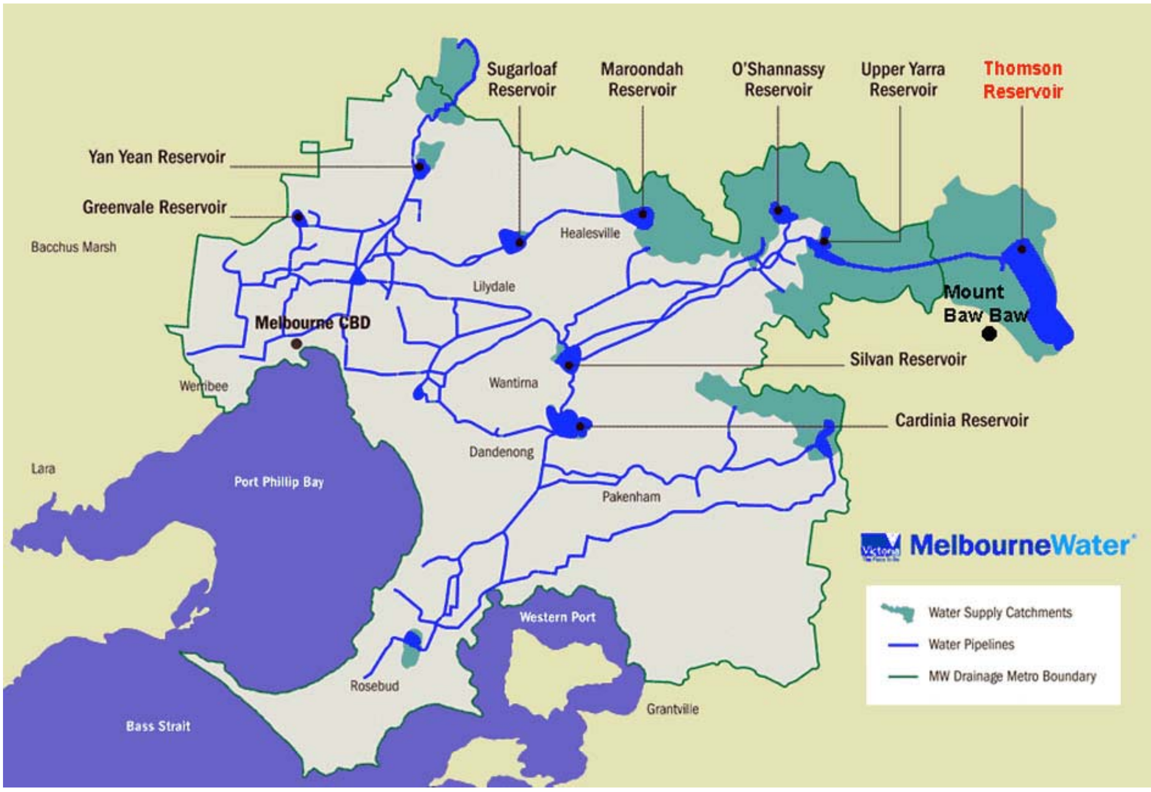


Figure 10.2.5 Distribution of water from the Reservoirs supplying Melbourne (Melbourne Water 2006)

10.3 Forests and Water Use

Our investigation of logging in Thomson Catchment refers to the application of the Macaque Model used in Peel et al (2000). Macaque is a large scale, long term, physically based water balance model that predicts the water yield of forested catchments subject to land cover change (Watson et al 1997). The Macaque Model was developed and tested using data from Maroondah (Peel et al 2000). An overview of the Maroondah data along with an introductory on the causes of water yield reduction is provided below.

10.3.1 Logging trials in the Maroondah Catchment

During the early 1950's, the then Melbourne and Metropolitan Board of Works (MMBW) initiated an experimental hydrological programme designed to test the effects of various forestry treatments on long-term water yield (Watson et al 1999). A number of small experiments were set up in the Mountain Ash forests of the Maroondah Catchments in the Central Highlands of Victoria. Some of the experimental plots contained old growth forest and some regrowth forest following the 1939 fires. A variety of silvicultural regimes, such as clearfelling, patch cutting, artificial thinning and planting at different stocking densities were applied throughout the 1970's and 1980's. The treated plots were then compared to untreated plots to measure differences (Watson et al 1999, Watson 1999).

The experiments were located at Coranderrk and North Maroondah. The Coranderrk experiment consisted of three small catchments that drained southwards into Coranderrk Creek below the water supply weir. The Catchments were named Picaninny (52.8ha), Blue Jacket (64.8ha) and Slip (62.3ha) and each contained a small gauging weir (Watson et al 1999). The North Maroondah experiments consisted of 15 small experimental catchments divided into five groups based on the type of experimental treatments applied. These groups were Monda (4 catchments), Ettercon (4 catchments), Myrtle (2 catchments), Black Spur (4 Catchments) and Crotty Creek (1 catchment).

The Picaninny catchment of the Coranderrk group was 78 percent clearfelled in the summer of 1971/72 and the Slip catchment was the control. The pre-treatment period was 42 months. The effect of this logging experiment on water yield is shown in Figure 10.3.1.1.

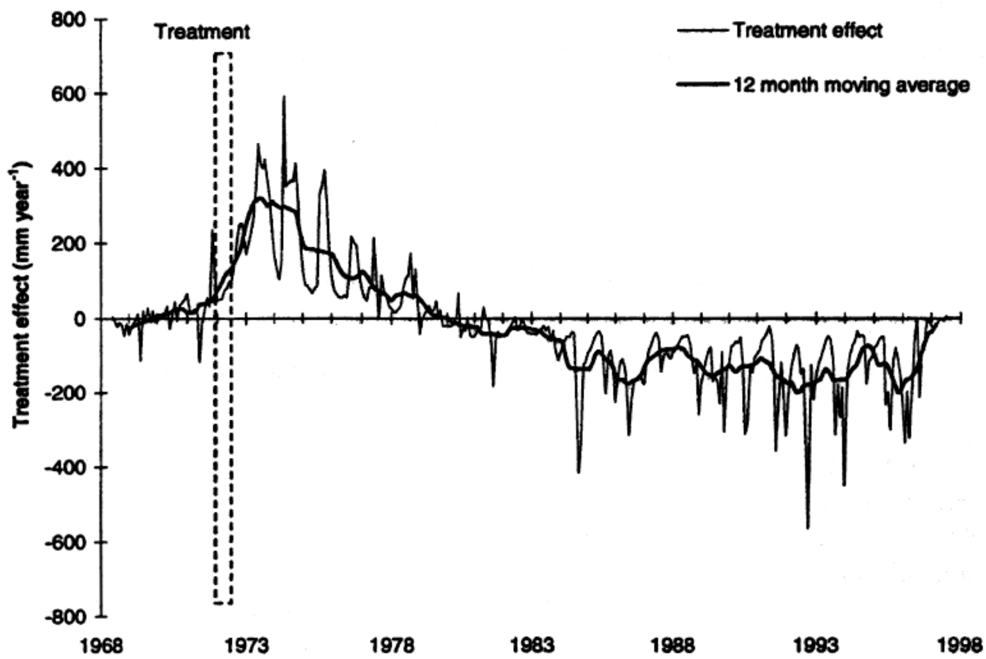


Figure 10.3.1.1 Logging effects on monthly stream flow at Picaninny (Watson et al 1999).

The results from the Picaninny logging experiment showed distinct increase in yield flow almost immediately following treatment, followed by a steady decline over the next 10 years to a low point that persisted for another 10 years when it apparently recovered. However, Watson et al (1999) was uncertain of the cause of the increase.

In the North Maroondah Catchment, the Myrtle Group consisted of 'Myrtle 2' being 74% clearfelled in the summer of 1984/85 with 'Myrtle 1' being the control catchment. The effects of this treatment are detailed in Figure 10.3.1.2.

In the post-treatment period, a significant increase in water yield runoff was observed for the first 2-3 years after treatment. Following this initial increase, the water yield then declined for a further 10 years where water yield increased following the regrowth becoming infected with Psyllids (Watson et al 1999).

From these trials, Watson et al (1999) concluded that the experiments showed a statistically significant medium term reduction in stream flow from the logged catchments.

