North West Tree Growers Field Day
Saturday 25\textsuperscript{th} February 2017

NOTES

\textit{Eucalyptus nitens} milling and drying trial and special species management

Wynwood Sawmill and Freeman Property

Program

10:30am  
STOP 1 - Wynwood Sawmill (Ian Smith)
Registration and cup of tea.
Inspection & discussion of \textit{E. nitens} milling & drying trials & log prices.
Milling Hydrowood logs from Lake Pieman.

12:30 – 1:30pm  
LUNCH – Wynwood Sawmill
Includes NW Tree Growers group discussion.

1:30pm  
DEPART Sawmill for Freeman Property

2:00pm  
STOP 2 – Graham and Judy Freeman’s property
View successful integration of redwood, cedar, pine, cypress, Douglas fir and eucalypts into a beef cattle grazing property.
Inspect 35 year old Coastal Redwood, \textit{Sequoia sempervirens}, pruned to 8m and non-commercially thinned.
Discuss stand volumes, log prices and potential harvesting.

4:00pm  
CONCLUSION

Supported by:
STOP 1 - Wynwood Sawmill, 683 Deep Creek Road Wynyard 7325

STOP 2 – Freeman Property - 109 Kimberley’s Hill Road, Milabena 7325
STOP 1 - Wynwood Sawmill – Mr Ian Smith
683 Deep Creek Road, Wynyard 7325, Ph 6442 3041 (find them on facebook)
STOP 2 - Property of Graham & Judy Freeman
109 Kimberleys Hill Road, Milabena, Tasmania 7325

1. Background
The Freemans have succeeded in showing that trees and farming can be successfully integrated in a property’s whole farm plan. The benefits from trees compliment the farm’s ultimate production potential, as well as achieving maximum multiple land use from the environmental aesthetic and amenity benefits.

Graham came from the Montumana farming area 18km west of the town of Wynyard on the North West coast of Tasmania. In 1979 he purchased a 64.8 hectare property at 109 Kimberleys Hill Road, Milabena, 12 km south of Montumana, and 19 km south west of Wynyard.

In 1988 the Freeman family leased a dairy property nearby for 6 years and during this time they built their house on their property.

They continued to expand their own farm by purchasing adjoining properties. In 1996 they increased their farm to a sustainable unit of 182 hectares, concentrating on cattle grazing and relinquished the dairy lease property.

The property consists of a mosaic of large flat grazing paddocks on the main Kimberleys Hill Road ridgeline, separated by different levels of steep rocky short slopes.

<table>
<thead>
<tr>
<th>Area:</th>
<th>182 hectares</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevation:</td>
<td>300m asl</td>
</tr>
<tr>
<td>Rainfall:</td>
<td>1500 mm/yr</td>
</tr>
<tr>
<td>Snow:</td>
<td>1-2 falls per year</td>
</tr>
<tr>
<td>Prevailing winds:</td>
<td>South westerly</td>
</tr>
</tbody>
</table>

The soil is predominantly high fertility red/brown clayey soils from tertiary basalt, with several small outcrops of quartz sandy loamy soils.

2. Management of the property
The primary production is cattle grazing, buying in 6 month old Angus calves, feeding for 12 months to 400-450kg weight, then on-sell to feedlot companies. Currently they have 101 hectares of grazing pasture with a carrying capacity 250 head. In 2005/06, with an approved Forest Practices Plan (FPP), 20 hectares of the native forest at the southern end of the property was cleared and harvested and sown into new pasture increasing the grazing area to a total 121 hectares and boosting the carrying capacity to 300 head.

There are about 45 hectares of previously cut-over wet sclerophyll native forest left, comprising of Stringybark (Eucalyptus obliqua) with scattered Blackwood (Acacia melanoxylon) which has been left for future selective harvest when the regrowth achieves merchantable size. This will allow the Freemans the medium term option to provide additional revenue for situations like a severe droughty year; replacement of farm machinery or a holiday away from the farm.
The Freemans aim to manage their property efficiently for environmental and economic benefits, with the full intention to achieve maximum land utilisation on their property. The property has quite a sizeable total area of steep rocky short slopes which separate the many grazing paddocks. Planting these slopes with commercial tree species will provide both environmental and economic benefits.

