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Indicative value analysis of New Zealand's privately owned indigenous forests

1 October 2013

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Private and confidential

1 October 2013

Aoife Martin
Ministry for Primary Industries
Pastoral House
25 The Terrace
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Dear Aoife

Estimate the indicative current and potential value of New Zealand's indigenous forests based on sustainable forest management and privately owned indigenous forests

The indigenous forest industry sources all of its timber from private indigenous forests, which are managed on a sustainable basis under the Forests Act 1949.

The sustainable management of New Zealand's private indigenous forests allows owners to apply for Sustainable Forest Management Plans and Permits that allow them to harvest and mill controlled volumes of timber over a period of many years.

Currently, the Ministry for Primary Industries does not have a clear understanding of the current or potential annual revenue stream generated by indigenous forests under sustainable management. Accordingly, we have been engaged to provide a high level view of the indicative revenue streams being produced by New Zealand's indigenous forestry sector at key price points in the value chain as well as an assessment of the potential revenue stream of New Zealand's indigenous forestry sector. This report outlines our findings.

Yours sincerely

SMcGrath

Sarah McGrath

Inherent Limitations

This report has been prepared in accordance with our Engagement Letter dated 17 August 2012 and the addendum to the engagement letter dated 24 May 2013. The services provided under our engagement letter and the addendum ('Services') have not been undertaken in accordance with any auditing, review or assurance standards. The term "Audit/Review" used in this report does not relate to an Audit/Review as defined under professional assurance standards.

The information presented in this report is based on that made available to us in the course of our work. We have indicated within this report the sources of the information provided. Unless otherwise stated in this report, we have relied upon the truth, accuracy and completeness of any information provided or made available to us in connection with the Services without independently verifying it.

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In relation to any forecasts included in the report, we do not make any statement as to whether any forecasts or projections will be achieved, or whether the assumptions and data underlying any such forecasts are accurate, complete or reasonable. We do not warrant or guarantee the achievement of any such forecasts. There will usually be differences between forecast or projected and actual results, because events and circumstances frequently do not occur as expected or predicted, and those differences may be material.

Third Party Reliance

Other than our responsibility to the Ministry of Primary Industries, neither KPMG nor any member or employee of KPMG undertakes responsibility arising in any way from reliance placed by a third party on this report. Any reliance placed is that party's sole responsibility.

Our report was prepared solely in accordance with the specific terms of reference set out in the engagement letter agreed dated 17 August 2012 and the addendum dated 24 May 2013 between ourselves and the Ministry for Primary Industries and for no other purpose.

KPMG expressly disclaims any and all liability for any loss or damage of whatever kind to any person acting on information contained in this report, other than the Ministry of Primary Industries. Additionally, we reserve the right but not the obligation to update our report or to revise the information contained therein because of events and transactions occurring subsequent to the date of this report.

Contents

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Key Findings

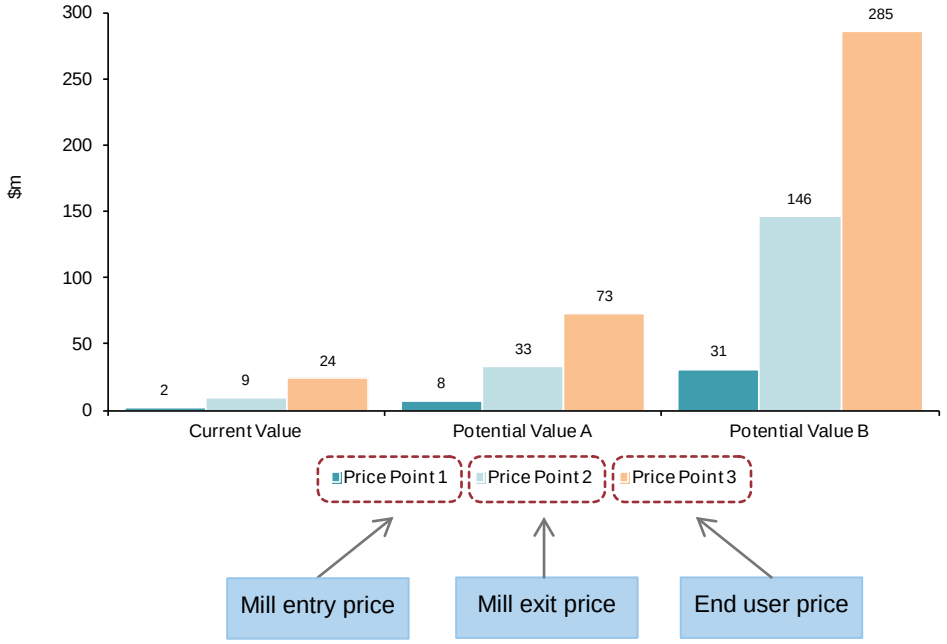
Summary of Key Findings

Information provided suggests that the annual revenue stream of indigenous timber increases 10 fold from mill entry to sale of finished goods.