Watson (1999) noted that Kuczera formed the 'Kuczera Curve' is used by Forest Management with regard to planning the location of new logging coupes within the Thomson catchment.
The Kuczera curve is based on an analysis of long term hydrographs from a number of affected water supply catchments in the period spanning from the 1939 Wildfires and is currently the best description of the effects of the 1939 fires, and of the effects of complete forest regeneration in general (Watson 1999). The curve is used to predict the effects of logging. However, the same curve is used for all Ash type forests regardless of other environmental influences on water yield such as precipitation and radiation. Precipitation has a range of well over 1000 mm within Mountain Ash forests, and radiation varies greatly between north and south facing slopes. **Watson (1999) states that current forest management is limited by inaccuracy in water yield prediction resulting from the assumption of spatial invariance of the yield/age relationship.**

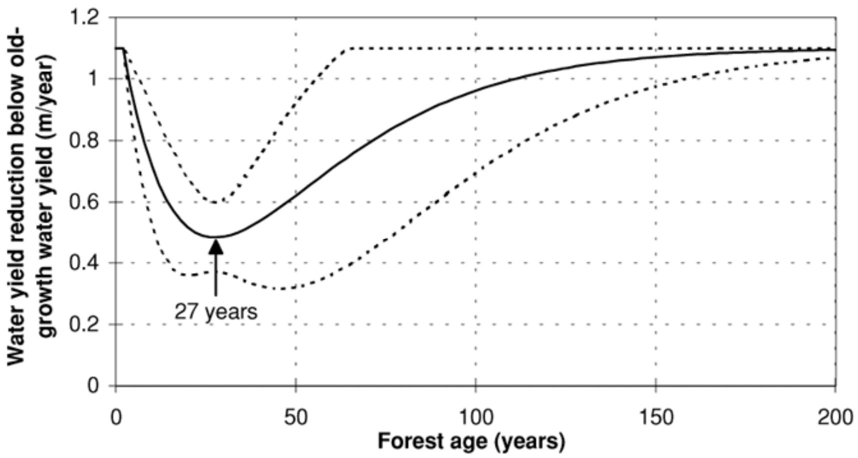


Figure 10.3.1.2 The "Kuczera Curve' as used to estimate water yield loss in Ash Forests (Watson 1999)

10.3.2 Causes of Water Yield Reduction in Regenerating Forests

In the Mountain Ash forests of south-east Australia, forest age is a major determinant of catchment runoff rate. It is now well documented that regrowth Mountain Ash Forest yields significantly less runoff than old-growth Mountain Ash. A great deal has been revealed about the hydro-ecological functioning of Mountain Ash forests through investigations on root development, stand structure, tree water relations and nutrient cycling (Watson 1999).

Watson (1999) states that the Leaf Area Index (LAI) is a major determinant of a number of hydrologic processes in forests. Vertessy et al (1998) states that the LAI controls the amount of plant transpiration and rainfall interception. Younger stands of Mountain Ash contain a higher Leaf Area Index (LAI) per unit of area and this is the key to the greater evapotranspiration difference between mountain ash stands of different ages.

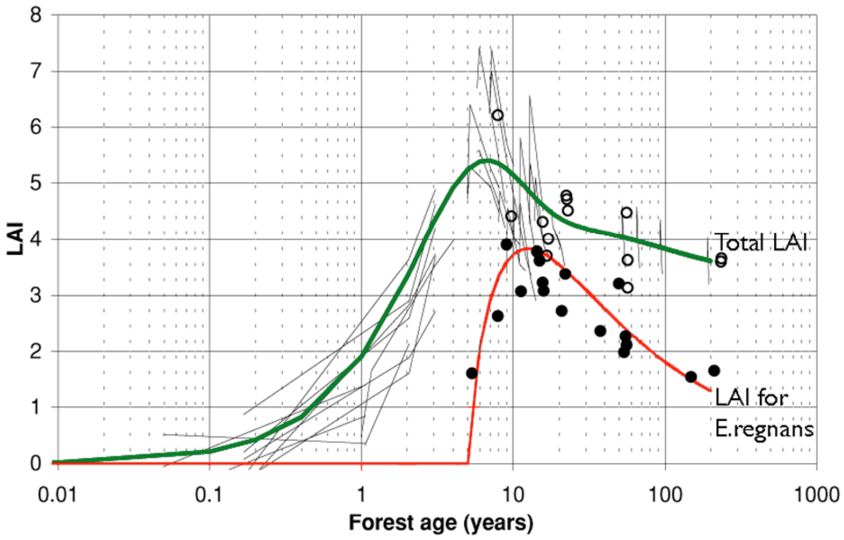


Figure 10.3.2.1 Leaf Area Index (LAI) following disturbance for a Mountain Ash Forest (Watson 1999)

Vertessy et al (1998) noted that the LAI of a mountain ash forest increases to a value of 4.0 at the age of 15 years and then decreases to about 1.3 at age 235 years, resulting in a threefold difference. The other Ash type species, that being Shining Gum *E. nitens*, and Alpine Ash *E. delegatensis*, appear to exhibit similar downward trends in LAI with age. In absolute terms Shining Gum is similar to Mountain Ash whilst Alpine Ash exhibits slightly lower total LAI in keeping with its preference for higher, colder sites. As expected, the drier, 'mixed species' forest type exhibits still lower LAI, with insufficient data to reveal any age trend. Finally, E. sieberi, which occupies the driest sites, exhibits the lowest LAI of the eucalypt forest types (Watson 1999).

The amount of water used by Mountain Ash Forests of different ages was studied and noted by Vertessy et al (1998). Here, the area of a trees' sapwood and the rate of water that passes through it is measured. For a stand of Mountain Ash, the volume of water passing through the sapwood did not vary greatly between the ages and was found to be a mean average of 11.6cm per hour for the six warmest months of the year. However, the total area of sapwood area greatly varied between the age classes. For a forest stand of 15 years, the total area of sapwood conducting water was measured at 10.6sq.m per hectare. At age 240 years, the sapwood area decreased to 3.6sq.m per hectare. As Vertessy et al (1998) assumed the sap velocity to be constant across the age classes, this threefold difference in sapwood area for Mountain Ash Forest overstorey translated into a threefold increase in transpiration for younger stands of Mountain Ash Forest.

The LAI for the understorey also increases with forest age. It was noted by Vertessy et al (1998) that the LAI increased from 0.1 in a 6 year old stand to 3.0 in an old growth stand. However, understorey trees were found to transpire significantly less on a per unit leaf area than the overstorey trees.

With regard to soil/litter evaporation, the study by Vertessy et al (1998) compared water yield loss between regrowth and old mountain ash stands. The study found that in an 11-year-old stand (with 15m tall mountain ash trees closely spaced at 2625 trees per hectare), with very little understorey vegetation, resulted in a mean daily soil and litter evapotranspiration rate of 0.36mm per day. For a 235 year old (80m tall mountain ash stand with a spacing of 50 trees per hectare), the Soil/Litter evapotranspiration decreased to 0.28mm per day. It is estimated that soil/litter evaporation accounts for 10-11% of annual evaporation from a mountain ash forest.

Further water yield losses are attributable to rainfall interception. This is where rainfall, landing on the leaves and stems of trees evaporates. The referenced study found that the rainfall interception rate peaked at 25% when the mountain ash forest was at the age of 35 years and declines slowly to about 15% by the age of 235 years. For a forest of a mean rainfall of 1800mm, stands aged 30 years intercept 190mm more rainfall than old growth forest aged 240 years.

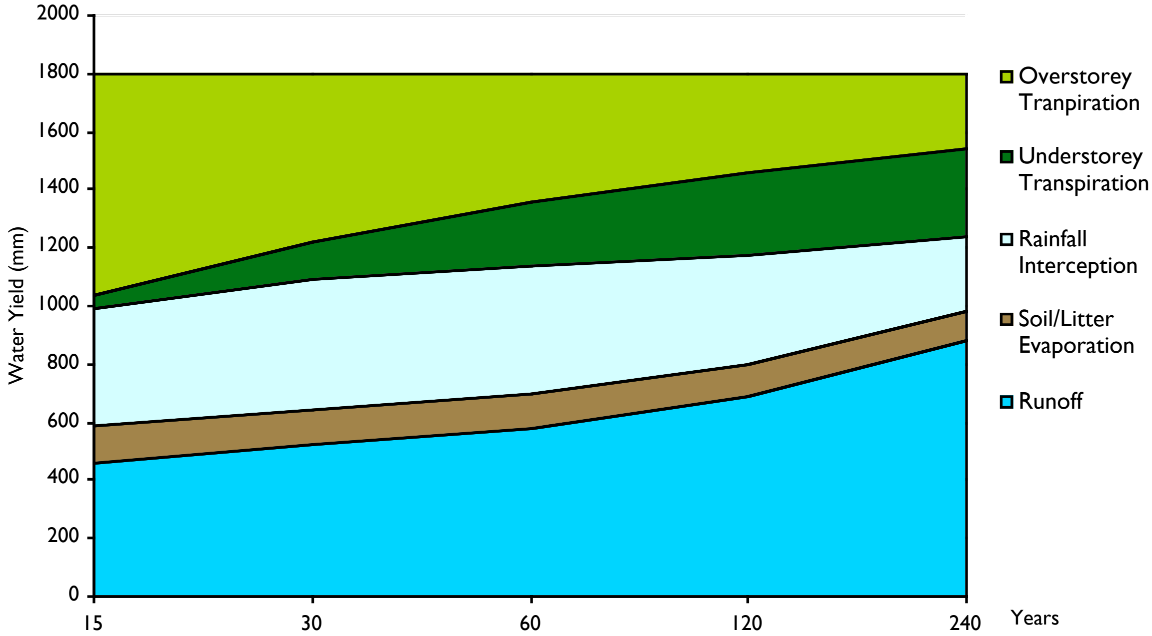


Figure 10.3.2.1 Water balance quantity estimates for 5 different age classes in Mountain Ash Forest showing increasing stream runoff with increasing forest age (Vertessy et al 1998)

