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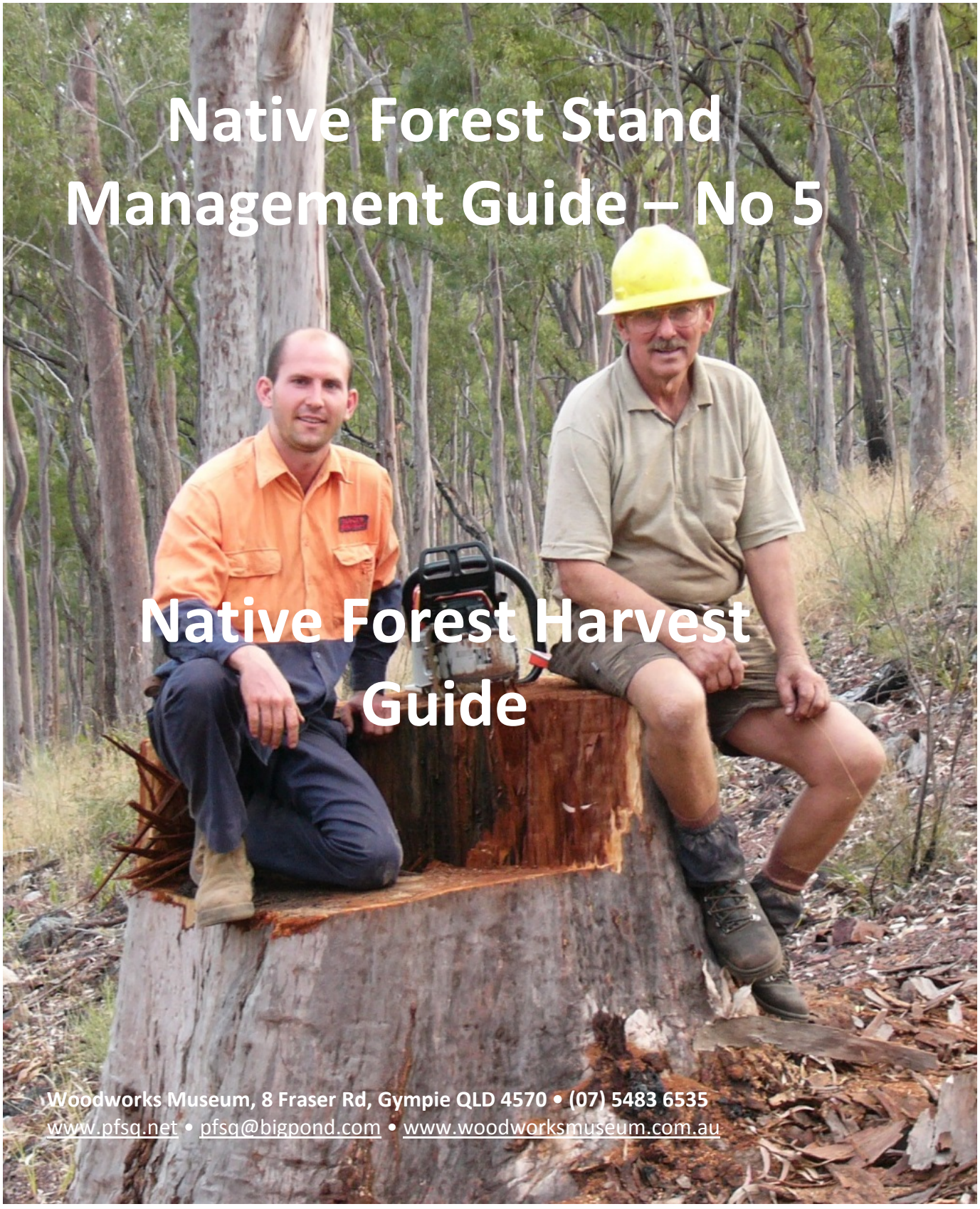
Native Forest Stand Management Guide – No 5



Native Forest Harvest Guide

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TABLE OF CONTENTS

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INTRODUCTION

The harvest of a native forest is one of the most significant events within a timber stand's management cycle. Harvesting, after the many years of managing the forest using fire, thinning and other forest management activities is the culmination of the forest management cycle but unfortunately is frequently not treated as such.

Forest Harvesting is often seen as an opportunity to cash in on accumulated forest growth when farm cash flow needs to be boosted, rather than the ultimate forest management tool. This form of harvest usually results in the removal of most of the trees that can make a product, regardless of a trees potential to grow on and produce a higher value return, or the considerations for the future productivity of the forest. Selection of trees to be retained after the harvest is critical to the stands future productivity and has obvious long term implications for the future of the forest. It is counter intuitive to have gone through management over many years, simply to asset strip the forest, particularly when many of the products have not reached their optimum size. With this in mind, harvest should be regarded as the pinnacle activity of all forest management.

Harvest operations generate capital which in turn provides the landowner the opportunity to re-invest in the management and long term health and viability of the future forest. A re-investment of a small percentage of the harvest return in critical follow-up management has major implications on future productivity of the stand. Post-harvest management includes the removal of unproductive or damaged trees, ensuring quality regeneration, fuel reduction burns and general maintenance of tracks and log dumps. The investment will be returned many times over at the next harvest.