Economic benefits include financial returns from:
1. Sale of wood products when plantations mature;
2. Increased grazing return of better conditioned and faster growing Angus cattle provided by the sheltering benefit from the cold winters south-westerly wind; shading for stock on hot summer days; as well as increased grass growth/biomass through reduced soil moisture loss from reduction in prevailing winds by shelterbelts.

Environmental benefits include:
1. Prevention of soil loss by erosion from the steep rocky slopes;
2. Improving water quality around dams and streams; as well as
3. Increasing amenity and aesthetic values of the local landscape.

Photo 1: Foreground – Angus Beef Cattle.
Middle ground – 11 year old Coastal Redwood to the left and 21 year old Western Red Cedar to front and right. Planted around dam and stream catchment.
Background – Looking west from Freeman property towards the ‘Dip Range’.
3. Plantation Establishment and Management

In 1982 Graham started planting out a couple of areas of short steep rocky slopes on the western section of the first property. Due to his interest in specialty timber species, he selected Coastal Redwood (*Sequoia sempervirens*) and Swamp or Stringy Gum (*Eucalyptus regnans*).

There was a time-lapse while they were building their own house and establishing the big garden. Later, during the period 1995 to 2004, he re-started his planting program to utilise the remaining available non-farming land, as well as reforesting areas where mature stands had been harvested.

The commercial specialty timber and amenity species planted included Monterey Cypress (*Cupressus macrocarpa*); Mexican Cypress (*Cupressus lusitanica*); Leyland Cypress (*Cupressocyparis leylandii*); Radiata Pine (*Pinus radiata*); Blackwood (*Acacia melanoxylon*); Western Red Cedar (*Thuja plicata*); Douglas Fir (*Pseudotsuga menziesii*); Shining Gum (*Eucalyptus nitens*); Western Hemlock (*Tsuga heterophylla*); Stringybark (*Eucalyptus obliqua*); Yellow Stringybark (*Eucalyptus meulleriana*); Lodgepole Pine (*Pinus contorta*); Himalayan Cypress (*Cupressus torulosa*); Japanese Cedar (*Cryptomeria japonica*).

The total established plantation area is about 14 hectares. The extensive locations of these species established in the property are shown in the aerial photograph on page 6.

In 2001, during the latter part of the plantation establishment period, the Freemans obtained some grant funding from the Natural Heritage Trust, as part of the Integrated Farm Forestry Project which was administered by Private Forests Tasmania (PFT). The project involved the establishment and management of plantations and/or shelterbelts on cleared agricultural land for environmental and economic benefits (as described above). PFT assisted the Freemans prepare a stand development plan for their 2002-2004 new planting sites. The grant funds were put towards the costs of material for wallaby-proof fencing, seedlings and fertiliser at planting. Graham provided all the labour. One condition of the funding project was that the Freemans must commit to self-fund and establish as least one hectare of plantation in the first year of the plan. The plan outlines all the establishment, silvicultural regime and management requirements for the agreed sites and species.

With the invaluable skills as a qualified professional chainsaw operator, and with his knowledge from the plantation management of the older stands, Graham was able to carry out all the works, diligently adhering to all environmental, safety and Forest Practices Code requirements. Site preparation generally involved chainsaw felling of scrub and scattered native trees, followed by excavator removal, dragging and heaping.
the slash down slope onto the lower paddocks, which were left to dry and then burned. The cleared slopes were sprayed with a glyphosate and brush killer mix, and followed by a burn. Graham erected vermin proof fences around each planting site. Spade hand-planting was the only option.

Fertiliser at 150g per tree of di-ammonium phosphate (DAP) was applied 6-8 weeks following planting. A follow up second and third year spray was applied around seedlings where required. For stands established for maximum clearwood production, Graham adhered strictly to the stand development plan and carried out all the silvicultural pruning and thinning work as scheduled.

Photo 3: 2006/2007 – Graham with his well pruned and thinned 11 year old Radiata pine. DBH 36cm (top), Total height 19.9m. Pruned height 6.5m (some up to 9m)

Note: The Radiata was initially the nurse crop for Leyland Cypress which was heavily browsed. Only a few of the very shade tolerant Leyland Cypress survived.
4. Extensive and diverse farm forestry plantings
5. Plantation Harvesting and Marketing

The first property Graham purchased came with a mature stand of Radiata Pine established in 1972. This stand was harvested twice, 0.6ha in 1996 and 0.3ha in 2003, when log prices were favorable. Graham did the tree falling, trimming, grading and cross cutting into the preferred log lengths of 3.7m, 5.5m and 11.0m. The whole operation also required the hire of a local excavator and driver, and a cartage truck and driver. Although the export market prices were favorable at the time, Graham elected to on-sell his wood to a local nearby sawmiller in Montumana which gave him a better price for his logs.