Vertessy et al (1998) noted that water yield changes were difficult to detect if less than 20 percent of the catchment is disturbed. However, if disturbance is concentrated within a high rainfall area, these impacts may become obvious. For example, Vertessy et al (1998) notes that more than half of the Maroondah Catchment is Mountain Ash, yet it yields about 80 percent of water runoff because it is situated in the wettest areas. As the Forest Industry considers Ash Forest valuable for timber and pulp, it concentrates on species occurring in high rainfall areas. This is the case with logging in the Thomson Catchment.

10.4 Predicting impacts on Water Yield in the Thomson Catchment

Peel et al (2000) detailed a series of tests and predictions within the Thomson Catchment. Using the 'Macaque Model', Peel et al (2000) aimed to demonstrate the utility for management and planning within the Thomson Catchment.

As part of the study, Peel et al (2000) identified the Leaf Area Index (LAI) for a number of prominent tree species occurring with in the catchment along with their age classes. Together with taking account of the aspect of mountain slopes, altitude and mean annual precipitation patterns across the catchment, Peel et al (2000) processed the data to ascertain the changes in water yield following disturbance to the forest.

This section provides an overview of the simulated impacts that disturbance has on the forests within the Thomson Catchment. As Peel et al (2000) noted, different tree species vary with their LAI and water uptake. Map 10.4.1 details their distribution across the catchment. Table 10.4.1 lists the respective maximum and long term LAI of the primary species as detailed by Peel et al (2000). Table 10.4.2 lists five widespread species occurring within the high rainfall areas of the catchment with respect impacts that has on water yield. This is referenced from Figures 10.4.1, 10.4.2, 10.4.3, 10.4.4 and 10.4.5 where simulated changes to Water Yield following disturbance are plotted against time.

These figures were to provide an indication and were examples of the range of water yield responses to disturbance for the different species across the Thomson Catchment using the Macaque Model (Peel et al 2000).

Forest Type	**Maximum LAI**	**Long-term LAI**
Mountain Ash *Eucalyptus regnans*	6.0	3.5
Alpine Ash *Eucalyptus delegatensis*	5.7	3.2
Shining Gum *Eucalyptus nitens*	6.0	3.5
Messmate *Eucalyptus obliqua*	3.5	3.5
Silvertop Ash *Eucalyptus sieberi*	2.937	2.397
Snow Gum *Eucalyptus pauciflora*	2.5	2.5
Myrtle Beech *Nothofagus cunninghamii*	4.5	4.5
Silver Wattle *Acacia dealbata*	3.907	3.907

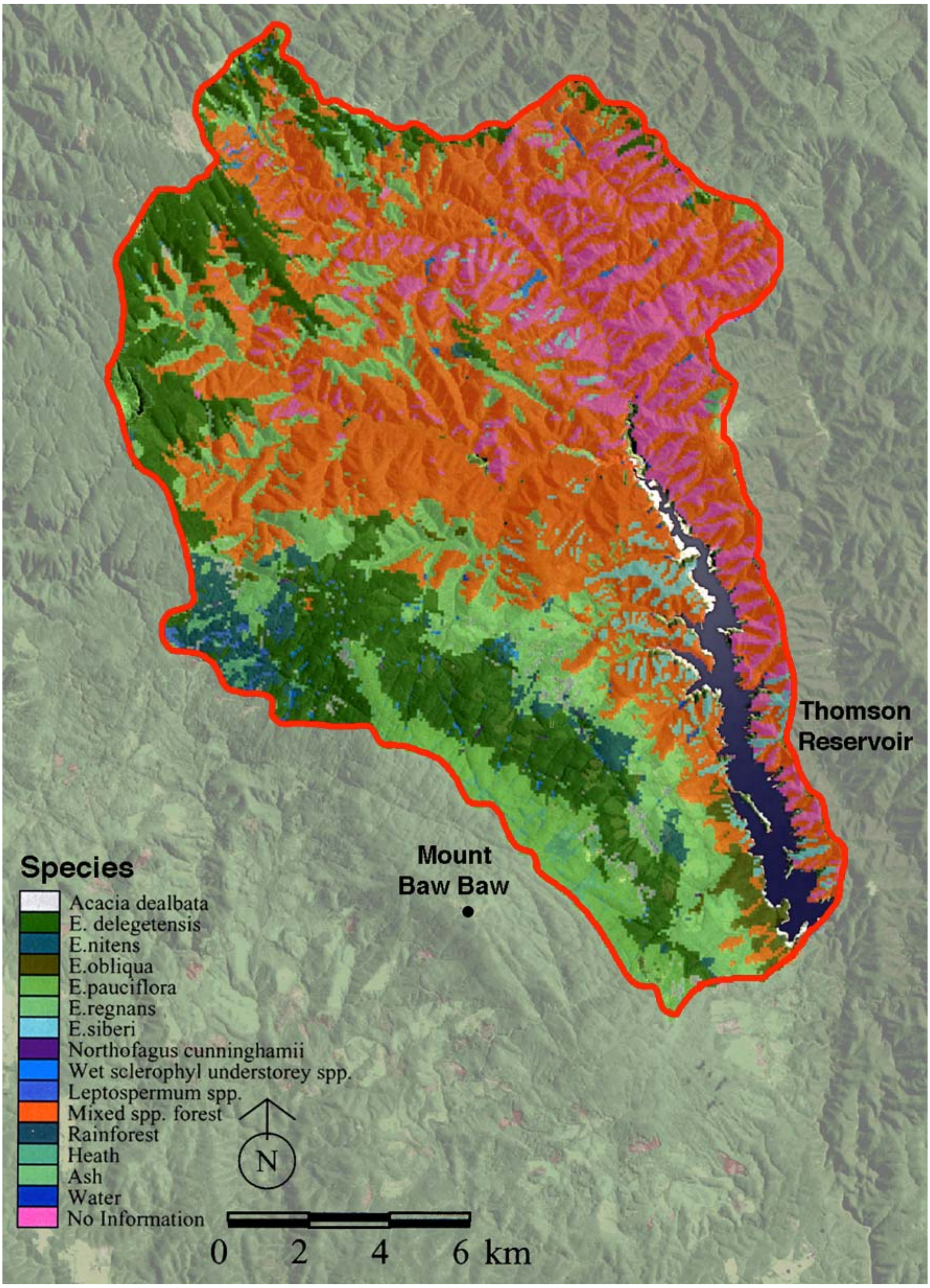
Table 10.4.1 Long term trends in Leaf Area Index (LAI) and maximum leaf conductance for the forest types present at the Thomson (Source – Peel et al 2000)

Forest Type	Total Forest Area (ha)	Percentage of Thomson Catchment Area	Forest available for Logging (ha)	Percentage of that Forest Type available for logging	Maximum Potential Water Yield Runoff per year (ML)	Percentage of Maximum Total Water Yield
Ash Forest	16,613	34.8%	11,133	67%	197,694.7	63.9%
Mixed Species	20,106	42.1%	10,333	51.4%	46,243.8	14.9%
Mixed	4,863	10.1%	0	0%	9,239.7	3%
Alpine	1,917	4%	0	0%	19,170	6.2%
Scrub	2,095	4.4%	0	0%	24,930.5	8%
Water	2,124	4.4%	0	0%	11,682	3.8%
Total	**47,718**	**100%**	**21,466**	**44.9%**	**308,960.7**	**100%**

Table 10.4.2 Area breakdown of the Thomson Catchment by Species (Read Sturgess 1994)