Planned and well managed forest harvesting requires an understanding of the stand to be harvested, its condition, likely product range and who will purchase them, access and landscape constraints and who will ultimately mange and undertake the harvest. There are pitfalls that the landowner should be aware of in the planning and subsequent harvest operation. There are many stories of landowners being short changed, taken advantage of or left with a forest in a very poor condition for future productivity, basically due to the fact that they did not know, what they did not know.

Interpreting forest condition, the importance of understanding product specification and the hierarchy of values and the optimal harvest scenario are highlighted within this guide for the purpose of raising landowner awareness of the benefits of Forest management planning, particularly in the lead up to a harvest. (See Forest assessment at the end of the guide).Before any harvesting is undertaken a notification of a forest practice (intention to harvest) must have been completed and submitted to DNRM.

Common harvest scenarios

Preparing for a Harvest

The Logging Contract

It is critical when engaging a Sawmill, or a contractor, or selling timber products to a purchaser to always do so with the protection of a Contract. The contract should be practical, relevant and able to be implemented in the field and must contain adequate information to identify the specific information relevant to the contract such as; landholders overall management responsibilities, each individual product specification and price, cut and snig rate/m^3, operational responsibilities of purchasers and field operatives, compliance with environmental standards, payment schedules, and contract commencement and completion date. It is recommended that a reputable and experienced harvesting team be employed. Three separate contract proforma are outlined in next section.

In any harvest scenario there is a requirement for one of the following specific contracts to cover the legal requirements of the transaction, namely:

1. Engaging a sawmill to harvest and purchase your timber or
2. Engaging a contractor to cut and snig and market your timber according to the requirements of the contract
3. Contractor cut and snigs (1 contract) Landholder then sells those products to a purchaser (2^{nd} contract)

What are your Harvest Management skills?

Managing the harvest and merchandising of a forest stand requires a considerable range of skills and knowledge which most landholders do not have. However basic knowledge of the choice of sale contracts and the implications of each type is a good first step in gaining a better understanding and ultimately better control over the whole proceedings and its outcomes. Of course, it must be stated that the way a harvest is set up, the details of the contract, who is doing the harvest, etc will all impact upon your ability to influence it. Generally there are four scenarios:

1. Sell the timber to a sawmill at a given price for sawlog and salvage logs (can include pole and girder specs in contract and the mill undertake the harvest and buys the product
2. Landholder engages a harvest contractor and managers the marketing
3. Landholder engages a harvest contractor who also managers the marketing of the products
4. Landholder undertakes the harvest and marketing

1. Sawmill Sale

In the majority of cases when landowners wish to harvest their timber they simply contact a sawmill. The sawmill will send a representative to the property, the mill will offer a price (either lump sum for the whole block or stumpage rate/m³ for each product) and the mill will organize the harvest, including cut, snig, loading and haulage back to the mill, the owner of the timber has little or nothing to do with the process and thus is dependent on the processor to make critical decisions such as grading the products (hence the value of the product), choosing what trees will be retained or harvested - critical to the future productivity and value of the forests, you would be hard pressed to find this level of disengagement in any other industry. Selling direct to a sawmill comes in a number of guises.

Whole of Block Purchases (Lump Sum Sale)

Whole of Block purchase usually means the purchaser has paid the landholder a lump sum for whatever products are on the block and has the rights over all standing timber. From a productive stand management point of view this is the worst option available to a landholder, as the purchaser now owns all the standing timber and has the right to remove every available product in the stand. This can leave the stand in a debilitated state with the best trees removed and only reject and non-merchantable trees left for future production.

Minimum Diameter Sale

A variation of this form of sale is the purchaser buying a set number of cubic metres of timber from a designated area e.g. 5000 m³ of saw and salvage grade logs from trees with a 40cm+ dbh. The landholder is paid on a stumpage basis i.e. a set amount per m³ harvested and generally the higher value products are graded as sawlog.

This form of contract can have good forest management guides written into the contract but in the end it's the cutter making the decision which tree is removed. Some mills, especially where they have a long term association with the owner, are ensuring high quality, healthy trees not yet ready for harvest are being retained. Unfortunately on many occasions the best trees are removed leaving the forest in a state that will take many years to recover its productivity. Both form of sale results in the landholder having little control over the impact of the purchaser's harvest management regime. Conversely the landowner may demand the removal of as much product as possible to ensure a higher return or because they are selling the property and wish to asset strip it prior to sale.

A further variation of this style of contract is a Purchase Covenant Contract. This contract may cover the block for many years and allows the purchaser to remove timber when they require it. Usually this option results in the purchaser having concern for the productivity of the forest as they wish to maximize the available timber over the duration of the covenant.

Model Contract 4. This contract provides for the situation where a landowner or independent third party sells a 'fixed quantity' of standing timber to a purchaser for a 'fixed or lump sum' and the purchaser also harvests the native forest. Sales using this contract may be characterised as the partial disposal of a capital asset for taxation purposes. Specialist legal and accounting advice is essential as it is the landowners personal circumstances that determine whether the sale can be considered a disposal of a capital asset.