Our analysis assumes no price elasticity with changes in volumes. This is unlikely to be the case and will need to be explored further if necessary.

Growth will also be constrained unless there is significant investment in related infrastructure.

Estimated current and potential annual revenue streams generated by red beech, silver beech, rimu and tawa



The bar chart above outlines the estimated combined total annual revenue streams from red beech, silver beech, rimu and tawa at:

- Current levels
- Potential levels if harvest levels were at the current maximum allowable harvest level (Potential Value A)
- Potential levels if all privately owned indigenous forest was under a SFM Plan or Permit (Potential Value B)

Observations

- At a simplistic level, assuming no price variance relating to the level of supply, the analysis indicates that increasing volumes could significantly increase revenues derived from indigenous forests. We suggest further work is carried out to determine both demand for the product and price points to test the validity of this assumption.
- We further note the growth is likely to be constrained by infrastructure, for example a significant increase in drying capacity will be required to process increased volumes.

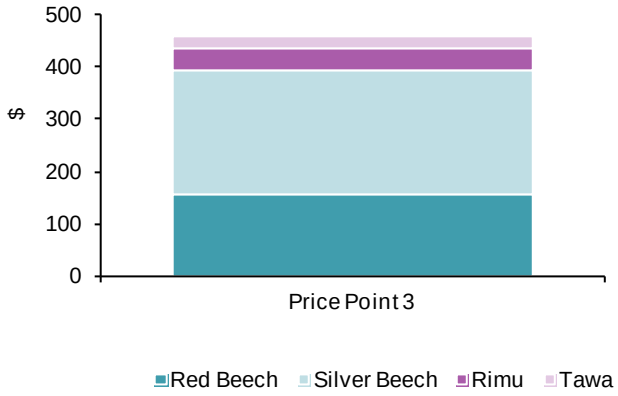
Summary of Key Findings

By utilising the current maximum indigenous forest resource, the total potential annual revenue streams at Price Point 3 are estimated to be $460 million.

Our analysis assumes no price elasticity with changes in volumes. This is unlikely to be the case and will need to be explored further if necessary.

In addition, achieving the estimated potential revenue streams is unlikely to occur without significant changes to the markets for indigenous timber.

Potential value of annual revenue streams at Price Point 3 if all available indigenous forestry resources were utilised



Approach

- The gross annual harvest standing volumes (m^3) were used for each species to represent the maximum privately owned indigenous forest resource that can be utilised. Standing volumes were converted to log volumes using conversion factors described in Appendix C.
- To determine the potential revenue streams at Price Point 3 pricing, recoverable mill rate and apportionment assumptions, as detailed in Appendix A, were applied.

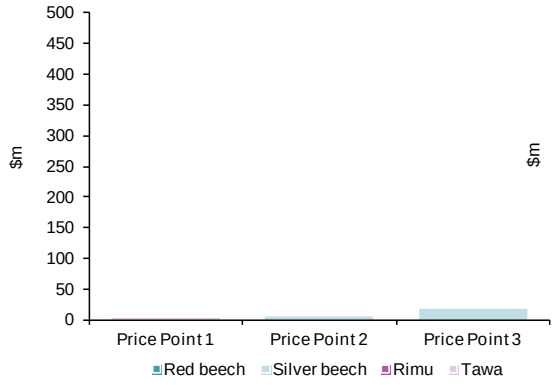
Findings

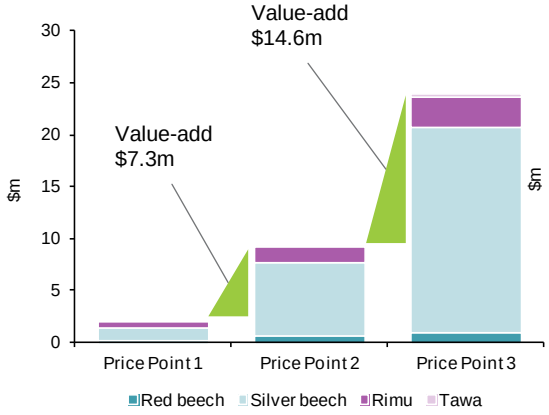
- By utilising the current maximum indigenous forest resource, the total potential annual revenue streams at Price Point 3 are estimated to be:
  - Red beech - $156 million
  - Silver beech - $237 million
  - Rimu - $45 million
  - Tawa - $22 million