Forest	Species	Area of Species (ha)	% of total Catchment Area	Annual Rainfall (mm)	Old Growth Yield (mm)	Regrowth Yield (mm)	Difference in Yield (mm)
Alpine	Snow Gum	3,386	7%	2475	1546	1309	237
Ash	Mountain Ash	5,283	11%	1933	692	0	**692**
	Alpine Ash	9,193	19%	2220	1125	386	**739**
	Shining Gum	1,320	3%	2234	1036	359	**677**
Mixed	Messmate	20,106	42%	1184	238	46	192

Table 10.4.3 Table detailing simulated impacts of water yields following the logging an old-growth forest and replacing it with a regrowth stand in the Thomson Catchment (Source – Peel et al 2000, Read Sturgess 1992, Read Sturgess 1994)



Map 10.4.1 Thomson Catchment detailing species distribution across the Thomson Catchment (Source – Peel et al 2000)

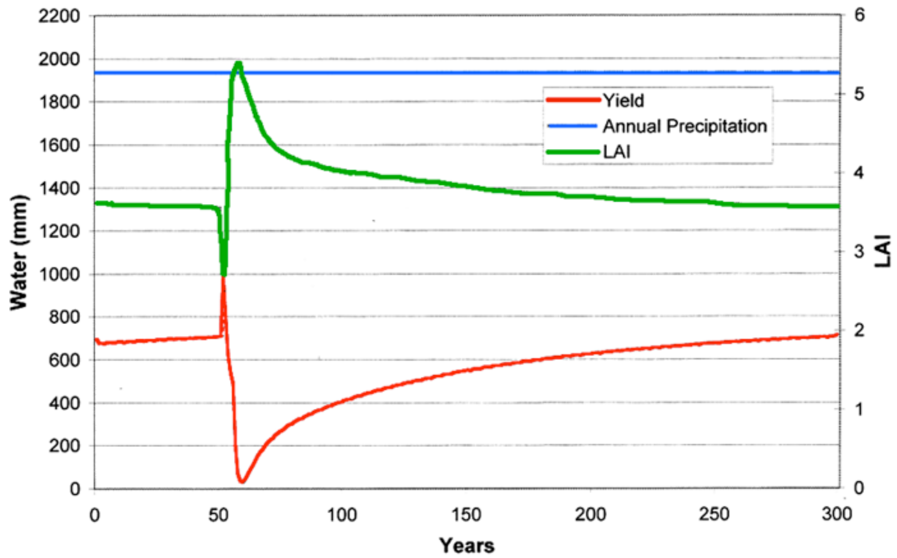


Figure 10.4.1 Results for a Mountain Ash Forest using a synthetic climate with a time series on annual water yield, annual precipitation and LAI (Source – Peel et al 2000)

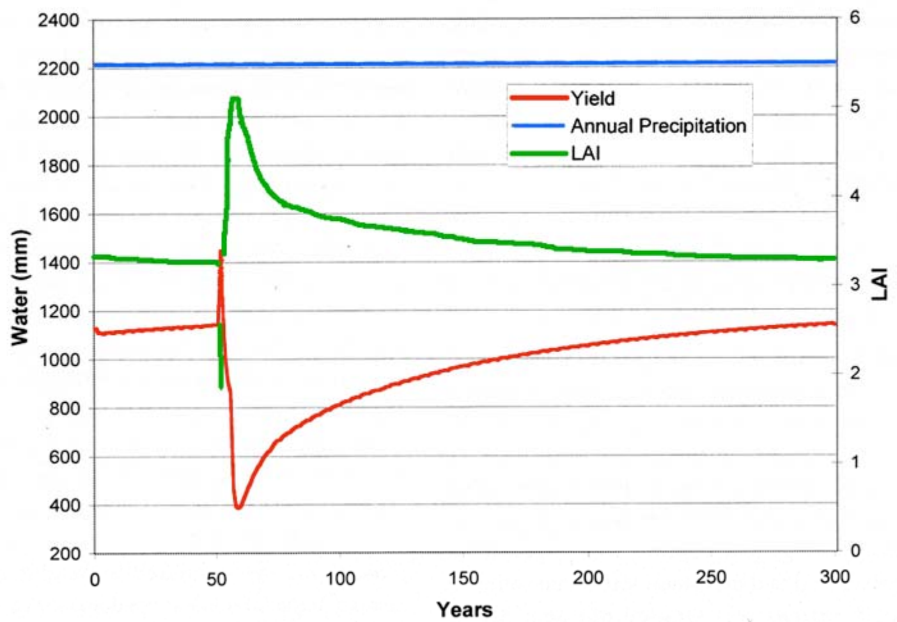


Figure 10.4.2 Results for an Alpine Ash Forest using a synthetic climate with a time series on annual water yield, annual precipitation and LAI (Source – Peel et al 2000)

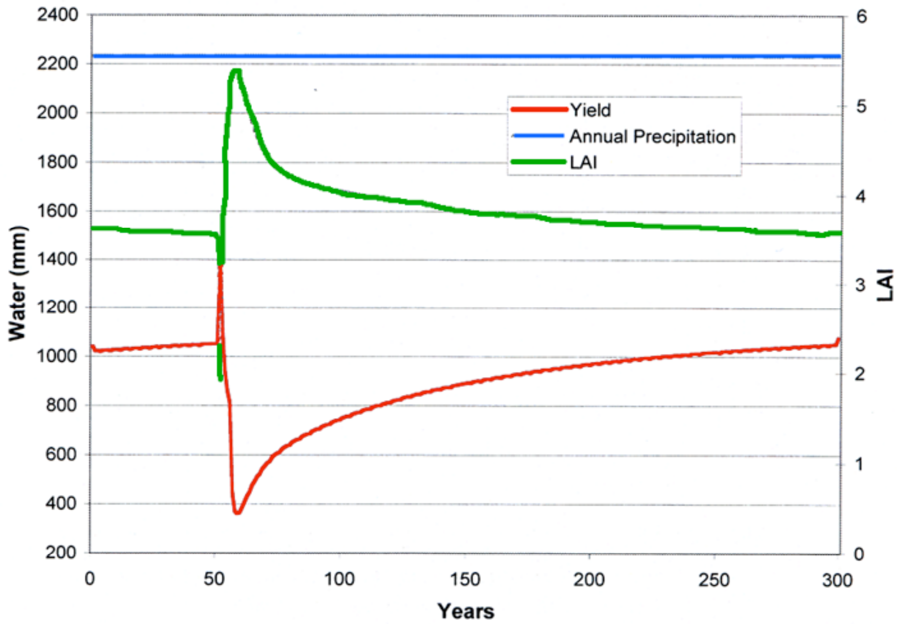


Figure 10.4.3 Results for a Shining Gum Forest using a synthetic climate with a time series on annual water yield, annual precipitation and LAI (Source – Peel et al 2000)

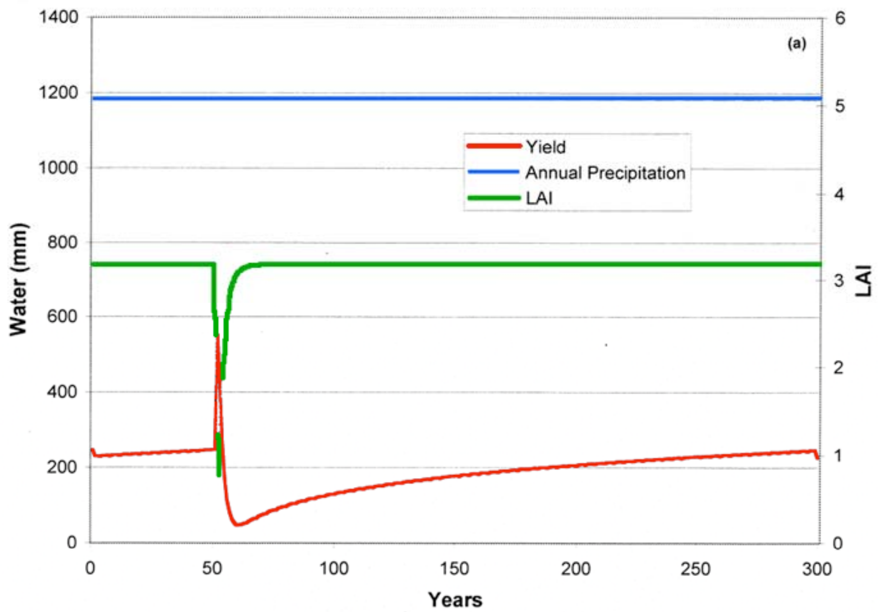


Figure 10.4.4 Results for a Mixed Species (include. Messmate) Forest using a synthetic climate with a time series on annual water yield, annual precipitation and LAI (Source – Peel et al 2000)