Although the stand was unpruned and unthinned, the mature trees with small branches still yielded 80% small knotty sawlogs for sawn framing timber; with the balance for the manufacture of vegetable boxes and pallets. The 2003 harvested area of 0.3ha yielded 400 tonnes; fetching a gross return of $11,200 from the Sawmill. Taking off $2,000 for the hire of both the excavator and truck, Graham netted an average run-of-bush stumpsage of $23 per tonne, a good price at the time.

There is still 0.4ha of these mature pines remaining which is a valuable asset for future cash income.

6. The Choice of Suitable Species

Since the first property purchase in 1979, Graham has had a vision to grow and harvest his own specialty timber. With only the knowledge from books about trees and timber, he took some considerable risks and decided in 1982 to plant his first two stands of Coastal Redwood and Swamp or Stringy Gum. Due to the available surplus seedling stocks at the then Forestry Commission Perth Nurseries, he was fortunate to obtain these seedlings at a cheap price. A large range of specialty timber species were planted in subsequent years with seed stocks from the Woodlea Nursery in Scottsdale.

One of the early establishment risks encountered was native animal browsing. Due to several unfortunate breaks along the erected perimeter fence of the 1995 planting of Leyland Cypress and Radiata Pine nurse crop, very high browsing losses resulted in many of the Leyland Cypress seedlings. With less Radiata seedling loss, Graham fortunately ended up with a very promising Radiata Pine stand, which he has diligently pruned and thinned on schedule. Growing on high fertility red basalt soil, these pines achieved an average diameter at breast height (DBH) of 30cm in 2006 (at age 11). This stand will be harvestable in
another 15 or so years, yielding large high premium clearwood veneer logs, which were highly demanded by the then Gunns Veneer Processing Plant in Somerset. In 2007, a comparable 2007 high stumpage price of $120 per cubic meter was paid for 28 year old pruned logs (average DBH 60-65cm) from a small 1.3ha stand at the Elliot Agricultural Research Station.

7. **North West Farm Forestry Field Day 2006**

Graham has certainly been very successful in the integrated management of both the farm and plantations. Private Forests Tasmania and Graham hosted a “North West Farm Forestry Field Day” in November 2006. The field day attracted 78 local farm foresters, private tree growers and landowners, with the opportunity to see the various successfully established and managed tree species at the property. A special portable sawmilling demonstration was also organised on-site, demonstrating the sawing of a large 34 year old “small knotty” radiata sawlog (from the remaining 0.4ha mature pine stand) and a few 24 year old Coastal Redwood thinning logs (from the 1982 first planted stand). The field day demonstrated the feasibility of on-site harvesting and processing of high value logs from small woodlots, which are traditionally not harvested by commercial logging contractors because of high logging costs and the economies of scale.

**Photo 5:**
Farm foresters, tree growers and landowners admiring the well-tended 24 year old Coastal Redwood at 2006 field day.

**Photo 6:**
On-site portable sawmill demonstration at 2006 field day. Sawmilling demonstration of a thinning log from the 24 year old Coastal Redwood stand.
8. Estimated Financial Returns

Estimated Harvest Product Values, Volumes and Financial Returns for Coastal Redwood and Radiata Pine as at 2013

Plantations at 109 Kimberleys Hill Road, MILABENA 7325

This information is an edited version of the full report prepared by Private Forests Tasmania.

Introduction
In January 2013, staff of Private Forests Tasmania (PFT), Arthur Lyons, David Bower and Henry Chan, visited the plantations of Graham and Judy Freeman to establish and measure growth monitoring plots. The plot measurements were analysed by Henry Chan using the Farm Forestry Toolbox, a computer model, to determine management regimes and options.