Issues/Implications for this form of Harvest

One of the key issues with this form of harvest is it separates the harvest operation from general forest management. Suddenly, when it comes to the most important management process of a forest cycle, the decisions as to which trees are retained or harvested is now in the hands of the purchaser with implications for the future productivity of the stand. This assumes a number of vital management considerations:

1. The contractors have good forest management understanding and will apply it to ensure best management practice
2. The purchaser has the best interest of the landholder in mind regarding utilisation levels and optimising returns from the harvest while maximizing the future productivity of the stand
3. That there will be a clear accountable system of checks and balances for the removed volumes of product and accurate classification in line with appropriate specifications
4. Vital post-harvest maintenance and management will be undertaken

2. Landholder Engages a Harvest Contractor and Managers the Marketing

In this case the landholder engages a contractor to complete the cut and snig and generally the grading (sawlog, salvage, pole, girder etc) and the landholder undertakes the marketing and sale of the product. This means the landholder is closely involved in the harvest and, if they have gained the skills, direct which trees are to be retained for the future crop.

Other options available to landowners with suitable skills are for them to undertake the harvest operation, process the products on a log landing and then market the forest products to appropriate purchasers in order to achieve the best value for their product and direct control over the management of their forest.

3. Landholder Engages a Harvest Contractor Who Also Managers the Products Marketing

An independent contractor sale is used by a Landholder who does not have the requisite harvest management skills but wishes to have a degree of control over the harvest process. A contractor manages the whole harvest and sale process either being paid a percentage of the sale returns or a contract fee for the service. This places an independent step between the harvest and product grading and the sale. It gives the opportunity for the landholder to set very specific harvest guidelines and the contractor has to ensure those standards are maintained. It also gives the opportunity for a fully integrated sale where high harvest product utilisation is achieved by sorting all products at the dump from veneer logs to fencing material and selling them to the highest bidder.

Model Contract No 1. This contract is used where a landowner engages an independent third party to supervise and manage the harvest, and the sale of the landowner's native forest products to a purchaser or purchasers. It may be adapted for use for the provision of other services such as post- harvest thinning, inventory or management planning.

The Optimal Harvest Scenario

Regardless of who is undertaking the harvest management and merchandising the following is an optimal Harvest scenario based on a simple set of parameters and a work timeline.

Parameters of Harvest

1. **Trees to be retained after the harvest are at an adequate stocking to maintain high stand productivity. All retained stems (other than those to be treated) are free of defect, have healthy crowns in dominant or co-dominant position and have a good product potential**

2. **Criteria for tree removal is directed towards harvesting trees that have reached one or more of the following attributes:**
    a. **Have reached its maximum economic value,**
    b. **There is a current demand for the products to be harvested**
    c. **Is showing signs of defect or poor health,**
    d. **Will decline prior to the next harvest or**
    e. **Are suppressed and unlikely to develop to potential**

3. **Harvested products are differentiated into the highest value product according to specification**

4. **Harvest contractor completes all work according to the Code including post-harvest track drainage etc**

5. **Non-merchantable trees not required under the code are chemically injected**

3. **There is an adequate lignotuber pool present on the forest floor or the harvest coincides with the presence of mature seed in the canopy of the most desirable species for regeneration**

Work Timeline

1. Undertake a stand assessment to achieve an understanding of the stocking rates, product range, average diameter class and stem volume of the trees to be harvested, ie is the stand ready for a harvest
2. Contact a range of possible purchasers and either request a site inspection and a purchase price for each product line, or offer the products at a set rate
3. Complete a harvest plan that complies with - ***Managing a native forest practice*** *- A self-assessable vegetation clearing code. In particular*
    a. *Regional ecosystems outlined on your property's Vegetation Management Support Map are listed as harvestable*
    b. *What is the status of drainage lines and ech one's required buffer and filter zones*
    c. *The area is not covered by a Protected Plant Map (Trigger Map)*
4. Contract a cutter and snigger and clearly articulate the parameters of the harvest plan/logging contract, systems to delineate harvest exclusion areas, define all product specifications, outline penalty clauses for excessive collateral damage to the retained trees and set a date for commencement and completion of the harvest
5. In consultation with the snigging contractor mark all major snig tracks and log dumps

6. Inspect operations regularly to ensure all conditions of the harvest are being met, and all trees not marked for retention that have a product in them are harvested and all products are removed to dump
7. If product has been presold, arrange final inspection by purchaser, (poles have to be inspected and passed in the field before removal). If the product has not been presold, arrange for potential purchasers to inspect and secure bid for each product type. Notify successful purchaser, arrange for sale contract including payment and removal terms.

Parameters of the Logging Contract

The Logging Contract outlines the parameters the cutter and snigger work within to complete a harvest and is signed by both parties before work commences to signify they are cognisant of the system. The contract also protects both parties by ensuring a process that is legally binding. Evidence of the Notification of a Forest Practice for the property should be attached to the contract along with the Vegetation Management Supporting Map (DNRM) outlining the regional ecosystems, remnant vegetation and drainage line classification.

If the stand is to be paint marked for retention, the agreement ensures the cutter is aware of the codes/marking system that is being used. It also outlines OH&S standards such as if a tree hang-up occurs it should be removed immediately or that any tree that has a scarf cut must be felled regardless of utilization potential.

Cutting to a face is an important block management procedure and on a large block it allows for easy location of the cutter and opportunity to track product to ensure all trees that should be removed, have been, and optimum utilization levels are being achieved. Harvest operations can differ significantly between remnant and non-remnant forest, within remnant area the code must be complied with and the cutter should be given a map clearly marking the regional ecosystem mapping with the designated creek lines marked to ensure code compliance.

