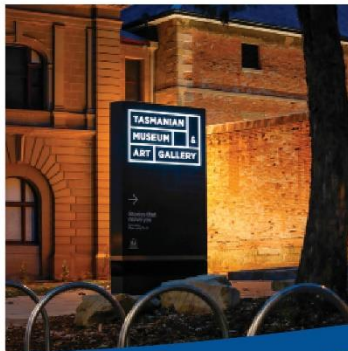
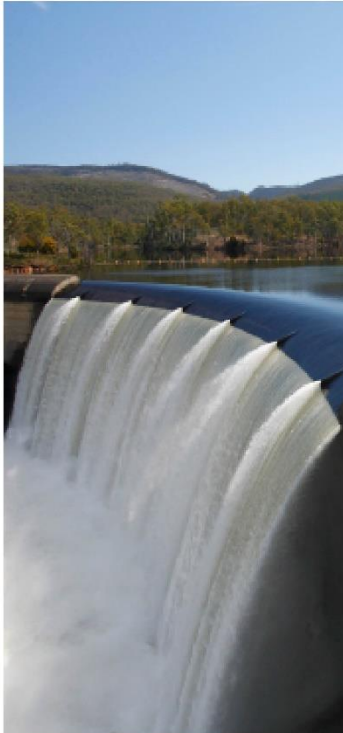
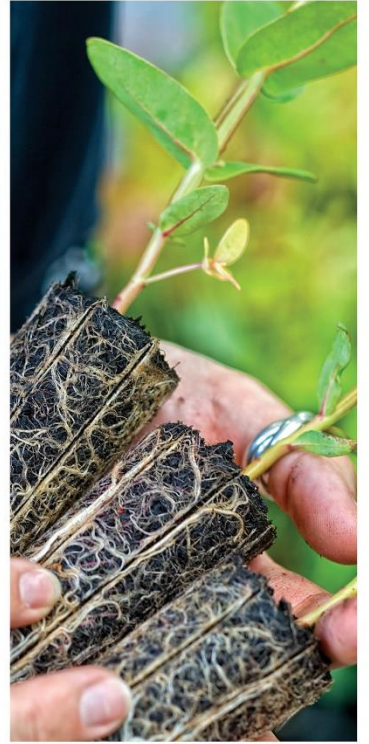
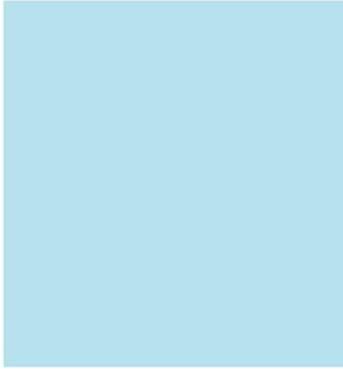


Southwood log merchandiser trial final report



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Abstract

The Tasmanian Government is committed to enabling industry to achieve the highest possible value for wood harvesting and processing residues. In recognition of this, the Department of State Growth (DSG) and Sustainable Timbers Tasmania (STT) undertook an operational trial to further understand how to maximise the recovery of timber products from forestry operations in Tasmania's southern forests. DSG is partnering with STT to deliver this trial, in conjunction with Ta Ann, Midway Plantations Pty Ltd, Neville Smith Forest Products, Private Forests Tasmania (PFT) and Reliance Forest Fibre, from February – May 2020. The trial has been co-funded by DSG, STT and PFT and has a governance framework comprising the three organisations.

One of the avenues to increased value for wood harvesting is undertaking log merchandising in a specialised yard. Merchandising is the segregation of log products from harvested trees. In Tasmania it is generally conducted on forest landings, with discrete loads of different forest product delivered to individual customers.