Included here are:
- a stand summary, financial analysis & returns and potential clearfell age for both
  - Coastal Redwood (*Sequoia sempervirens*) planted 1982 and
- Notes including: log grade sets, regime operation costs and ‘using NPV and IRR in decision making and
- Glossary
1982 Coastal Redwood

Table 1: 1982 Coastal Redwood Stand Summary (January 2013)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>30.5 years</td>
</tr>
<tr>
<td>Mean DBHob</td>
<td>49.0 cm</td>
</tr>
<tr>
<td>Stocking</td>
<td>375 stems/ha</td>
</tr>
<tr>
<td>Basal Area</td>
<td>71.2 m²/ha</td>
</tr>
<tr>
<td>Mean Dominant Height</td>
<td>18.7 m</td>
</tr>
<tr>
<td>Mean Annual Increment</td>
<td>15.7 m³/ha</td>
</tr>
<tr>
<td>Total Volume</td>
<td>479 m³/ha</td>
</tr>
<tr>
<td>Stand Value</td>
<td>$45,737/ha/ha</td>
</tr>
</tbody>
</table>

The well managed stand has good form pruned trees - a credit to Graham for his dedication in pruning the trees up to a 10 metre pruned height. The plantation is on fertile basalt red soil and exposed to the west.

Financial Analysis and Returns

The operational costs (Notes: Table 3), and the current log prices (Notes: Table 4) were analysed by the Toolbox for a range of clearfell age classes, with 5% discount rate. The returns for the various clearfell ages are summarised in Table 2.

Table 2: Revenue, Net Present Value and Internal Rate of Return

<table>
<thead>
<tr>
<th>Clearfell age (yrs)</th>
<th>Revenue ($/ha)</th>
<th>NPV ($/ha)</th>
<th>IRR (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>50,021</td>
<td>8,821</td>
<td>11.71</td>
</tr>
<tr>
<td>35</td>
<td>59,498</td>
<td>8,342</td>
<td>10.54</td>
</tr>
<tr>
<td>40</td>
<td>68,715</td>
<td>7,341</td>
<td>9.43</td>
</tr>
<tr>
<td>45</td>
<td>76,899</td>
<td>6,158</td>
<td>8.51</td>
</tr>
<tr>
<td>50</td>
<td>84,200</td>
<td>4,955</td>
<td>7.75</td>
</tr>
</tbody>
</table>

Based on assumptions of current market log prices, log grade and growth model volume projection, revenue increases with longer clearfell age. This is due to increased projected volumes and the higher ratio of higher value pruned log and sawlog.

Potential Clearfell Age

Graph 1: Net Present Value of 1982 Coastal Redwood

The NPV is graphed against Clearfell age in Graph 1. The ideal harvest age is where NPV peaks, which is just before age 30 (about $9,000/ha). This investment return is further supported by the high IRR return of 10.85% (see Table 2).
1995 *Pinus radiata*

**Table 5: 1995 Radiata Pine Stand Summary (January 2013)**

<table>
<thead>
<tr>
<th>Age</th>
<th>17.5 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean DBH</td>
<td>41.4 cm</td>
</tr>
<tr>
<td>Stocking</td>
<td>400 stems/ha</td>
</tr>
<tr>
<td>Basal Area</td>
<td>53.7 m²/ha</td>
</tr>
<tr>
<td>Mean Dominant Height</td>
<td>26.6 m</td>
</tr>
<tr>
<td>Mean Annual Increment</td>
<td>25.7 m³/ha</td>
</tr>
<tr>
<td>Total Volume</td>
<td>449 m³/ha</td>
</tr>
<tr>
<td>Stand Value</td>
<td>$18,867/ha</td>
</tr>
</tbody>
</table>

Based on the current market log stumpage prices (i.e. net in hand; less harvesting and cartage costs) in Table 5, the value of the stand at the time of plot assessment is a respectable $18,867/ha. The good growth rate of the trees will continue to give higher values in the future years (refer to Table 4 for a range of clearfell ages).

**Financial Analysis and Returns**

The stand regime operation costs (Notes: Table 7) and the current log prices (Notes: Table 8) were analysed for a range of clearfell age classes. All past and future costs, and revenues during the rotation are either compounded forward or discounted back to the present day value (at 5% in this exercise). The estimated returns for the various clearfell ages are detailed in Table 6.