The cutter usually determines the utilization potential of each log and grades it for sale at the stump or dump. In the case where the landholder or a contract harvest manager is undertaking this function (as per the agreement) the cutter will only snig the full merchantable length to the dump and leaves it there for processing. It pays for the landholder to have good product specification knowledge and understand how logs volumes and pole/pile classes are calculated. Knowing minimum small end diameters, log lengths and defect standards etc will promote higher levels of utilisation. Stump height not only affects the utilization levels of the tree bole but also the quality of the coppice/regrowth from the cut tree stumps and should be stipulated in the Logging Contract.

Harvesting operations can drag on indefinitely without an agreed operational timeframe. For example, when will operations commence and when does the harvest operation have to be completed by. On what days of the week will the cutter work and what is the normal start and finish times. It is critical to maintain communication lines; if the cutter isn't there you cannot discuss the problem on site. To avoid this, in Logging Contract define the timeline and set penalty clauses for failure to comply with these provisions.

Fence lines should be marked on the map, which accompanies the Logging Contract and clearly state who is responsible for the repair of any damage that may occur during logging. Include a clear depiction of the logging area boundaries and fire lines (kept clear at all times). Ensure the cutter is clearly aware of the boundaries and the implications of crossing them.

Some properties are not accessible during periods of wet weather. Delaying harvesting for areas that have soils with low erodibility and compaction characteristics (more suited to wet weather operation) to near the completion of the harvest can maintain continuity in the event of wet weather.

Employing a Cutter and Snigger

The first step in employing a cutter is to verify whether the cutter is accredited and insured. A quality cutter is a highly skilled individual who can work amongst a densely stocked forest and fall trees into the smallest

of gaps causing little smash or damage to the retained trees. A poorly skilled cutter is not only a safety hazard but can leave many of the retained trees (your future crop) damaged and useless. Knowing the history of your cutter is important in understanding both their capacity and their method of merchandising. A cutter who has only ever cut sawlogs may not understand the specifications for poles, veneer logs, etc and not utilizing these products will translate into lower returns from the sale.

Negotiate the cut rate and terms of payment before the commencement of work and set this in the Logging Contract along with clear instruction on the methodology and constraints of the harvest.

Snigging

As with felling timber, snigging is a highly skilled operation requiring a machine suited to the terrain and the size of the logs being removed and an operator who can skilfully manoeuvre, often very long lengths, through the bush without damaging the retained stems. It is absolutely critical to protect the retained stems from smash and rub during snigging. Very often, inspection of a stand after harvesting reveals tree after tree that has had slabs of bark removed at ground level by log rub during the snigging operation. This effectively destroys the future crop and is a huge economic loss for the landholder, and the Logging Contract should have penalty clauses as an adequate disincentive. One solution to reducing snigging damage can be when major snig tracks are marked out, and if there is an unavoidable bend on the snig track, a rub trees is retained. A rub tree is a tree that will be harvested but is temporarily retained for the skidder or dozer operator to pull logs around to protect an adjacent retained tree.

Photo 1. Appropriate harvest machinery is essential

Snig track location is crucial to the efficient transfer of logs from stump to dump. Major snig tracks will ultimately be used each time a block is harvested and the location and subsequent maintenance of those tracks plays an importation part in its longevity and the prevention of soil erosion. Major snig track location needs to be determined in consultation with the cutter taking into consideration the type of logging machinery, special features and grade of slope. Log dumps should be located where possible at the tops of hills and on already cleared areas. Snigging machinery should have a minimum of front blade and rear grapple to lift the butt of the log off the ground while it is being snug to reduce soil gouge.

Basic forest hygiene, including the disposal of oil filters, waste oil, rubbish, etc needs to be included in the agreement.

Risk mitigation is an essential element of the Logging Contract and no-go areas should be clearly marked on the logging map. The landholder has a duty of care to the contractors. Power lines, major landslips, deep crevices, etc should be marked on the map and the cutter notified. It is mandatory for machinery used in the harvest operation to have appropriate protection in the case of roll over or falling objects. If there is a safety issue or wilful neglect of the harvest provisions, suspension of operations may be necessary.

Regardless of all the regulations and codes, communication and negotiation are the keys to managing contractors. Remember that cutting, snigging, barking and merchandising is very hard and dangerous work. Be aware of what issues your cutter is faced with.

Marking Trees for Retention

Photo 2. An area of well stocked trees in the residual stand

Unless the cutter has a clear and demonstrated understanding of the retention standards to ensure a healthy productive stand after the harvest then it is recommended to mark the best 100 trees or so per ha over 20 cm dbh (if available considering the selection criteria outlined below). If the block is classified as 'remnant' vegetation under the Vegetation Management Act also retain the required number of habitat trees under the Forests Practices Code. Trees to be retained are paint marked at chest height using bright fluro paint with either three dots around the tree or a large H to signify Habitat Tree, remembering that some trees lose their bark around September
This system places the emphasis on the quality of the retained stand rather than focusing on what can be harvested. It also assists during the selection and harvesting process, the 'tree marker' can look back and easily see the number of stems retained. Likewise the cutter and snigger can see which trees are not to be damaged in the harvesting process. It also sets the trees to retain if the Tordon® crew are going to come in after the harvest.