With the hypothesis that centralised merchandising would increase product recovery, this trial compared product recovery yields between conventional in-forest merchandising versus centralised merchandising, at the Southwood site. As such, there were two treatments:

- 1) *In-forest merchandising*. This involved the current practice of in forest segregation of high value poles, sawlog and full specification length peeler logs (Treatment 1.1). In addition to this the remaining (pulp) logs were transported to the centralised merchandising yard as truck length logs (Treatment 1.2) where they were merchandised into long or short peeler billets, pulpwood and merchantable waste. A total of 3 970 tonnes of logs were processed.
- 2) *Centralised merchandising*. This involved recovery of long length high quality sawlog and high value poles at the forest coupe landing, then cutting remaining logs into the longest possible lengths (merchandising logs) for transport to the Southwood merchandising yard. These logs were cut to recover sawlogs, peeler logs, peeler billets, pulpwood and merchantable waste (pulp). A total of 4330 t of logs were processed.

The combined results of both treatments showed that centralised merchandising resulted in an 3-4% increase in the recovery in higher value products coming from the pulp stream and an 11% increase in recovery of category one/three sawlogs from the lower quality sawlog categories and peeler logs.

Introduction

Tasmania has a long history of forest utilisation for timber production. Traditionally timber production has relied on supply from native forests and it remains an important part of the Tasmanian forest sector. The sawmilling industry in Tasmania has specialised in processing hardwood logs for appearance and structural timber markets.

Like any other traded commodity, products from forests vary in their quality. In general "quality" means fitness for a defined end use and log specifications (or quality grades) are used to determine whether the log is "fit for purpose". Logs can be visualised as being divided into a hierarchy of end-use categories. From the most valuable to least valuable these are:

- poles, piles and girders
- sliced veneer logs
- sawlogs
- rotary veneer (peeler) logs
- pulplogs.

Logs are generally of better quality if they are straight, have a round cross-section, a larger diameter, have small branches and are free from defects such as rot, insect damage, internal defects and have not been damaged in the processes of felling, extraction and cross cutting (James, 2001).

Log grading is a fundamental part of the process of transfer between growing trees to processing them into a marketable commodity (James, 2001).

The way in which wood is sold will influence the way in which it is graded. One common method of sale is the sale of the standing timber. The wood processor may or may not be responsible for logging and cartage to mill but in any case the specification will be written with the objective of defining an acceptable log. The grower will have a financial interest in ensuring that all trees containing merchantable logs are counted for the purposes of payment; whether actually extracted or not.

A second method is commonly referred to as "mill door sales". In this case the miller buys only logs suitable for utilisation at the particular mill. The forest owner fells and segregates (or merchandises) the different quality logs and delivers them to the appropriate mill (James, 2001).

Log merchandising is the segregation of log products from harvested trees and generally conducted on forest landings, with discrete loads of product delivered to individual customers. However the recovery of the maximum volume of each product to its minimum specification is expected from each tree presented at landings. The efficiency of this process and costs of production become limiting factors when recovering towards the minimum diameter and length specifications for each product category, particularly where this task is performed by manual means. For example, in the southern forests in Tasmania, at the moment, product specifications account for practical handling constraints and consequently very short lengths (e.g. single length peeler billets <3.4m and log offcuts <2.4m) are not part of current log recovery. The lack of scale economies makes the recovery of these products uneconomic at the forest landing and other forest residues cannot be economically recovered.

Additionally, short products cannot be easily or economically transported using currently available truck configurations and are lost to lower value product categories. According to Han-Sup Han, et. al., (2011) it becomes impractical or not economically viable to sort all materials at landings while trying to maximise operational efficiency in those treatments.

To address this, merchandising can be done centrally at a log merchandising yard. This is where full logs are brought to a central location for merchandising. This allows for greater product recovery;

increased efficiency in grading, scaling and sorting; reduced log flow bottle necks from forest to mill; allows for truck dispatch and scheduling; significantly reduces operations in the high incident/accident frequency area of the forest operation and results in reduced environmental impact on forest coupe landings. Essentially merchandising allows for the supply chain to respond to uncertainty in timber supply, through a greater ability to stockpile logs and allows for the recovery of more value from the resource. These matters combined could be expected to create significant cost savings to forest contractors and improve the overall economics of forest management. Dramm et al. (2004) also noted that log merchandising yards could also have application in forest management by improving utilisation of wood and biomass removed from thinning operations and fuel reduction work.