Summary of Key Findings

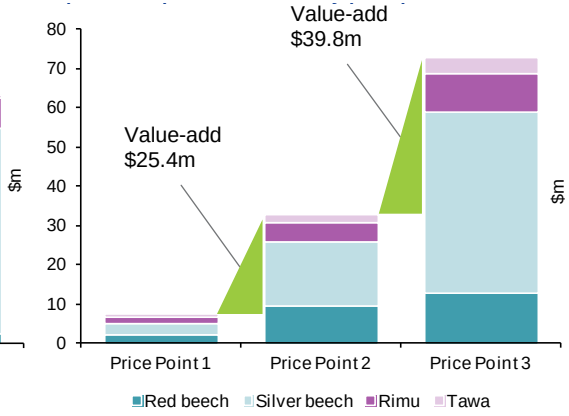
While our analysis indicates the species with the most growth potential, more specific analysis on the economics of individual species should inform any decision regarding investment.

Current value of revenue streams by Price Point

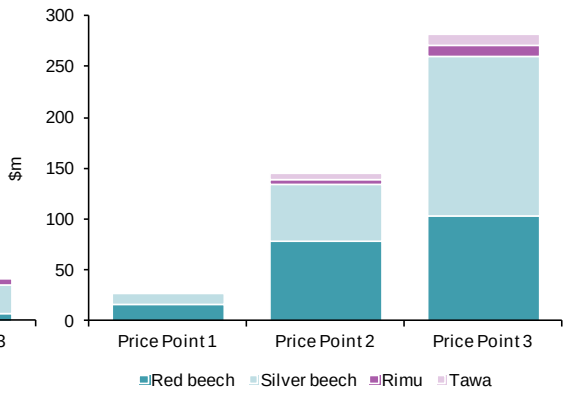


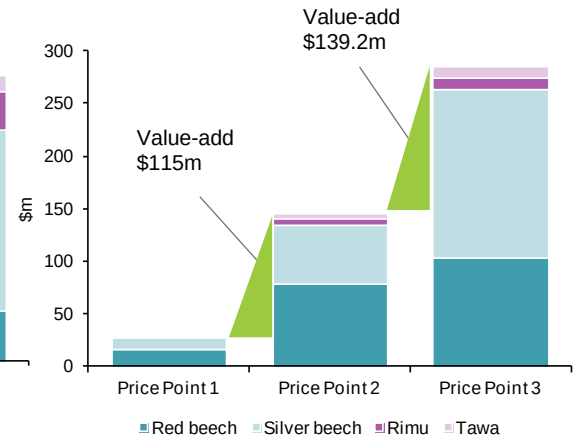


Potential value A of revenue streams by Price Point



Potential value B of revenue streams by Price Point





Potential revenue from increased volumes

Achieving the estimated potential revenue streams is unlikely to occur without significant changes to the markets for indigenous timber.

Key barriers identified by industry are kiln drying capacity and legislative restrictions.

Introduction

- The scale of potential annual revenue streams is described under two scenarios:
  - If harvest levels were at the maximum allowable level under the current SFM Plans and Permits; and
  - If all privately owned indigenous forest was under a SFM Plan and/or Permit, and harvest levels were at the maximum allowable level.

Harvest levels

- Currently SFM Plan and Permit holders are not harvesting to the maximum allowable levels; nationally red beech and tawa harvest levels are more than 95% lower than the total allowable harvest level and silver beech and rimu are more than 70% below the total allowable harvest levels. Harvest rates of SFM Plan and Permit holders who are actively harvesting range from 40% to 60%.
- Discussions with industry indicates that low harvest levels are a consequence of minimal or limited marketing in the sector, and therefore without changes in New Zealand or export markets, potential revenue streams estimated in this report are unlikely to be achieved.
- Currently many SFM Plan and Permit holders are investigating opportunities to enter the export market or increase existing exports. This is complicated by legislative restrictions and the ability to supply large volumes of timber consistently, which is impacted by the resource size and kiln drying capacity.

Price

- Increased supply would have an effect on price, however there are divergent views across the industry regarding the point that price changes would occur. This is not surprising given the variety of markets and products being addressed. Therefore the potential annual revenue streams presented do not include supply and demand sensitivities.

End users of indigenous timber

- Increasing the amount of privately owned indigenous forest under an SFM Plan and/or Permit may introduce new plan and permit holders and potentially new saw mill operators. However there are industry risks that may arise.
- A consistent view from end users of indigenous timber is that increased numbers of operators in the New Zealand market could be beneficial in providing improved consistency and flexibility of supply. However, a significant concern in the industry is that any increase in supply and operators may have negative effects on the quality of timber, particularly if processes are not adequately managed. A decrease in quality of timber could result in a decrease in end users purchase, which would have an industry wide impact on the potential revenue streams presented in this report.
- Nothing has come to our attention to suggest that current end customer use of indigenous timber would grow in parallel with increased supply of indigenous timber, without a change in the current market forces. For example, evidence from the market indicates that the furniture manufacturing sector is declining in New Zealand.