**Table 6: Revenue, Net Present Value and Internal Rate of Return**

<table>
<thead>
<tr>
<th>Clearfell age (yrs)</th>
<th>Revenue ($/ha)</th>
<th>NPV ($/ha)</th>
<th>IRR (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>25,314</td>
<td>6,685</td>
<td>13.56</td>
</tr>
<tr>
<td>25</td>
<td>36,964</td>
<td>8,108</td>
<td>12.26</td>
</tr>
<tr>
<td>30</td>
<td>46,964</td>
<td>8,098</td>
<td>10.84</td>
</tr>
<tr>
<td>35</td>
<td>55,743</td>
<td>7,368</td>
<td>9.64</td>
</tr>
</tbody>
</table>

**Potential clearfell age**

**Graph 2: Net Present Value of 1995 Radiata Pine**

Clearfell age and stand NPV are graphed in Graph 2. The highest NPV is at 27 years, where NPV curve peaks. The high IRR indicates this stand of trees is a very attractive project with good return on invested costs.
NOTES:

Establishment of Growth Monitoring Plots
Two growth monitoring plots were established in each stand - 1982 planted Coastal Redwood (*Sequoia sempervirens*) and 1995 planted Radiata Pine (*Pinus radiata*).

Application of the Farm Forestry Toolbox
The growth plot data; along with fixed assumptions like log types (e.g. peelers, pruned sawlogs, export logs, pulp logs, etc.) and log prices, and the operational costs (e.g. costs of land preparation, planting, seedlings, pruning and thinning, fertiliser, etc.) were analysed with the Toolbox to estimate the Net Present Value (NPV) and Internal Rate of Return (IRR%) for each of the 4 to 5 clearfelling ages, using a discount and compound rate of 5%. The exercise was repeated for a range of clearfelling ages for each stand. The financial outcomes will be reported separately below.

Disclaimer - Application of the Farm Forestry Toolbox
The growth models used in the Toolbox are developed from industrial research data which is limited in its range of age, site quality, stocking and thinning effects. All models are imperfect, and you are strongly advised to seek professional advice from Private Forests Tasmania before investing on the strength of results from this program.

Using NPV and IRR in Decision Making
One important decision for a tree grower is to estimate the clearfell harvest age so as to maximise the returns on money invested. The Toolbox financial analysis estimates the Net Present Value (NPV) and Internal Rate of Return (IRR). In long term forestry investments, many foresters prefer to harvest trees at the clearfell age when the NPV is highest. This is based on fixed assumptions of current log prices, operational costs, log mix and estimated log volumes. The ideal harvest age is when the NPV peaks. Remember that any changes to one or more of the fixed assumptions will alter the NPV values accordingly.

IRR is determined by finding the interest rate or discount rate that equates the present value of benefits with the present value of costs. The higher the indicated IRR on the investment, the more attractive the project, as it maximises the return of monetary capital.

*A note of caution*: It is advisable not to use IRR by itself as a deciding factor, but rather to use it to supplement NPV results, especially for long term investments like a rotation of trees.

There are other factors in decision making including things such as; market access, potential price movements, cash flow preferences, tax, etc.
Regime operation costs – and Log Grades - Redwood
Table 3 outlines the various operations and costs for this stand at clearfell age of 25 years