Log merchandising yards come in a range of sizes and technology used. From simple processing machinery that you would find in a forest coupe landing to fully automated merchandising machines (Figure 1).



Figure 1: (Dramm et al 2004)

In North America the direct benefits of log merchandising at a merchandising yard have been generally recognised, and interest in them has increased because of a decline in timber resource quality and availability, diversified log and fibre markets, and the need to recover more value from the available resources (Han-Sup Han et. al., 2011). Dramm et al. (2004) suggested that log merchandising yards are now integral components to efficient forestry supply chains.

Aside from large private processing facilities, log merchandising yards are rare in Australia and there are currently no large scale regional merchandisers in Tasmania, although in 2019, a private industry trial in the North East region of Tasmania was undertaken aimed at maximising the recovery of other forest products from the native pulp stream. It identified that centralised merchandising was able to recover higher value products from pulp logs. It concluded that this would be a model for product segregation and merchandising would be part of any potential processing hub. In addition to this, a desktop study by Rolley (2018) into maximising the value of forest resource opportunities from southern Tasmania recommended full scale operational trials need to commence at the Southwood site to explore increasing log value recovery through effectively designed log merchandising. This

would involve taking the longest trackable lengths of non-sawlog/veneer log to a site (Southwood) for careful electronically scanned processing to recover short solid billets for value added processing. These logs would otherwise have been loaded into the pulp log residue stream or burnt in the forest.

In their research, Dramm et al (2002) observed that log merchandising yard projects are often based on subjective opinion rather than objective investigation. The establishment of a centralised log merchandising yard at Southwood would represent a significant investment, therefore it would be prudent to undertake a trial that compares the benefits and costs of traditional merchandising with those of centralised merchandising. This information would then potentially form the basis of an in depth feasibility study.

Materials and methods

Harvesting sites

Franklin 32E (FN032E)

- Net coupe area was 40.09 ha.
- 22% *E. regnans* and 78% *E. obliqua*. Burnt in 1967 wildfire therefore approximately 53 years old.
- Operations undertaken by P L & N R Voss Pty Ltd.
- Harvesting period was 11 February to 13 March 2020.

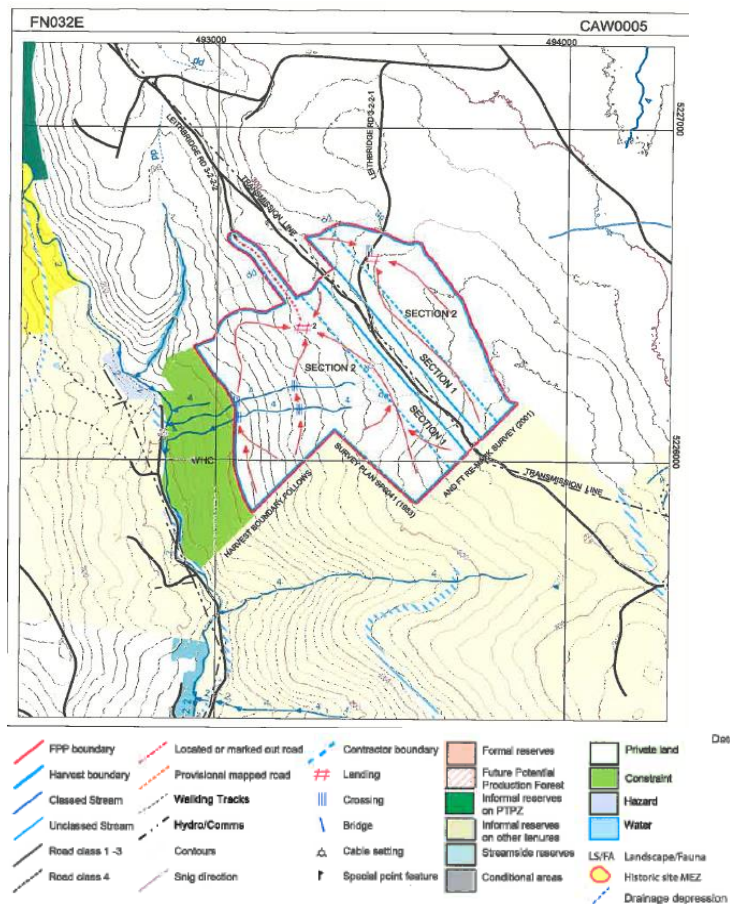


Figure 2: Franklin 32E coupe map

Southport 5D (SO005D)