Barriers and proposed incentives to entering the sustainable forest management for the New Zealand Indigenous Forestry sector

Industry have identified key barriers to growth in the sector as:

- **The cost of RMA application and compliance**
- **Restrictive export legislation**
- **Lack of marketing both in New Zealand and globally**
- **Lack of infrastructure, particularly kiln drying capacity and heavy lifting helicopter capability.**

Introduction

- During the course of interviews with industry we discussed the barriers to entering sustainable forest management for New Zealand indigenous forests. Industry also proposed initiatives which would incentivise new or continued engagement in the New Zealand indigenous forestry sector. These pages highlight the key points from these discussions.

Barriers

Cost of the Resource Management Act (RMA) application and compliance

- SFM Plans and Permits are administered by MPI. Following the approval of an SFM Plan or Permit, the holder must obtain RMA consent from the relevant local council.
- A number of industry representatives highlighted the high cost of applying for RMA consent and the prohibitively long time frames required for the consent process. The cost is largely made up of legal fees, consultant fees and internal time. Typically RMA consent is granted with conditions, such as conservation, pest management and these conditions add annual compliance costs to the SFM Plan or Permit holder. In some cases, the RMA consent and conditions result in re-work to the SFM Plan or Permit previously approved by MPI.
- The RMA application and consenting process appears to vary considerably from region to region, with increased time frames and more stringent procedures in some regions. This was highlighted as an area of frustration for industry.
- The general view was the cost of applying for an SFM Plan or Permit was minimal when compared to the cost of RMA application and compliance.

Export restrictions

- Some industry representatives perceived that export legislation on indigenous timber was restrictive. In particular, the restrictions on export of green sawn tawa and certain forms of beech (e.g. size restrictions, logs, chips and sawdust) are seen to be prohibitive to entering markets overseas, where interest has been shown in these products.

Lack of marketing

- A consistent theme through the interviews conducted was that New Zealand indigenous timber is under-valued by a large portion of the New Zealand public. This is thought to be driven by either a belief that indigenous forests in New Zealand should be conserved and a lack of understanding of the sustainable harvesting of indigenous forests, or by the demand for lower priced products, particularly furniture.
- Traditionally, the New Zealand indigenous forestry sector has not invested heavily in marketing and branding of its timber and end products. A common view in the industry is that this investment is required to improve both the New Zealand market and overseas markets.

Barriers and proposed incentives to entering the sustainable forest management for the New Zealand Indigenous Forestry sector

Industry proposed a number of initiatives to support the indigenous forestry sector.

Capital Investment

- Two areas would require significant capital investment by SFM Plan and Permit holders and saw mill operators to increase supply of indigenous timber into the market; kiln drying and heavy lift capacity helicopters.
- Unless indigenous timber is sold in a green sawn state, it must be dried using kiln capacity. Kiln drying is a specialised process requiring dedicated facilities and technical skills. The kiln drying process can take up to eight months and is considered to be a bottleneck in the milling system. Increased harvesting to the maximum allowable harvest rate if all privately owned indigenous forest was under a SFM Plan or Permit would require investment in additional kiln drying capacity. Indicative figures from industry suggest that a new kiln drying facility would cost in the region of $1,000,000. A more in-depth analysis of the potential costs of building a new kiln drying facility would be required to determine accurate costs.
- In many areas of the privately owned indigenous forest resource, ground harvest is not possible due to the terrain and topography of the land. In these cases, aerial harvesting is required using helicopters capable of lifting heavy loads. Currently, there is a lack of heavy lift capacity helicopters in New Zealand. This would have a negative impact on the ability of the industry to harvest at higher levels, as proposed in the scenario where all privately owned indigenous forest was under a SFM Plan or Permit. Industry suggests that an investment of $3 million to $6 million would be required to establish a heavy lifting helicopter capability to service the entire industry.

Proposed initiatives

- Industry suggested a number of areas where investment is required including:
  - Development of a marketing strategy for indigenous timber both in the New Zealand and overseas markets;
  - Increase kiln drying capacity;
  - Establishment of a heavy lifting helicopter facility;
  - The use of indigenous timber extensively in the re-build of Canterbury following earthquake damage; and
  - Procurement of indigenous timber for government related building construction or upgrades.
- Industry also indicated a desire for changes to biosecurity regulations to ensure that imported timber must adhere to the same biosecurity standards as New Zealand indigenous timber.
- We note that many of the initiatives suggested by industry are not fully formed and need to be explored further.

Increased utilisation of indigenous wood on Department of Conservation (DoC) land

- Multiple industry representatives suggested there could be better use of indigenous timber, which has been wind-blown or strategically cut on DoC land.
- Several examples were given where felled indigenous trees have been seen to lie unused on the ground on DoC land. Industry representatives would be willing to purchase and remove this timber and process it through its mills generating revenue for the sector.