Table 3: 1982 Coastal Redwood Regime Operation Costs

<table>
<thead>
<tr>
<th>Date</th>
<th>Yrs</th>
<th>Age</th>
<th>Event</th>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/06/1982</td>
<td>-0.17</td>
<td>-0.2</td>
<td>Spraying</td>
<td>pre plant spraying</td>
<td>$120</td>
</tr>
<tr>
<td>1/06/1982</td>
<td>-0.17</td>
<td>-0.2</td>
<td>Nursery costs</td>
<td>seedling $350/1000</td>
<td>$350</td>
</tr>
<tr>
<td>1/08/1982</td>
<td>0.00</td>
<td>0.0</td>
<td>Financial Base</td>
<td>Interest Rate 5.0%; Include previous</td>
<td>$0</td>
</tr>
<tr>
<td>1/08/1982</td>
<td>0.00</td>
<td>0.0</td>
<td>Planting</td>
<td>SPH(1000); [Survival 100%]</td>
<td>$150</td>
</tr>
<tr>
<td>3/08/1982</td>
<td>0.01</td>
<td>0.0</td>
<td>Fertilizing</td>
<td>© MARKER: (NO3(0); NH4(0), UREA(0)) I</td>
<td>$400</td>
</tr>
<tr>
<td>2/08/1990</td>
<td>8.00</td>
<td>8.0</td>
<td>Pruning</td>
<td>Lift 1; 3.2m; 375 SPH</td>
<td>$600</td>
</tr>
<tr>
<td>1/08/1993</td>
<td>11.0</td>
<td>11.0</td>
<td>Pruning</td>
<td>Lift 2; 6m; 375 SPH</td>
<td>$600</td>
</tr>
<tr>
<td>2/08/1996</td>
<td>14.00</td>
<td>14.0</td>
<td>Pruning</td>
<td>Lift 3; 8.1m; 375 SPH</td>
<td>$600</td>
</tr>
<tr>
<td>2/10/1996</td>
<td>14.17</td>
<td>14.2</td>
<td>Thinning</td>
<td>© T1; Waste; Out 0; 375 SPH;</td>
<td>$500</td>
</tr>
<tr>
<td>1/06/2017</td>
<td>34.83</td>
<td>34.8</td>
<td>Forest Practices Plan</td>
<td>Forest Practices Plan</td>
<td>$600</td>
</tr>
<tr>
<td>1/08/2017</td>
<td>35.00</td>
<td>35.0</td>
<td>Clear felling</td>
<td>Commercial;</td>
<td>$0</td>
</tr>
</tbody>
</table>

Log Grades
Due to unavailable data in Australia, Cypress 2013 log prices and specifications from New Zealand sales (see Table 4) were used. Cypress and Redwood have similar wood properties and end-uses.

Table 4: Log Grade Set of Coastal Redwood in Milabena

<table>
<thead>
<tr>
<th>Name</th>
<th>Code</th>
<th>Length Min (m)</th>
<th>Length Max (m)</th>
<th>SED Dub Min (cm)</th>
<th>SED Dub Max (cm)</th>
<th>LED Dub Min (cm)</th>
<th>LED Dub Max (cm)</th>
<th>Value $/m³</th>
<th>Preferred Length Step (cm)</th>
<th>Overcut Length (cm)</th>
<th>Pruned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sawlog Peeler</td>
<td>SP</td>
<td>2.7</td>
<td>6.0</td>
<td>30.0</td>
<td>999.0</td>
<td>120.0</td>
<td>999.0</td>
<td>30.0</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knotty Sawlog/P</td>
<td>A</td>
<td>2.7</td>
<td>11.0</td>
<td>30.0</td>
<td>999.0</td>
<td>80.0</td>
<td>999.0</td>
<td>30.0</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small sawlog</td>
<td>K</td>
<td>2.7</td>
<td>11.0</td>
<td>20.0</td>
<td>999.0</td>
<td>50.0</td>
<td>999.0</td>
<td>30.0</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firewood</td>
<td>F</td>
<td>2.4</td>
<td>11.0</td>
<td>10.0</td>
<td>999.0</td>
<td>9.0</td>
<td>999.0</td>
<td>10.0</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste</td>
<td>X</td>
<td>0.0</td>
<td>999.0</td>
<td>0.0</td>
<td>9,998.0</td>
<td>0.0</td>
<td>9,998.0</td>
<td>0.0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Regime operation costs and Log Grades - Radiata Pine
Table 7 outlines the various operations and standard 2013 costs for a clearfell age of 30 years for this stand. These costs were used by the Toolbox to generate the estimated Revenue, NPV and IRR. Other clearfell ages were also analysed with their corresponding returns summarised in Table 6. Note the discount rate used is 5%.
Table 7: 1995 Radiata Pine Regime Operation Costs