- Net coupe area was 45.06 ha.
- 72% *E. regnans* and 28% *E. obliqua*. Between 50-60 years old.
- Operations undertaken by CP & SM Cowen & Sons Pty Ltd.
- 12 February to 6 April 2020.

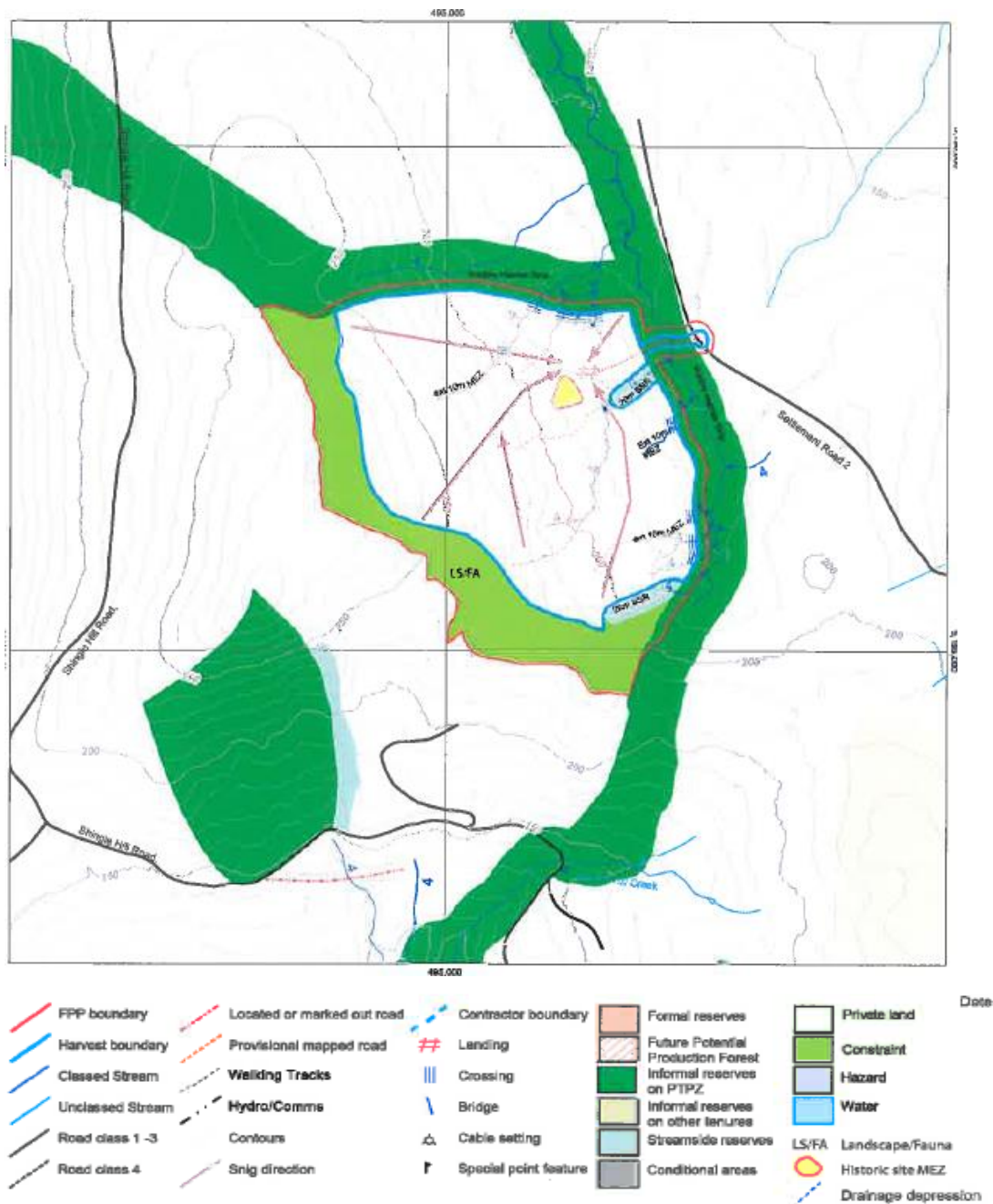


Figure 3: SO005D coupe map



Figure 4: SO005D (photo: Mitch Raspin)

Harvesting and merchandising methods

Each of the two coupes were subject to two treatments.

Treatment 1 – in-field merchandising

Treatment 1 was traditional merchandising, where in roughly the first half of each of the two coupes trees were felled and skidded to the landing where a processor cut and segregated the logs into the various products. The products were then delivered directly to their customers via the Southwood weighbridge.

Dockets were generated for each truckload of product. Information recorded includes coupe of origin, harvesting contractor, weight, product, and customer.

The only difference to normal operations is that the pulpwood generated from the in-field merchandising operation was first sent to the Southwood merchandising site (Treatment 1.2), where it was weighed on the way in, merchandised, re-weighed (by product); then sent to its customer. This was to test the ability to recover any higher values products from the pulpwood stream at a specialised merchandising site.

Les Walkden Enterprises Pty Ltd conducted the operations at the Southwood log merchandising site. Machinery included a Caterpillar 966 Wheel Loader; Komatsu Excavator with live head and a Komatsu Excavator with a Waratah Processor Head.

Treatment 2 – centralised merchandising

For the second half of each coupe trees were felled and skidded to a landing, where segregation of long length (>5.5m) high quality sawlog and high value poles was prioritised, then cutting the remaining logs into the longest possible lengths (merchandising logs) for transport. These logs were then hauled to the centralised merchandising site. Whereby the basic functions of receiving/scaling, unloading, transport, grading, merchandising, sorting, reloading and log storage and inventory were undertaken using a Caterpillar 966 Wheel Loader; Komatsu Excavator with live head; Komatsu Excavator with