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Introduction

Background and scope

The purpose of this report is to assist MPI in estimating the current and potential values at key points in the value chain.

Background

- The Forests Act 1949 covers the sustainable management of private indigenous forests. It allows owners to apply for Sustainable Forest Management (SFM) Plans or Permits that allow controlled volumes of timber to be harvested or milled.
- Under current legislation, indigenous timber can only be harvested from forests that are managed in a way that maintains continuous forest cover and ecological balance.
- There are currently around 50,000 hectares of forest under sustainable management (i.e. SFM Plans and Permits). Many more hectares around New Zealand have the potential to be sustainably managed, which would increase the allowable harvests of many species of indigenous forest.
- MPI have asked us to provide a high level view of indicative current and potential annual revenue streams of New Zealand's privately owned indigenous forestry sector
  a) Under current harvest levels;
  b) Harvest levels were increased to the maximum allowable level under current SFM Plans and Permits; and
  c) Assuming all privately owned indigenous forest was managed under SFM Plans and Permits and harvested at a maximum allowable harvest level.

Scope

- The purpose of this report is to assist MPI in estimating current and potential annual revenue streams generated by New Zealand's privately owned indigenous forestry sector at key points in the value chain:
  - Price Point 1: the cost or price of logs on entry to the mill
  - Price Point 2: the price of milled timber on exit from the mill
  - Price Point 3: the price of the finished goods produced using the milled timber.

Scope continued

- For the purposes of this project, price and harvest volume data has been gathered from MPI and from forest industry representatives ("industry") for each of the sample species chosen for this project: red beech, silver beech, rimu and tawa.
- Any costs associated with milling or production of indigenous forests are not included in the scope of this project.
- The estimate of current annual revenue generated used average market prices and harvest volumes over the 2009/10, 2010/11 and 2011/12 financial years.
- The estimate of potential annual revenue used:
  - An assessment of the potential value if harvest levels were at the maximum allowable level under the current SFM Plans and Permits; and
  - An assessment of the potential value if all privately owned indigenous forest was under a SFM Plans and/or Permits, and harvest levels were at the maximum allowable level.
- In the absence of indicative alternative pricing, average market prices for the years above were used in all scenarios outlined. We acknowledge this as a limitation to our work as this method does not allow for price movements based on supply. In terms of price point 3, the estimate also assumes that end markets / products remain consistent proportionally. Again, the validity of this assumption could be tested further.
- The scope also included discussions with industry representatives to identify the incentives and barriers of entering into the indigenous forest sector. Industry representatives included SFM Plan and Permit owners, sawmill owners and sawmill customers (i.e. the producers of finished goods).

The value chain

The scope of this work comprised of a value analysis of revenue streams at three points in the value chain.

The diagram on this page describes the value chain and the price points included in the scope of this project.

Price Point 1
Log entry to the mill

- Trees are harvested from private land that is covered by either a SFM Plan or Permit.
- Harvesting can be achieved by ground or aerial means.
- Costs incurred in the harvesting of indigenous forests includes:
  - Harvest costs
  - Labour costs
  - Forwarding costs (logs taken to be transported)
  - Transportation costs (logs taken to the mill)
  - An additional cost of capital has been added to the cost/price of logs at Price Point 1. This cost of capital reflects the return that is expected on the capital that has been invested. The rate of 15% has been calculated using an industry average EBITDA margin.

Price Point 2
Exit from the mill

- Logs arrive at the mill and are sorted.
- The milling process consists of:
  1. Sawing (various shapes and sizes)
  2. Filleting
  3. Kiln drying
  4. Dressing.
- The timber is graded as it leaves the mill.
- The price of the milled timber is based on the grade of the wood.

Price Point 3
End users

- Milled timber is purchased by customers who use the various grades of timber for a variety of finished goods.
- These customers include:
  - Wholesalers
  - Furniture makers
  - Builders
  - Floorers
  - Manufacturers of giftware and health and food items.
- The price of finished goods varies based on the quality of the wood used and the nature of finished good.