Retention Criteria

<table>
<tr><th>Trees 30cm+ diameter class.</th><th>Trees within the 20 – 30 cm diameter class</th><th>Smaller trees in the 10 – 20cm diameter class</th><td rowspan="2">The combined retained stand should not exceed 100 trees/ha, on the condition that every tree has space to freely grow into.</td></tr>
<tr><td>Spaced at an average of 10m from other trees in this size class.</td><td>Spaced at an average of 7 – 8m from other trees in this size class or larger.</td><td>Spaced at an average of 5 – 7m from any other tree.</td></tr>
<tr><td colspan="4">Selection Criteria for marking trees for retention:
1. Preferred Species
2. Not having reached its optimum product value
3. Good quality – straight stem, free of fire or other scares, defect, bumps or insect damage
4. Vigorous, healthy, uniform dense tree crown with limited dead branches, mistletoe and/or epicormic shoots.
5. Dominant or at least a co-dominant tree crown placement in the canopy.
6. In 'remnant' vegetation retain the required numbers of 'habitat' trees prescribed in the 'Forests Practices Code'</td></tr>
</table>

Product Sorting and Classification

(For better product specification understanding, this section must be read in conjunction with Forest Products and Marketing Guide – 4)

Log Dumps

Log dump location, layout and management is a key factor in an effective integrated sale. The area needs to be large enough to accommodate a significant volume of material with additional room to process logs into a range of products

A separate area or at least delineated areas are required for the range of potential products such as sawlog, poles and piles, salvage logs and fencing material.

Booking and Tallying

Booking and tallying are normally undertaken by the cutter at the stump. The log is docked to length and its centre diameter under bark measured. This is then entered into a standard cutter's booking sheet indicating – Tree number, log number, length, centre diameter under bark (cm) grade and volume (m³) (Figure 2). The log number and cutter number are also written on the stump.

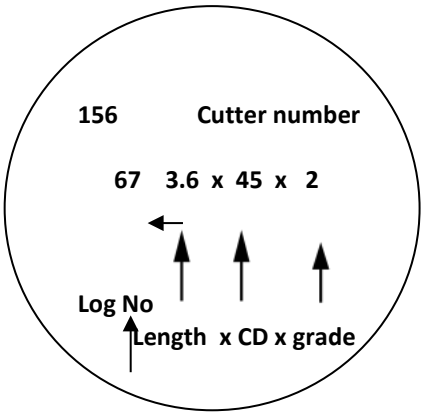
Volume is calculated using a Log and Timber Ready Reckoner.

Cutter name : John Cutter					Cutter No
Date cut: 20. 1. 2017					Property
Tree No	Log No	Length	Centre Diameter	Log Grade	Volume
88	109	4.5 2.4	35 29	1 2	.433 .159
88	110	6.0	33	1	.513
89	111	6.3	37	2	.677
90	112	12.9	40	1	1.621

Figure 2. Typical cutter docket layout and entry

Sawlog and Salvage log

Sawlogs and salvage logs are presented at dump in increments of 0.3 of a metre, with a minimum length of 2.4 m and small end diameter under bark (SED UB) of 30 cm. The cutter number, log number, length and centre diameter (under bark) and grade are written in paint pen on the butt end of each log. Salvage classification (x 2) is given to logs failing sawlog specifications due to pipe size, number and size of limbs, degree of bend or small end diameter (can be down to a minimum of 25cm.



As a simple guide sawlogs usually drop to salvage class when :

1. Small end diameter is < 30cm dub
2. Pipe exceeds the specifications in Table 1, or
3. Limbs (100mmØ+) affect 50% of the circumference of the log,
4. Bends exceeds; 2½° in a < 40 cm dub at the bend; 5° for logs 40-49 cm dub at the bend; or 10° if > 49 cm dub at the bend.

Allowable Pipe	
Centre Diameter of Log ub (cm)	**Pipe Diameter (cm)**
30-34	**5**
35-39	**17**
40-44	**20**
45-49	**24**
50-54	**24**
55-59	**28**
60-64	**34**
65-69	**38**
70-74	**42**

Table 1. Specifications for allowable pipe for sawlogs

Poles

Poles are presented debarked, dressed (branches trimmed, faults proven) and with its species code, pole number, length, D line diameter (mm) and strength rating (kN) written in paint pen on the base. Rot-pockets, unsound knots and grub holes are cleaned out and the whole stem presented on skids for inspection against the Australian Pole Standards specifications.

Pole specifications very simple terms include:

1. No fault within the critical zone,
2. Pipe : diameter <20% of circumference, <10% length of pole length,
3. Unsound knots associated with branch stubs or grub holes: trenched out with a chainsaw tip until free of decay. Maximum allowable width 10% of circumference, depth 5% of circumference, (a maximum of 6 allowed >1m apart)
4. Straightness - to specifications, and
5. Strength rating – diameter under bark at the D line (2 m from butt) and head match the length as per table

Photo 3. Decay in a branch stub being trenched out with a chainsaw

It is essential the poles are inspected and approved by the purchaser at the dump. Placing them on skids allows them to be easily rolled, measured and checked before hauling. This avoids argument on specification interpretation if the inspection is undertaken at the purchaser's yard where the seller is at a distinct disadvantage with diminished options for the sale of the product.

The pole number, strength rating and length are written on the base in paint pen. If the pole fails the specifications it may still be acceptable for a number of other products eg private property pole, sawlog, pile, or fencing (if durability 1.) . Currently there are three pole processors in Queensland each have a schedule of prices they pay for each pole length and class. Some processors want to pick and choose what lengths they take, this is generally unacceptable so its all or nothing.