Log Grab and a Komatsu Excavator with a Waratah Processor Head and were overseen by a yard manager.

The logs were cut to recover sawlogs, peeler logs, peeler billets, pulpwood and merchantable waste (pulp). Dockets were generated for each truckload of product going into and out of the merchandising site.



Figure 5: Peter Bone and excavator and Tylah Birchall and processor (photo: Craig Patmore)



Figure 6: Southwood merchandising site, pre-operations (photo: Craig Patmore)



Figure 7: Southwood merchandising site (photo: Craig Patmore)



Figure 8: Southwood merchandising site, final waste products (foreground) (photo: Craig Patmore)

Products produced

Sawlogs

There are four categories (all eucalypt):

- Category one: first class sawlogs, generally with minimal defect and suitable to produce select and standard grade boards. Category one has historically been used to describe logs from mature and pro-mature forests.
- Category two: second class sawlogs, generally with more external defects such as limbs and bumps than first class sawlogs and suitable to produce standard and scantling grade boards.
- Category three: first class sawlogs, generally with minimal defect and suitable to produce select and standard grade boards. Category three has historically been used to describe logs from regrowth forests.

- Category eight: logs which do not meet other specifications but may be taken at the customers' discretion. Usually at least one side of the log face at each end will consist of solid wood suitable for sawing generally for scantling grade boards or pallet suitable boards.

Round wood

The main product was utility poles.

Peeler logs

Sold for the manufacture of plywood to Ta Ann Tasmania. Peeler logs contain a combination of peeler billets and merchantable waste. Peeler logs ranged in length from 3.4m to 11.0m.

Peeler billets

Sold for the manufacture of plywood to Ta Ann Tasmania. Billets were made up of short billets (1010mm and 1310mm long) or long billets (1960mm or 2560mm long).