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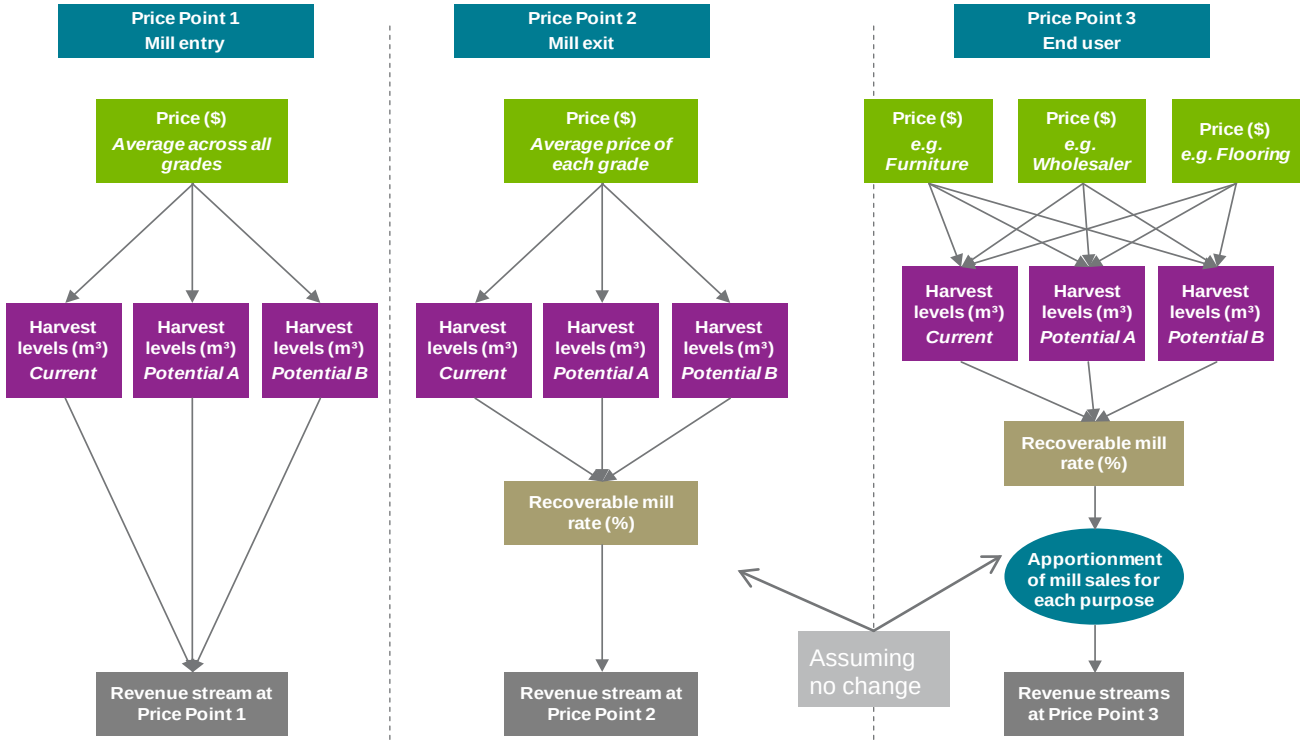
Approach

Methodology

The scope of this work comprised an assessment of revenue streams at three price points in the value chain.

The diagram on this page outlines the methodology used to determine these revenue streams.

The methodology is explained in further detail in Appendix A



Price Point 1

Two types of data were collected at Price Point 1 (mill entry), the cost of harvesting logs and the cost of purchasing logs from a Plan or Permit owner. Data was collected for the 2009/10, 2010/11 and 2011/12 financial years from a selection of industry representatives. A weighted average price was calculated for each species based on the volume of logs associated with each price. Standing volumes used for potential harvest levels (Potential B) have been converted to log volumes using conversion factors described in Appendix C.

Price Point 2

Following milling, timber is graded using species-specific criteria . The timber is then priced according to grade. Price data has been sourced from a selection of industry representatives for each species by grade. Weighted average prices for each species have been calculated and applied to total harvest levels for each species.

Price Point 3

Milled indigenous timber is transformed into a variety of finished goods. The types of finished goods are largely determined by the suitability of the species and quality of the timber. Price data has been sourced from a range of timber end users, but this list of end user is not exhaustive. Average end user prices have been calculated and applied to total harvest levels.

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Results – current annual revenue streams

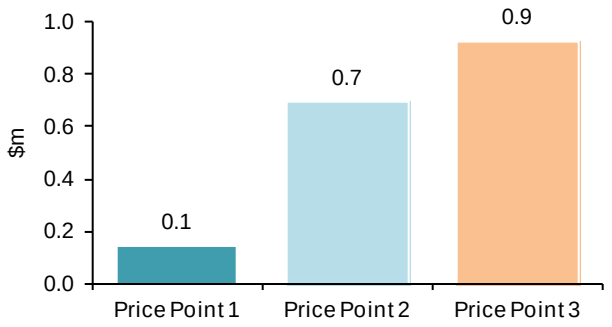
Current revenue streams – Red Beech

The current annual red beech revenue streams are estimated to be:

- **Price Point 1 (mill entry) - $0.1m**
- **Price Point 2 (mill exit) - $0.7m**
- **Price Point 3 (end users) - $0.9m**

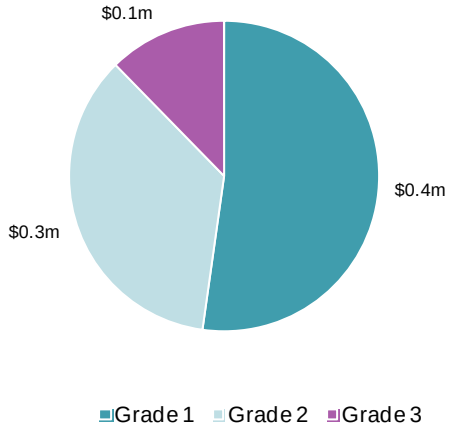
Data was collected from end users who manufacture flooring and decking. This was applied to the national average harvest rate for red beech.