<table>
<thead>
<tr>
<th>Date</th>
<th>Yrs</th>
<th>Age</th>
<th>Event</th>
<th>Description</th>
<th>Cost $/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/06/1995</td>
<td>-0.17</td>
<td>-0.2</td>
<td>Spraying</td>
<td>pre plant spraying</td>
<td>120</td>
</tr>
<tr>
<td>1/06/1995</td>
<td>-0.17</td>
<td>-0.2</td>
<td>Nursery costs</td>
<td>seedling $350/1000</td>
<td>350</td>
</tr>
<tr>
<td>1/08/1995</td>
<td>0.00</td>
<td>0.0</td>
<td>Financial Base</td>
<td>Interest Rate 5.0%; Include previous</td>
<td>0</td>
</tr>
<tr>
<td>1/08/1995</td>
<td>0.00</td>
<td>0.0</td>
<td>Planting</td>
<td>SPH(1000); [Survival 100%]</td>
<td>150</td>
</tr>
<tr>
<td>3/08/1995</td>
<td>0.01</td>
<td>0.0</td>
<td>Fertilizing</td>
<td>® MARKER: (NO3(0); NH4(0); UREA(0) I)</td>
<td>400</td>
</tr>
<tr>
<td>1/08/2000</td>
<td>5.00</td>
<td>5.0</td>
<td>Pruning</td>
<td>Lift 1; 3.2m; 400 SPH</td>
<td>600</td>
</tr>
<tr>
<td>1/08/2002</td>
<td>7.00</td>
<td>7.0</td>
<td>Pruning</td>
<td>Lift 2; 5.5m; 400 SPH</td>
<td>600</td>
</tr>
<tr>
<td>1/08/2004</td>
<td>9.00</td>
<td>9.0</td>
<td>Pruning</td>
<td>Lift 3; 8.9m; 400 SPH</td>
<td>600</td>
</tr>
<tr>
<td>1/09/2004</td>
<td>9.08</td>
<td>9.1</td>
<td>Thinning</td>
<td>© T1; Waste; Out 0; 400 SPH;</td>
<td>500</td>
</tr>
<tr>
<td>1/06/2025</td>
<td>29.83</td>
<td>29.8</td>
<td>Forest Practices Plan</td>
<td>Forest Practices Plan</td>
<td>600</td>
</tr>
<tr>
<td>1/08/2025</td>
<td>30.00</td>
<td>30.0</td>
<td>Clear felling</td>
<td>Commercial;</td>
<td>0</td>
</tr>
</tbody>
</table>

Log Grades

Table 8 outlines the 2013 market log price stumpages in the Milabena locality (i.e. net price paid to the landowner, less harvesting and cartage costs) and specifications for the various log types for this stand.

Table 8: Log Grade Set for Radiata Pine in Milabena

<table>
<thead>
<tr>
<th>Name</th>
<th>Code</th>
<th>Length Min (m)</th>
<th>Length Max (m)</th>
<th>SED Dub Min (cm)</th>
<th>LED Dub Max (cm)</th>
<th>Value $/m³</th>
<th>Preferred Length Step (cm)</th>
<th>Overcut Length (cm)</th>
<th>Pruned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sawlog Pruned</td>
<td>SP</td>
<td>2.7</td>
<td>8.0</td>
<td>30.0</td>
<td>999.0</td>
<td>80.50</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A Grade</td>
<td>A</td>
<td>2.7</td>
<td>11.0</td>
<td>30.0</td>
<td>999.0</td>
<td>28.50</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K Grade</td>
<td>K</td>
<td>2.7</td>
<td>11.0</td>
<td>20.0</td>
<td>999.0</td>
<td>11.50</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KI Export</td>
<td>KI</td>
<td>2.7</td>
<td>11.0</td>
<td>30.0</td>
<td>999.0</td>
<td>9.00</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulp</td>
<td>P</td>
<td>2.4</td>
<td>11.0</td>
<td>10.0</td>
<td>999.0</td>
<td>1.00</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste</td>
<td>X</td>
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<td>999.0</td>
<td>0.0</td>
<td>9,999.0</td>
<td>0.00</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Disclaimer

This information was prepared in June 2013 by Henry Chan, Private Forest Advisor and Arthur Lyons, Manager Services, Private Forests Tasmania. Every reasonable endeavor has been used to ensure that the material was accurate at this time. No legal responsibility can or will be accepted by Private Forests Tasmania for the accuracy, completeness, or relevance of such information to the user’s purpose. Before undertaking any significant forestry or revegetation project it is recommended that you seek personal professional advice from Private Forests Tasmania on the particular matter.

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GLOSSARY

**Basal Area**
The area of the cross section of a tree which although termed ‘basal’ is in fact calculated at breast height (1.3m above ground level).

**Note:** A common term is Basal area per hectare = the sum of the basal areas of the individual trees over a hectare of forest. It is often determined from a sample of trees in a plot.