Pulpwood

Logs that could not be utilised for the above grades. They need to be free of bark and debris.

Results

Table 1: products recovered by weight and proportion for both treatments.

Product	Treatment 1 In-field merchandising				Treatment 2 Centralised merchandising	
	1.1 - products from in-field merchandising		1.2 - products recovered from merchandising of pulpwood			
	Weight (t)	Portion (%)	Weight (t)	Portion (%)	Weight (t)	Portion (%)
Sawlog (category one/three)	554.3	14	5.3	0.3	1 086	25.1
Sawlog (category two)	167.8	4.2	4.9	0.3	107	2.5
Sawlog (category eight)	433.1	10.9	6	0.3	122.4	2.8
Ta Ann peeler log	1012.2	25.5	N/A		770.7	17.8
Long peeler billet	N/A		73.4	4.1	49.7	1.1
Short peeler billet	N/A		51.8	2.9	84.6	2.0
Pulplog	1 804.3	45.4	1285.6	71.2	1 205.2	27.8
Merchandising offcuts (pulp)	N/A		377.3	20.9	905	20.9
Total	3 971.7		1 804.3		4 330	

Discussion

The two objectives to Treatment 1 were to set a baseline for the levels of product recovery that can be expected from traditional in-field merchandising (Treatment 1.1) and determine the amount of

higher value product that can be recovered from the pulp stream if it were to be merchandised in a merchandising yard (Treatment 1.2).

The objective of Treatment 2 was to determine if merchandising in a specialised, central yard as opposed to a coupe landing, increases the recovery of higher value products.

It was found that merchandising pulp logs centrally resulted in an increase in the recovery of higher value products in the order of 8% from the pulp stream (or 3.6% from the entire basket of products). Around 1% of this was in the form of sawlogs equally spread across categories one, three, and eight and the remainder was recovered as billets (4% long and 3% short).

Centralised merchandising of the merchantable logs showed that the recovery of category one/three sawlogs almost doubles (up by 11.1%). This recovery came from the lower quality sawlog streams of categories two and eight and from the higher recovery of minimum specification category three sawlogs (30cm diameter x 2.4m long) from the peeler stream.

The higher proportion pulp log produced in Treatment 2 was said to be an artefact of the presentation of the logs towards the end of the trial, where more mature elements of the coupe were being harvested, hence the higher volume of pulpwood. In addition to this, the more mature material presented to the merchandising yard was not fully trimmed of limbs and this made it more difficult to recover Ta Ann peelers. However, even in the face of this, the 3.1% of long and short billets produced out of the entire basket of product in Treatment 2 is comparable to the 3.6% produced in Treatment 1.2.

Therefore if results from both treatments are combined, centralised merchandising resulted in a 3-4% increase in the recovery in higher value products coming from the pulp stream and an 11% increase in recovery of category one/three sawlogs from the lower quality sawlog categories and peeler log stream.

It must also be noted that for this trial non-specialised equipment and operators were being used. The operators, although experienced forest machine operators, had little experience in working in a merchandising yard. Therefore with specialised machinery with specifically trained staff, and with a well-designed layout, sorting systems and operations, you would expect the rate of recovery of higher values products to be even greater. For example, studies by the Forest Engineering Research Institute of Canada have shown that about 5% of the volume processed through a log sort yard accumulates as debris or “offcuts” (Sinclair and Wellburn 1984). Whereas the offcuts produced in this merchandising trial were in the order of 20%.

Conclusion

This project showed that in the current operating environment centralised merchandising at a specialised yard increases the recovery of higher value products from both the pulp stream and the lower category sawlog and peeler streams.

Based on the log input and products data, the feasibility of a centralised log merchandising site at Southwood in the southern forests of Tasmania looks promising. However, before a more definitive conclusion can be drawn, further work would need to be undertaken in terms of forecasting the long term log supply from both private and public forests; and long term sales; determining the full costs of site construction; and establishing an internal rate of return.

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