Piles

Piles are also presented debarked and with their number, length and small end diameter written on the base.
The pile market varies widely with some mills stating they deal only in piles with a length <9 m and a small end diameter ≤ 200 mm, and other processors taking up to 17m with a 350 mm head. It is a very demand driven market and requires prior research on current demand and specifications.

The new draft Pile specification is very similar to poles but without the critical zone criteria. This does not necessarily transfer into the marketplace. Small pile (6m x 150 or 180mm sed) prices have not changed in 10 years and are rarely worth considering.

Fencing

Durability One material unsuitable for any other product (usually due to fault) is delivered to the fencing dump in 2.15 m or multiples of 2.15 m lengths. These can be subsequently split for split posts. Solid rounds are cut to length for strainers (small end diameter (sed) ~200-350 mm x L ~ 2.3 m), rails or stays (sed ~100 - 180 mm x L ~ 3 m).

Regular Harvest Progress Inspection

As with any management process regular progress inspections are essential. It is too late at the end of the harvest to complain about the product standards, harvesting process or levels of damage. It is worthwhile to check on material left in the bush to confirm high utilization standards are being met and no potential products are being left behind. If a problem arises discuss it with the contractors and arrive at a solution. If in your mind an irreconcilable issue has occurred a suspension of operations may be necessary.

The ability to communicate is essential in managing a logging operation. If a problem develops, deal with it immediately.

Marketing and Sales

Competitive Bids at Dump

If the products have not been presold then once the harvest is well under way (i.e. with 100 m^3 of sawlog cut) bids from prospective purchasers are invited for the range of products at the dump. This bid has to cover cut, snig, stumpage and harvest management for each product. The bid could be for one or all products and be on a per m^3 basis for sawlogs or lineal metre for poles and piles.

Marketing a range of timber products to processors provides as many opinions, variations in classification and values, as there are processors. Each one has their own system of standards, preferred products and values they are willing to pay.

In this case the purchaser bids for the product on an 'as is - where is' basis. They can clearly see the classification standard of the product and bid accordingly. There will be discussion on the attributes of any poles or piles presented as they have to meet the Australian Standards.

Post Harvest

Erosion Mitigation

At the completion of the harvest, maintenance of snig tracks and log dumps for erosion control must be completed. This may require removal of logging debris, instillation of whoa boys (cross drains) and the removal of temporary stream crossings. Topsoil should replaced on log dumps and associated logging debris (trimming and butting) should be pushed up and burnt and then appropriate drainage installed as part of the post-harvest rehabilitation. To comply with the Code of Practice the distance between cross drainage should not exceed those outlined in Table 2.

Table 2. Maximum Distance Between Cross Drainage

Slope	Maximum Distance (m)
<3 degrees	145
3 to 5 degrees	100
6 to 7 degrees	65
8 to 10 degrees	40
11 to 14 degrees	25
>14 degrees	15

Top Disposal Burn

At the completion of the harvest it will be necessary to complete a top disposal burn to promote regeneration and to reduce the accumulated fuel generated as a result of the harvest. In preparation for this burn it is necessary to ensure there is no accumulated fuel around the base of retained trees including

the habitat trees. During the top Disposal burn concentrations of accumulated fuel around these trees may result in severe damage or death to the trees that are essential for the next harvest round.

Forest Assessment

Why undertake a forest assessment?

Forest assessment is the process of breaking up your forest area into like forest types (Units), taking a representative sample (species, diameter, stocking, estimated log length and product) and applying that data over its respective management unit. This information can be used for a number of key management areas, namely:

1. To calculate the standing value of timber on the property at purchase to ensure that it is recognised as part of the capital purchase and hence non-taxable until the income from timber sales exceeds the valuation
2. To calculate the standing value of timber on the property at the point of selling the property or to demonstrate collateral for bank overdrafts or loans
3. Critical data on the condition of your forest to be able to construct a meaningful management plan
4. Estimate future income and harvest cycles as well as forecast expenditure for such things as infrastructure maintenance, forest treatment etc.

The approach does not need to be too complex however an assessment process gives a thorough understanding of the dynamics of your forest and without this basic information a planned management approach cannot be achieved. You could equate it to managing and selling your cattle without knowing how many cattle are in the paddock, what age they are and then letting the purchaser pick which ones are to be sold.

One of the most useful tools in the assessment process and native forest management planning is aerial photography. Apart from identifying likely landscape management units, assets, fence lines, etc., aerial photography will aid in defining how you will go about breaking up your forests for the assessment process.

A very useful phone App that can greatly assist your assessment is the Avenza PDF Map app. PFSQ can supply you with a georeferenced aerial photo of your property that you can then download via the app to your phone. The aerial photo can have your vegetation mapping overlays showing remnant and non-remnant boundaries as well as drainage line classification. You can view your location in real time, record and locate your tracks, photos, measure distances and areas and add place marks.

Areas that may exist on your property that require special management can be clearly marked on your aerial photograph. This is a good basis to now decide which areas are worth assessing, what areas are likely to have similar forest types and conditions and how extensive the assessment needs to be to capture an accurate understanding of your forest

A number of skills are needed to assess the attributes of a forest. These include:

1. The ability to recognise non-commercial such as Smooth barked apple, Supple Jack etc and commercial species such as Spotted gum, Grey ironbark, Yellow stringy bark etc., (PFSQ has a pocket booklet to assist in the identification of 22 of the most common species of southern Queensland)
2. Ability to recognise the probable forest products within the standing trees such as pole, sawlog etc.
3. Recognising the crown health classification (from very poor to very good)
4. Basic stand assessment and tree measurement skills to determine diameter, height, stems/ha, and volumes.