Red beech revenue generated under current harvest levels



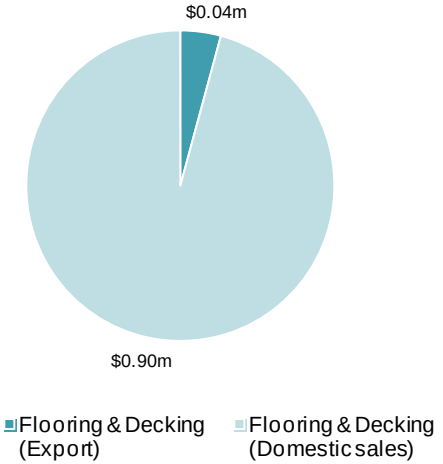
Red beech revenue generated at Price Point 2 (exit from mill)

Red beech is graded into three grades on exit from the mill. Red beech grades are described in Appendix D. The pie chart below describes the revenue split by grade.



Red beech revenue generated at Price Point 3 (end users)

The pie chart below describes the revenue generated from end users of red beech.



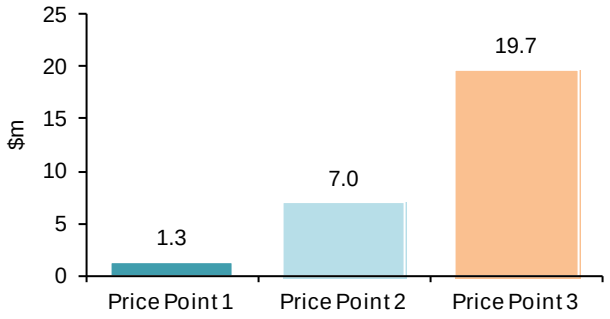
Current revenue streams – Silver Beech

The current annual silver beech revenue streams are estimated to be:

- **Price Point 1 (mill entry) - $1.3m**
- **Price Point 2 (mill exit) - $7.0m**
- **Price Point 3 (end users) - $19.7m**

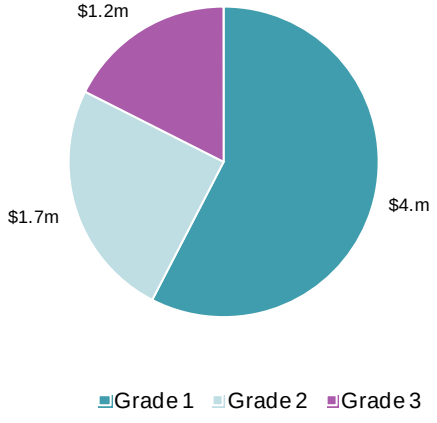
Silver beech price data was collected from wholesalers and end users who manufacture furniture, flooring and decking and other finished goods. This was applied to the national average harvest rate for silver beech.

Silver beech revenue generated under current harvest levels



Silver beech revenue generated at Price Point 2 (exit from mill)

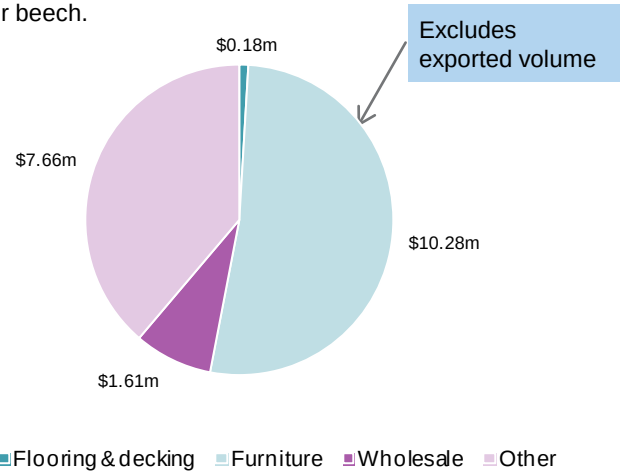
Silver beech is graded into three grades on exit from the mill. Silver beech grades are described in Appendix D. The pie chart below describes the revenue split by grade.