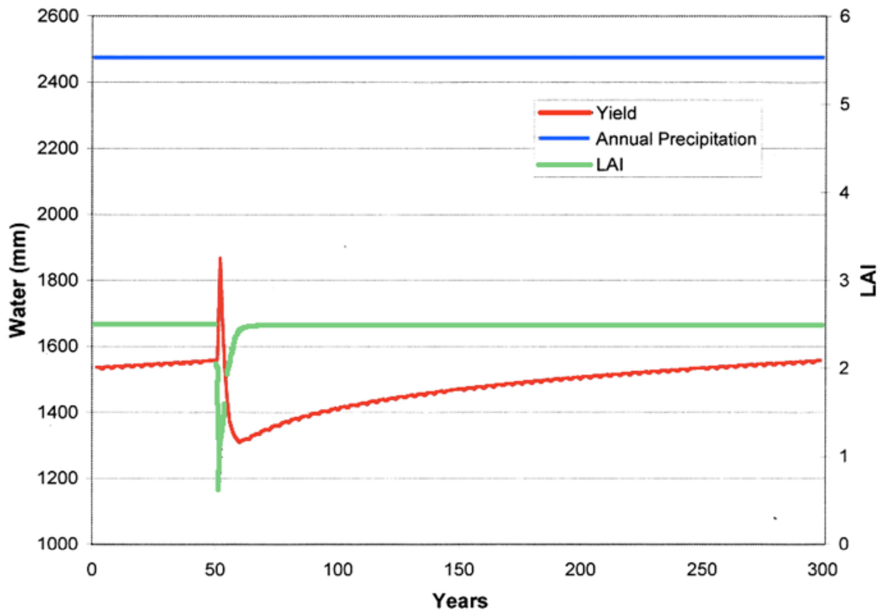


Figure 10.4.5 Results for Snow Gum using a synthetic climate with a time series on annual water yield, annual precipitation and LAI (Source – Peel et al 2000)

In Figure 10.4.6, Peel et al (2000) plotted the simulated water yield impact against the Mean Annual Precipitation (MAP) and provided the approximate prediction of the zone of maximum water yield reduction. It recognised that disturbance to Mountain Ash (E.regnans), Shining Gum (E.nitens) and Alpine Ash (E.delegatensis) resulted in the greatest reduction in water yield for the Thomson Catchment.

These simulations revealed that Mountain Ash, Alpine Ash and Shining Gum Forests have the greatest yield reductions following disturbance of the forest types in the Thomson Catchment. All these fall under the generic term 'Ash Forest' (Ref Figure 10.4.6).

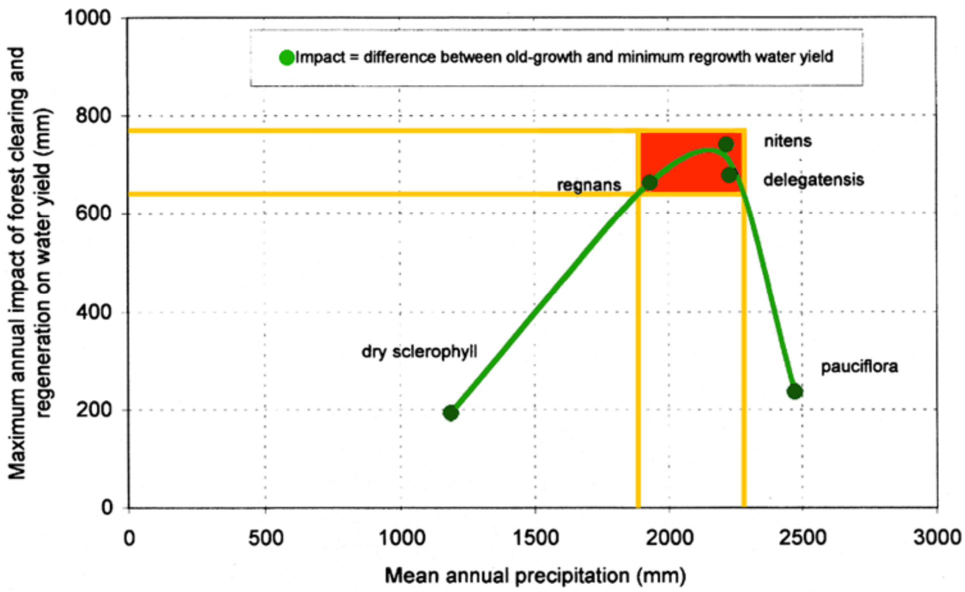


Figure 10.4.6 Macaque model suggests that maximum annual impact of clearfell logging and regeneration on water yields peaks at 2200mm Mean Annual Precipitation (MAP) on the ecotone between E.regnans (Mountain Ash), E.nitens (Shining Gum) and E.delegatensis (Alpine Ash) Forest (Source – Peel et al 2000)

Figure 10.5.1 Logging within the 'Ash Forests' of the Thomson Catchment with the Thomson Reservoir in the Background

10.5 Logging within the Thomson Catchment

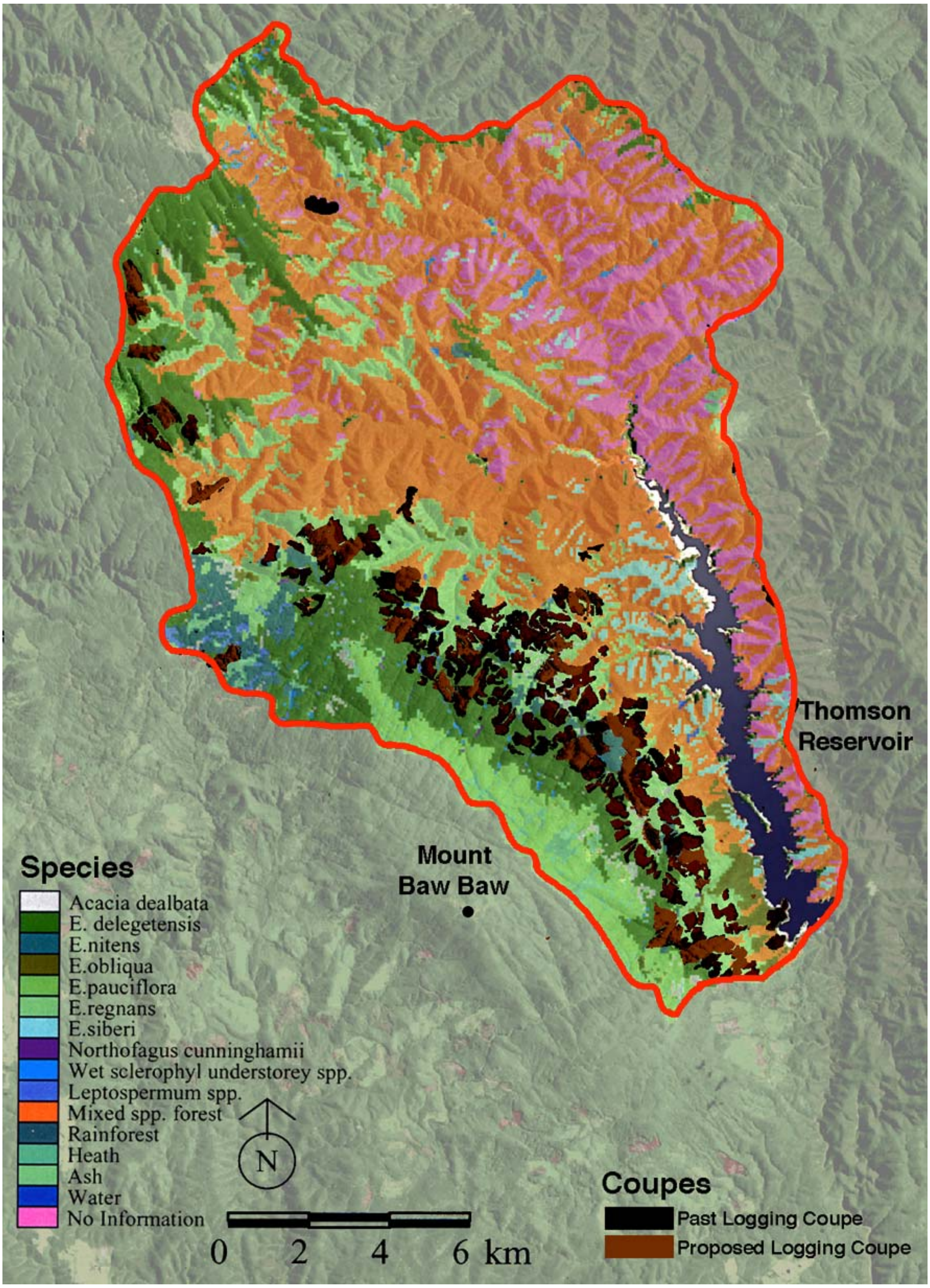
The Thomson Catchment is the only one of the four 'major' water catchments for Melbourne that is open to logging. Current forest prescriptions do not allow the area logged for any one year to exceed 150 hectares within the catchment (DSE 2006). The significant majority of the logging has focused on the 'Ash Forests' as Table 10.5.1 details below.