Forest assessment gives you an understanding of your forest and provides an informed basis on which to make future management decisions.

Forest Assessment is an acquired skill best attained by attending specific assessment training sessions run by Private Forestry Service Queensland.

How do I start?

The following is a simple outline of a forest assessment process.

Assessment is usually undertaken by measuring and recording data on a representative sample of the stand (see Assessment Plot Sheet, Appendix 1.) including species, stem diameter at breast height (dbh), product range and length, stem defects and crown health of each tree in the plot. A decision is also made and recorded as to whether a tree is ready for harvest, retained in the stand or treated out. The plots may be a series of 1/10th ha (17.85m radius) circular plots or preferably a 10m wide strips (.1 ha per 100 metres). This is achieved by measuring 5m either side of a compass bearing central line. The major benefit of strip lines is that you can also pick up changes in vegetation, watercourses, etc as you traverse the property. The length of the strip line is again determined by the intensity of the assessment and the degree of variability within the stand.

Once a representative sample of each forest type (1- 5% depending on size of the unit and its consistency) has been completed, the information can be extrapolated across the management unit. The assessment process is best undertaken with two people, one to book and the other to measure and assess. To simplify the process equipment such a retractable tape to measure the diameter of the plot and diameter measuring tape to measure the dbh of each tree is essential. *Crown health is described in Native Forest Stand Management Guides No1 and 2 and Forest Products are outlined with specifications in Forest and Marketing Guide No 4. Once stem diameter and product length is determined, log volume can be calculated using log volume tables.*

Remember: Plot and strip variability is a certainty; it is the average of the plots/strips that determines the unit condition, not a single plot!

What information and data does stand assessment give you?

Forest Stand assessment can give a range of very useful information. Of course the reliability of the extrapolated information is dependent on the accuracy of the data collected in the first place, and how representative is the area assessed to the net harvestable area within the management unit. If 5% of the stand is assessed and it's the best 5% of the unit, then multiplying that factor by 20 to bring it up to 100% will give a wildly inaccurate picture of the stand and would be a waste of time and effort. Attention to detail during the assessment process gives surprisingly accurate and detailed information on management issues such as:

1. Current forest health status – crown health is the most critical factor in stand productivity
2. Stocking rates/ha – Overstocking results in poor crown health and low productivity
3. Product range – essential to determine what product the stand is best managed for and who will be the likely purchasers. Is it a pole stand, are there veneer logs present or is it best managed for fencing?
4. Merchantable Standing log volume – gives an indication of the likely value of the stand
5. The Non-merchantable and non-commercial sector of the stand – If there are increasing numbers of young non-commercial species in the stand then a treatment to remove them from the productive areas is required.

6. Species mix – Which species are most desirable, perform the best on the site, and when do they flower and have mature seed in the canopy to manage for good regeneration of that species
7. No of stems to be removed / ha – is it time to harvest? What are the number of trees to be removed, likely product range and value?
8. No of stems to be retained / ha – Ensuring a productive stand with optimal stocking, spacing and crown health

PFSQ has a computer program that automatically calculates that information and provides it in the following format.

Resource Summary Page

Landholder/Property:	Swin		**Unit Description:**	**Dud Rate:**	10 %
Coupe/Unit/Strip No.:	Unit 2		Spotted Gum/Forest Red Gum		
PLOT DETAILS			**UNIT DETAILS/ha**		
Strip / plot area	8860.0	**m²**	Unit hectares	125	**ha**
Original stems in plot	359	**st**	Original sph	405	**st**
Residual stems in plot	53	**st**	Residual sph	60	**st**
Habitat stems in plot	2	**st**	Habitat sph	2	**st**
Treated stems in plot	297	**st**	Treated sph	335	**st**
Treated stems in plot <10cm	197	**st**	Treated sph<10cm	222	**st**
Logged stems in plot	9	**st**	Logged sph	10	**st**
BA original in plot	7.173	**m²**	Original BA / ha	8.10	**m²**
BA total post logging	3.405	**m²**	BA / ha total post logging	3.84	**m²**
Original m3 in plot	8.561	**m³**	Original m3/ha >10cm	9.66	**m³**
Logged m3 in plot	2.334	**m³**	Logged m3/ha	2.63	**m³**
Residual m3 in plot	6.227	**m³**	Residual m3/ha	7.03	**m³**