**Current Annual Increment (CAI)**
The CAI is defined as the annual change in growth of a stand and is a measure of how actively the stand is growing. It is often expressed in m³/ha/yr. CAI and MAI (Mean Annual Increment) are linked as the curves below show, with the optimum harvest age for the maximum rate of annual growth where the two curves intersect.

**DBHob**
The diameter of a tree measured at breast height over bark. It is the standard height in Australia at which all trees have their diameter measured and is always the diameter over bark (in centimetres) of the tree stem at 1.3m above ground on the uphill side. Loose or flaky bark should be removed prior to measurement.

**Dub**
The diameter under over bark, used in log specification (refer to Log Grades); which is specified by log buyers.

**Internal Rate of Return**
One of a number of techniques used to choose between a selection of projects. It is determined by finding the interest rate or discount rate that equates the present value of benefits with the present value of costs. The higher the indicated rate of return on the investment, the more attractive is the project as it maximises the return of monetary capital. IRR shows which project makes the highest benefit the quickest.

**Warning:** IRR can only be used when the project has all of the costs occurring before all of the revenues. If a project has some revenues occurring first then a very high and misleading IRR may be produced. It is advisable to use IRR to supplement NPV results rather than using IRR by itself. Seek expert advice before carrying out a project using IRR as a deciding factor.
**Large End Diameter**
Large end diameter of log and most often the end of the log that is closest to the stump, except perhaps where it coincides with a swelling associated with a whorl of branches.

**Log grades**
When a tree is being assessed for the quality of timber it may produce, the assessor will assign particular quality grades to various parts of the tree, depending on the condition of those parts. These log or quality grades are defined by a number of criteria or requirements. For example, for a log to be classed as a particular grade it may be a necessary criterion that the log be completely free of bumps and knots. Depending on the species of tree, there are a number of different log grades.

**Mean Annual Increment (MAI)**
The MAI is defined as the annual change in growth of a stand based on the standing volume at the time of harvest divided by the age at which the harvest occurs and is a measure used to compare two regimes of different rotation lengths. It is usually expressed in m³/ha/yr. MAI and CAI (Current Annual Increment) are linked as the curve below shows, with the optimum harvest age for the maximum rate of annual growth where the two curves intersect.

![Mean Annual Increment (MAI) and Current Annual Increment (CAI)](image)

**Mean Dominant Height (MDH)**
An important measure of forest size, which, together with age, can be used to calculate indices of site productivity. The definition of MDH varies widely. Many organisations (and the growth models they create) use the mean of the tallest 50 trees per ha, but you should use a definition that best suits you and your region (ask a forestry consultant).

**Net Present Value (NPV)**
One of a number of techniques used to choose between a selection of projects. Over the period of a forest rotation, costs and revenues often occur at different times, for example, establishment costs at the very beginning versus clearfell revenue perhaps 35 years later. As a result, it is necessary to either discount costs/revenues back to one common year or compound them forward to some common year in the future. NPV is calculated by discounting all costs and revenues over the course of the rotation to present day values and calculating the difference between these discounted revenues and costs.

\[
\text{NPV} = \text{Sum of discounted revenues} - \text{Sum of discounted costs}
\]

NPV = 0 (zero) means the discounted costs and revenues balance exactly.
NPV < 0 (negative) indicates that the discounted costs exceed the discounted revenues.
NPV > 0 (positive) indicates that the discounted revenues exceed the discounted costs and so the project looks promising.
The higher a project’s NPV, the greater its $ worth to us today. As it is usual to wish to maximise the return we get on our assets, the project we would choose, considering only the $ value of the inputs in the calculation, would be the one offering the highest NPV. Seek expert advice before carrying out a project using NPV as a deciding factor.

**Plot**
A sample area of trees measured to get an estimate of the surrounding larger forest area.

**SED**
Small end diameter of log; usually measured under bark; as specified by log buyers.

**Stand Diameter Height (SDH)**
Standard diameter height (SDH) is the height at which tree diameter is measured in the Inventory tool. In many countries this height is at 1.3 m above the ground on the uphill side of the tree and is commonly called breast height.

**Stump Height**
The height above ground to the bottom of the first log in a tree.

**Total tree height**
The height in metres from ground level (including the stump height) to the uppermost green tip.
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Please call Tracey on 6477 7052 or email tracey.king@pft.tas.gov.au to be added to the list and ensure you don’t miss out on events and important forest information.