Table 10.5.1 Annual area cut within the Thomson Catchment (Source – DSE 2006)

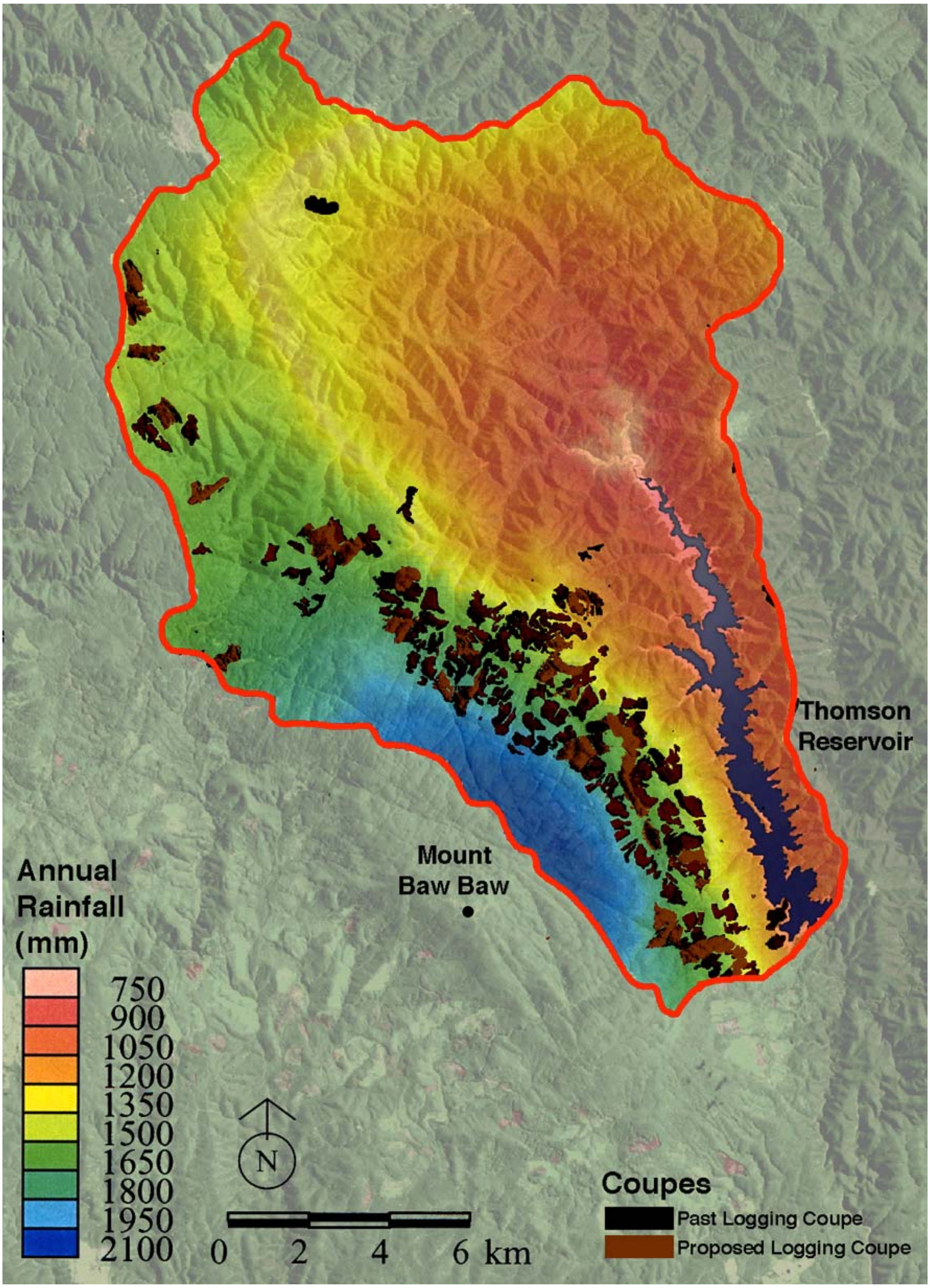
Season Ending June 30	Ash (ha)	Mixed Species (ha)	Other Species (ha)	Total Hectares	Percent of Ash to Total
1988	29	8	0	37	78%
1989	155	0	4	158	98%
1990	255	7	3	266	96%
1991	202	4	0	207	97%
1992	93	0	0	93	100%
1993	108	0	0	108	100%
1994	212	24	3	238	89%
1995	226	19	5	250	90%
1996	157	15	6	178	88%
1997	148	11	3	162	91%
1998	148	4	2	154	96%
1999	43	15	1	58	74%
2000	94	5	2	101	93%
2001	101	10	0	111	91%
2002	96	15	0	111	86%
2003	85	24	1	110	77%
2004	117	8	0	125	94%
2005	118	4	0	122	97%
Total	**2387**	**173**	**30**	**2589**	**92%**
Average	**132.6**	**9.61**	**1.67**	**143.8**	**92%**

As detailed in Table 10.5.1, an average of 92 percent of forest cut is Ash. These forests cover only 34.8 percent of the catchment (Read Sturgess 1994), however, they yield over 60 percent of the Thomson Reservoirs' water supply (refer to Map 10.5.1). Map 10.5.2 further reveals that logging is concentrated along this area where the high rainfall bands encircle the escarpments of Mount Baw Baw.

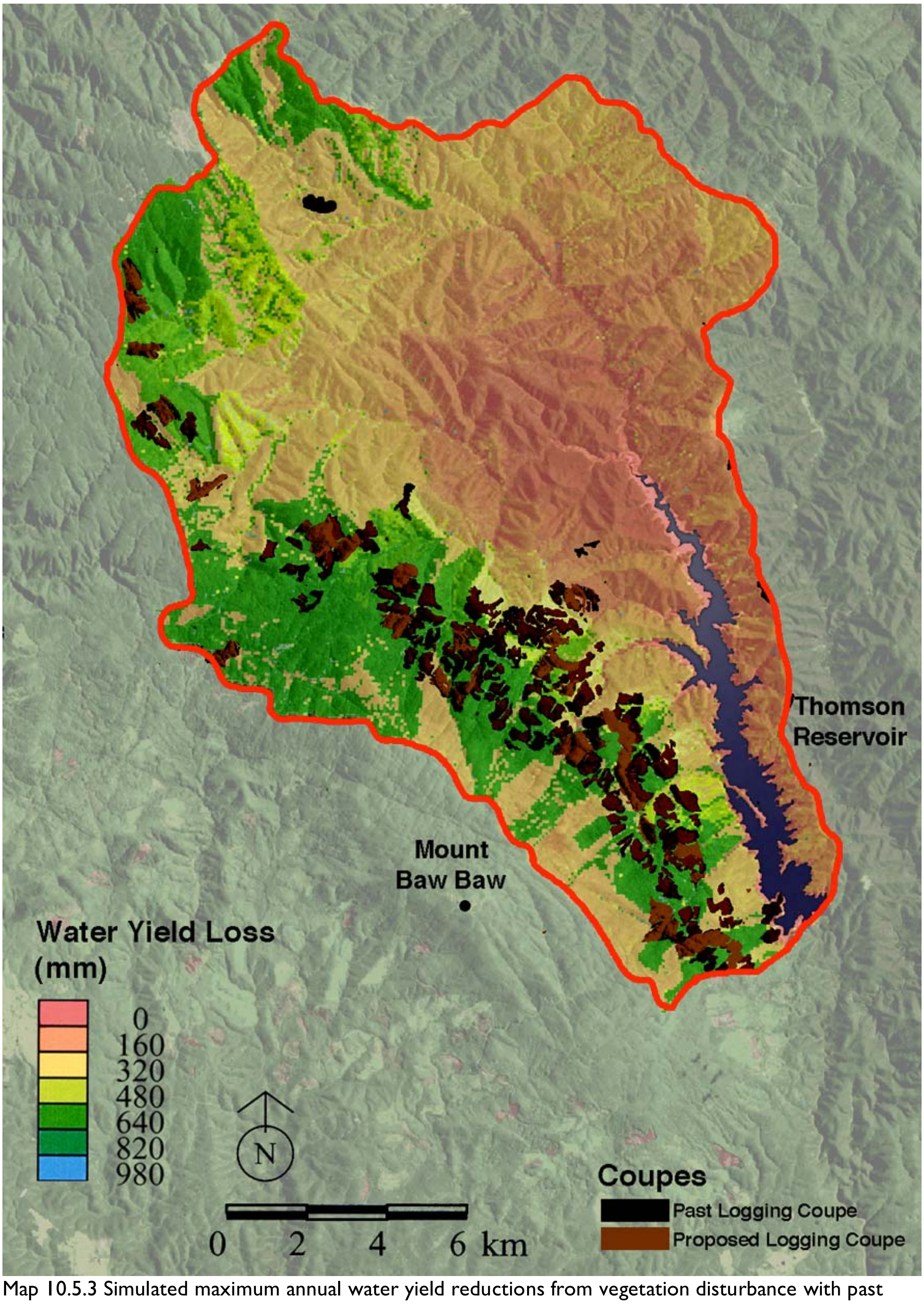
Note - The logging history on the maps date back to 1980. This was to coincide with the commencement of construction of the dam wall in 1976 and its completion in 1983 (Melbourne Water 2005).