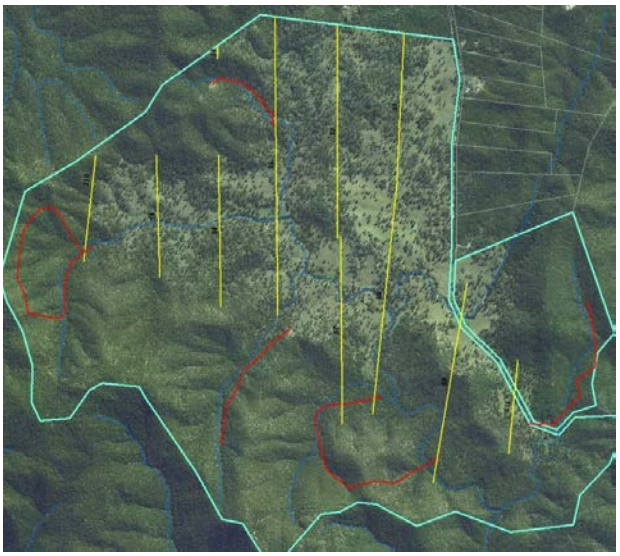
Forest Management Units

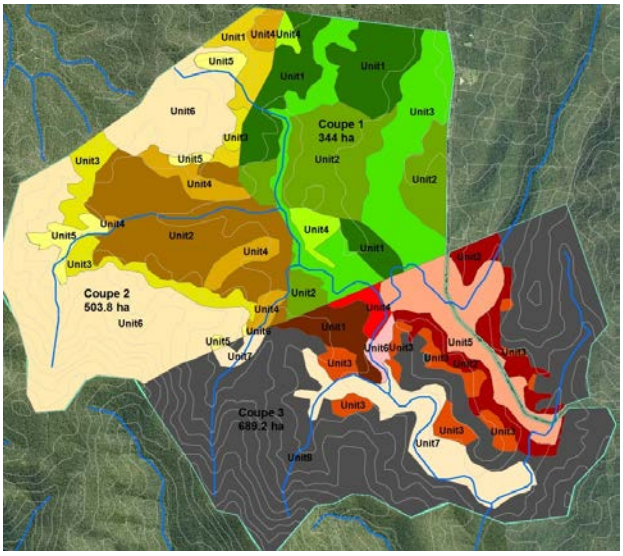
Forest management units are areas of forest cover that display a degree of consistency. Consistency is a group of characteristics which are repeatable across an area, such as species, stocking levels (trees per hectare), and average diameter distribution, tree height or log length.

Before forest assessment can be performed in any detail it is first necessary to delineate/stratify the forest into management units. The reason for this is that within any forest, even those that contain a single species, there could be variation such as:

1. Differences in past management intensity/practices
2. Areas that exhibit superior growth potential
3. Areas that could be managed for specific products (Poles/sawlog)
4. Areas where there is a significant difference in regeneration or trees per hectare.
5. Areas requiring specific exclusion and management
6. Structural diversity such as: Tree size classes, even age, etc

On a very large property, 10 or more management units may be identified depending upon species and structural diversity. On a smaller property with one forest type and structure, the entire property may be classed as a single management unit. Accurate identification of management units and the calculation of their net area (ha) is essential for precision.





Map 1. Aerial photo of a 1500ha property with property boundaries and assessment strips. Map 2. The same property broken into number of forest management units shaded in different colours

What Next?

On each assessment plot sheet calculate individual log volumes, stocking rates/ha, trees ready for harvest etc

1. Mark plots sites or strips on aerial photo
2. Define management units per consistency of species, diameter distribution and forest condition (See Management Unit definition
3. Mark management areas on Aerial photos
4. Combine data with all other tally sheets from each management unit and average, calculate per hectare statistics and multiply by number of hectares in Unit
5. Work out management options for each stand type and define as a management area
6. Define work plan for each stand and incorporate into Property Management plan

What is net area?

Net area is the area of forest in hectares (ha) that is available for management after all exclusion zones, buffer zones, major tracks and other non- harvestable area is deducted from the gross management unit area. Defining the net manageable area is of critical importance as this figure needs to be used when expanding/interpreting the inventory data.

Forest Management Plan

Forest Planning, like any planning exercise, assists the decision making process by clearly defining your management objectives, the state of the resource and the work required to meet those objectives for each management unit. It breaks the property into definable zones each with its own work plan and time line.

A forest management plan includes information such as:

1. Overall forest management objectives;
2. History of management; including volumes and types of timber that have been removed from the property
3. Management units by forest type and condition
4. Work plan and requirements for each Management Unit and time line
5. The harvesting potential and timing of the next harvests;

6. Which management areas are suitable for treatment and the timing of that process;
7. Regeneration Management Plan;
8. Fire management plan;
9. How the environmental values such as soil and water, flora and fauna will be managed.

Personnel constraints such as the amount of time and finances available will impact upon the level of management. It is always better to concentrate your management efforts towards easily accessible areas of higher quality to maximize your effectiveness.

Appendix 1.

Assessment Plot Sheet

Block : Location: Date : Mature Seed Present (species):

Tree no	Species	Dbh	Log Length (m)	Centre Diameter (Cm)	Defects	Crown V good, good, fair poor, V poor	Retain (R) Harvest (H) Treat (T)	Use (saw, salvage, pole, pile, round intermediate, useless)	Aprox Log Vol	
Plot total										
Total per ha									**Total x plot size Stems/Ha**	

Spotted Gum - spg **Yellow Stringy - wmy** **Grey Iron Bark - gri** **Grey Box - gbx** **Grey Gum - ggm**	**Smooth Barked Apple - sba** **Tallowwood - twd** **Blackbutt - bbt** **Forest Red Gum - frg**	**Narrow Leaved Red Ironbark - nri** **Broad leaved Red Ironbark - bri** **Red Bloodwood - rbw** **Queensland Qld Peppermint - qpm**	**12.6m radius plot = 1/20th ha** **17.85 m radius = 1/10th ha plot** **Log Vol calculated from log volume table**