Map 10.5.1 Past and proposed logging coupes concentrating on Ash Forest within the Thomson Catchment



Map 10.5.2 Past and current logging coupes occurring within areas of high rainfall within the Thomson Catchment



Map 10.5.3 Simulated maximum annual water yield reductions from vegetation disturbance with past and current logging coupes occurring within areas of high water yield impact (Based on – Peel et al 2000)

Peel et al (2000) details the maximum impact of vegetation disturbance on water yield calculated by subtracting post-disturbance minimum annual water yield from pre-disturbance average annual yield. This forms the base for Map 10.5.3. As detailed in Section 10.4, the greatest impact was found to occur within the ash forest. Map 10.5.1 details this area occurring mid slope along the escarpment of Mount Baw Baw. **Map 10.5.3 reveals that the significant majority of past and proposed logging occur within the vegetation zone where the impact and reduction on water yield is the greatest.**

With Ash Forest covering 33.5 percent of the Thomson Catchment (Alaouze 2004), the Ash forest cover approximately equates to 16,000 hectares with 11,000 hectares available for logging (Alaouze 2004). Table 10.5.1 notes that 2387 hectares of Ash Forest have been logged within the catchment since 1988 (DSE 2006). This equates to 15 percent of the total Ash Forest over an 18-year period. As the mean average area of Ash forest logged is 133 hectares per year, 11,000 hectares will be logged over an 83-year period. Vertessy et al (1998) notes that **for changes in water yield be detected on a catchment scale, at least 20% of the catchment has to experience disturbance. The area of high water yielding Ash Forest experiencing disturbance through logging is 67%. This is over 3 times the minimum threshold.** As the regenerating Ash forests reach a merchantable age, they will be logged again and the rotation will be repeated (according to Davies et al (1993), this can be as short as 50 years). This permanently holds the Ash Forests in a 'high water use' stage.

This finding is in contrast to the statement provided by the National Association of Forest Industries (NAFI) in its *'Submission to the Senate Rural and Regional Affairs and Transport Committee Inquiry into Rural Water Resource Usage'*, upon where is it stated that:

> *The Thomson Catchment covers an area of 48,700 hectares, with the forest industry harvesting ash timber from an area of less than 150 hectares per annum. At the present time, approximately 90 hectares or 0.18% of the catchment is harvested each year, producing 27,000 cubic metres of high value timber each year from the catchment. Over an 80-year rotation period, less than 20% of the catchment would be utilised for timber production. As is the case with plantations, the CRC Catchment Hydrology notes that "water yield changes are difficult to detect if less than 20% of the catchment is treated" by the harvesting of timber* (NAFI 2003).

In its submission, NAFI (2003) does not recognise that rainfall is variable across the catchment. As found by Peel et al (2000), drier forest types can a yield little to no water runoff and stream flow through these forests is depended on higher elevation forest where rainfall is greater.

10.6 Global Warming and the Thomson Catchment

In 2005, Melbourne Water published a study titled *'Implications of Potential Climate Change for Melbourne's Water Resources'* (Howe et al 2005). In its introduction, this report quotes the Water Resources Strategy for the Melbourne Area Committee finding that:

> *…..the increasing body of scientific evidence that gives a collective picture of a warming world and other climate changes and the potential of significant implications for our water resources systems. The Committee recommended that Melbourne Water and the retail water companies continue ongoing, active evaluation of climate change impacts on water supply and demand measures* (Howe et al 2005).

The report found identified major risk areas for water supply being:

- Reduced water supply due to decreased stream flows
- Increased risk of bushfires in catchment areas with associated risk of decreased stream flow

- Reduced environmental condition of streams with associated implications for water harvesting in regulated and unregulated streams

As part of its recommendations for catchments and recommendations, the report requests that:

- **Forested catchments are managed to minimise the water yield impacts from disturbances such as bushfires or logging**

- Evaporation reduction or rainfall enhancement measures are implemented

10.7 Implications for Future Management

The Committee for the Strategy Directions Report recognise that there are long term benefits from a water yield perspective of the gradual phasing out of existing logging from within Melbourne's water supply catchments (Water Resources Strategy Committee 2002). The report states that:

> *As an indication of the potential volumes of water involved, the gradual phasing out of logging in the Thomson catchment by 2020 could provide an estimated additional average annual volume of water of 20,000 ML in 2050* (Victorian Government 2005)

Creedy et al (2001) also demonstrated that the decision not to log the Thomson more than doubles its net present value when compared to the current management policy that allows logging to continue. Creedy et al (2001), from their economic analysis, found that:

> ***....given the Thomson Catchment is already an established forest, its net present value is maximised by taking advantage of the high water yield and carbon stock, rather than forgoing these to earn the profits from its timber resource.***

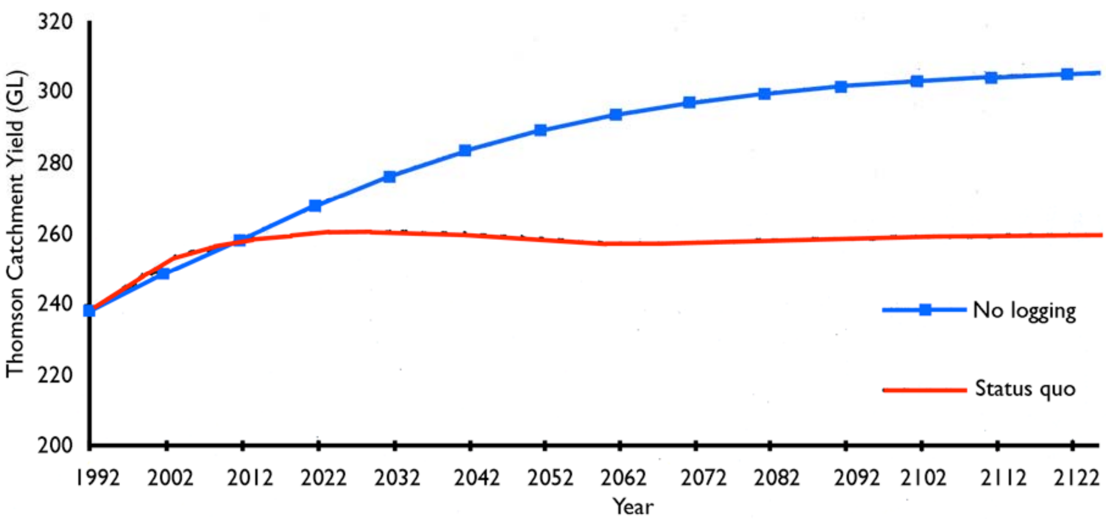


Figure 10.7.1 Predicted Yield analysis comparing a 'No Logging' scenario to one where current logging practices are maintained indefinitely (Source – Read Sturgess 1994).

With simulated evidence showing that logging is having an impact in water yield within the Thomson, along with risks identified by Melbourne Water with regard to Global Warming, it is recommended that a comprehensive impact study be made on the Thomson. All logging must cease whilst the investigation is underway to minimise any further potential degradation. The study must be conducted in an independent and transparent manner.

Key References

Creedy J, Wurzbacher A (2001), 'The economic value of a forested catchment with timber, water and carbon sequestration benefits', Ecological Economics 38, pp71-83

Howe C, Jones R, Maheepala S, Rhodes B (2005), 'Implications of Potential Climate Change for Melbourne's Water Resources', (CSIRO, Victorian Government and Melbourne Water)

Peel M, Watson F, Vertessy R, Lau A, Watson I, Sutton M, Rhodes B (2000), 'Predicting the Water Yield Impacts of Forest Disturbance in the Maroondah and Thomson Catchments using the Macaque Model – Technical Report 00/04', (Cooperative Research Centre for Catchment Hydrology, Melbourne Water, DNRE)

Read Sturgess and Associates (1992), ' Evaluation of the Economic Values of Wood and Water for the Thomson Catchment', (Read Sturgess and Associates).

Read Sturgess and Associates (1994), 'Phase Tow of the Study into the Economic Values of Wood and Water for the Thomson Catchment', (Read Sturgess and Associates).

Vertessy R, Watson F, O'Sullivan S, Davis S, Campbell R, Benyon R, Haydon S (1998), 'Predicting Water Yield from Mountain Ash Forest Catchments', Cooperative Research Centre for Catchment Hydrology

Water Resources Strategy Committee (2002), '21st Century Melbourne: a WaterSmart City Strategy Directions Report', (Victorian Government)

Watson F (1999), 'Large scale, long term, physically based modeling of the effects of land cover change on forest water yield', PhD dissertation

Watson F, Vertessy R, McMahon T, Rhodes B Watson I (1999), 'The Hydrologic Impacts of Forestry on the Maroondah Catchments – Report 99/1', (Cooperative Centre for Catchment Hydrology, Melbourne Water)

11.0 Unlawful Logging within the Thomson Catchment

11.1 Introduction

In the winter of 2006, coupe 353-501-0001 was logged. Part of this coupe falls within Thomson Water Catchment. The catchment is closed to logging operations between May 1st and November 30th as stipulated in Appendix R of the Central Highlands Forest Management Plan. In addition, the location of the coupe was not revealed in the Timber Release Plan issued by VicForests. The Sustainable Forests (Timber) Act 2004 requires that the details of the location of logging to be included in the Timber Release Plans. This did not occur. As a result, the community was not adequately informed about VicForests' and DSE's intent to log an area of what scientists and the community regard as a significant site for water catchment and biodiversity. Therefore, in reference to the above, **the logging of coupe 353-501-0001 was 'unlawful'.** This is covered in the following sections:

- Details of the Logging Operation (Section 11.2)
- Non-compliance with Forest Management Plans and Legislation (Section 11.3)

11.2 Details of Logging Operation

Coupe 353-501-0001 is planned on the amended Timber Release Plan schedule to be 34 hectares in size and to employ the 'Seed Tree' method of logging. The coupe is located within the Dandenong Forest Management Area and directly adjoins the Upper Yarra Water Catchment Boundary in the Yarra Ranges National Park on its western boundary, directly adjoins the Baw Baw Frog Moratorium Zone and Nine Mile Road on the eastern boundary and has the western boundary of the Thomson Water catchment running through the northern half of the coupe. The coupe had a known site of the endangered Leadbeater's Possum within its eastern boundary and has several other known sites within close proximity. The area is also monitored for known populations of the critically endangered Baw Baw Frog and other important species, such as the Powerful Owl, Smoky Mouse and Broad Toothed Rat – all species that give the region its rating as a Site of Global Zoological Significance (Mansergh et al 1982).

Figure 11.2.1 Looking towards the boundary of the Yarra Ranges National Park within Coupe 353-501-0001

The coupe contained Cool Temperate Mixed Rainforest. The application of seed tree logging, which is near identical to clearfell logging, is considered a threat to this forest community as it has been noted that it does not regenerate following logging (Peel 1999). Much of the rainforest component, that being of Myrtle Beech *Nothofagus cunninghamii* has been pushed over or logged. Peel (1999) stated that the rainforest component does not regenerate after the logging and applied high intensity regeneration burn, resulting in a changed plant species composition to a drier forest type. This can make the forest more susceptible to frequent and high intensity wildfires.

Figure 11.2.2 Recently logged Cool Temperate Mixed Rainforest within coupe 353-501-0001. The coupe adjoins the designated Baw Baw Frog Habitat near the Montane Fens, near Mount Baw Baw. The Rainforest component, the being Myrtle Beech, has been pushed over and will be burnt

Figure 11.2.3 Evidence of the logging of rainforest species in coupe 353-501-0001

The coupe also contains part of the Thomson Water Catchment. The Thomson is closed to logging between May 1 and November 30 as outlined in Appendix R of the Central Highlands Forest Management Plan. Figure 11.2.4 shows the eastern boundary of the coupe being Nine Mile Road and following the western boundary of the Thomson. It reveals how the coupe drains into the Thomson watershed towards the northern half of the coupe.

Figure 11.2.4 Coupe 353-501-0001 with Nine Mile Road on the left marking the boundary of the Thomson Water Catchment

11.3 Non-compliance with Forest Management Plans and Legislation

The Thomson is listed as a *Special Water Supply Area* under the Catchment and Land Protection Act 1994. The Central Highlands Forest Management Plan makes reference to this by stating that:

> Fifteen areas (see Appendix R) in State forest in the Central Highlands are identified as Special Water Supply Catchments Areas under the Catchment and Land Protection Act 1994. These are the basis for Special Area Plans which specify how particular land management issues in the Special Water Supply Area must be addressed. Land Use Determinations and Land Use Notices prepared for the Proclaimed Catchments now become Special Area Plans. NRE must have regard to any Special Area Plan applying to land under its control.

The plan continues to point out that:

> Special Water Supply Catchment Areas were identified because of their significance as water supply catchments. They vary in size, soil type and land-form characteristics and in the uses made of the water harvested from them. Because of these variations, Special Water Supply Catchment Areas do not provide a suitable basis for strategic forest management planning. Accordingly, they will be managed as part of the GMZ, subject to the relevant Special Area Plans, standard prescriptions and Code requirements.

Appendix R of the Central Highlands Forest Management Plan states that the Thomson Water Catchment is closed to logging between May 1 and November 30. Further to this, the Code of Forest Practice for Timber Production require that:

> Commercial Timber Harvesting operations will be based on a Forest Coupe Plan prepared and approved in advance of the commencement of operations. **This plan will be prepared with reference to higher level regional plans that address** coupe siting, **water quality protection**, roading, flora and fauna conservation and **any other relevant plans and prescriptions**.

The Central Highlands Forest Management Plan is referred to in the Forest Act 1958 as a *working plan*. The Act defines a working plans as a:

> ….a detailed scheme for the control and regulation of the working of a forest or any part thereof and for ensuring the maintenance of a sustained yield of forest produce therefrom.

Section 22 of The Forest Act 1958 requires the secretary to:

> …prepare and cause to be put into operation working plans with respect to the control, maintenance, improvement, protection from destruction or damage by fire or otherwise, and removal of forest produce in and from each State forest and any part thereof;

Section 99 of the Forest Act 1958 calls for:

> The Governor in Council may make regulations not inconsistent with the provisions of this Act for all or any of the following purposes, namely: Prescribing such annual cutting sections as are deemed necessary under a working plan;

As the coupe 353-501-0001 was logged between May 1 and November 30 2006, it was non-compliant with the seasonal restrictions as outlined in Appendix R of the Central Highlands Highlands Forest Management Plan.

The coupe also did not appear on the Timber Release Plan Maps as required by the Sustainable Forests (Timber) Act 2004. Section 37 requires:

> VicForests to prepare timber release plan
>
> (1) VicForests must prepare a timber release plan in respect of an area to which an allocation order applies for the purposes of -
>
> (a) Harvesting and selling, or harvesting or selling, timber resources and
>
> (b) Undertaking associated management activities in relation to those timber resources.
>
> (2) A timber release plan is to be for a period not exceeding 5 years.

The Act continues to state in Section 38:

> (1) A timber release plan must include -
>
> (a) A schedule of coupes selected for timber harvesting and associated access road requirements
>
> **(b) Details of the location and approximate timing of timber harvesting in the proposed coupes**
>
> **(c) Details of the location of any associated access roads**

Section 41 of the Act also states that:

> *A notice published under sub-section (1) must include details of where the approved timber release plan may be viewed*

This breach of law prevented the community from being adequately informed about the location of coupe 353-501-0001. The coupe proceeded and also resulted in the destruction of Cool Temperate Mixed Rainforest, a rainforest community that does not recover after clearfell logging and burn (Peel 1999), logging within proximity of the Baw Baw Frog Habitat, logging a known site of the endangered Leadbeater's Possum along with several other endangered and threatened species noted by the DSE BioMap (2006). The coupe is featured in the following figures.

Figure 10.6.3 Stags pushed over. These provide habitat for the Leadbeater's Possum that are found throughout the immediate area. These provided habitat for the endangered Leadbeater's Possum that are to be found in the area.

Key References

DNRE (1998), 'Central Highlands Forest Management Plan'

DNRE (1996), 'Code of Forest Practices for Timber Production'

Victorian Government (2006), 'Sustainable Forests (Timber) Act 2004'

Victorian Government (2006), 'Forests Act 1958'