15% of volume is exported directly from mill

Silver beech revenue generated at Price Point 3 (end users)

The pie chart below describes the revenue generated from end users of silver beech.



Additional assumptions

To calculate the price of silver beech furniture at Price Point 3 we have used the sale price for a table (representing a high value item) and a chair frame (representing a low value item). These two values have been combined and represent the revenue stream estimated from the production and sale of silver beech furniture.

Information received from mill owners has shown that on average 15% of silver beech sales are exported. We have not included any value associated with these sales as the subsequent sale overseas produces no revenue stream for New Zealand.

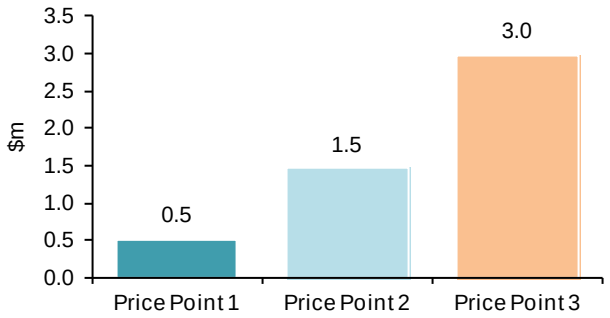
Current revenue streams – Rimu

The current annual rimu revenue streams are estimated to be:

- **Price Point 1 (mill entry) - $0.5m**
- **Price Point 2 (mill exit) - $1.5m**
- **Price Point 3 (end users) - $3.0m**

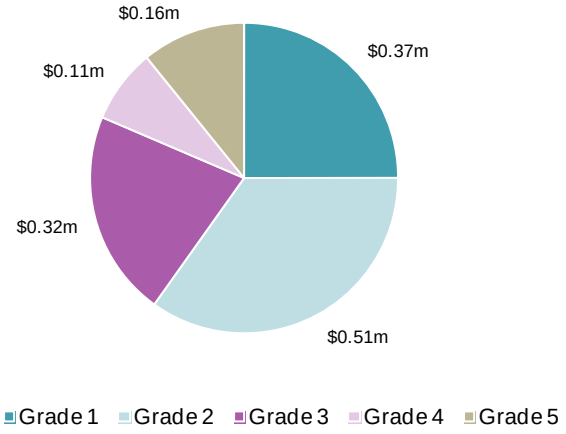
Data was collected from wholesalers and end users who manufacture furniture and flooring products from rimu. This was applied to the national average harvest rate for rimu.

Rimu revenue generated under current harvest levels



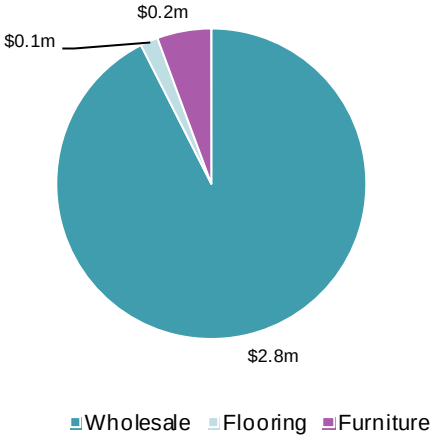
Rimu revenue generated at Price Point 2 (exit from mill)

Rimu is graded into 5 grades on exit from the mill. Rimu grades are described in Appendix D. The pie chart below describes the revenue split by grade.



Rimu revenue generated at Price Point 3 (end users)

The pie chart below describes the revenue generated from end users of rimu.



Additional assumptions

To calculate the price of rimu furniture at Price Point 3 we have used the sale price for a high-value table. This has been used to determine the revenue stream estimated from the production and sale of rimu furniture.

Note

Industry representatives who provided price data for rmu are currently harvesting predominantly lower grades rimu. We understand that higher grade rimu would attract higher prices. Therefore, based on the information provided, the national revenue streams for rimu in this report may be underestimated. The average price provided for Price Point 1, including cost of capital, was $358 per m^3 however prices of up to $1,000 per m^3 were provided.

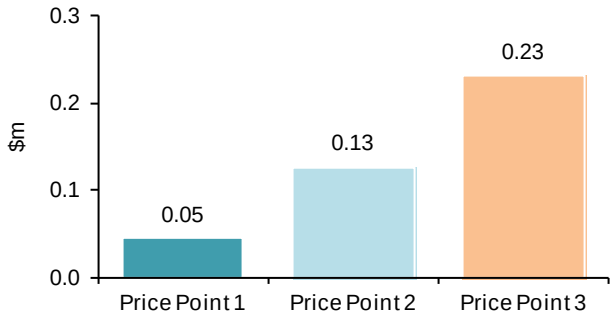
Current revenue streams – Tawa

The current annual tawa revenue streams are estimated to be:

- **Price Point 1 (mill entry) - $0.05m**
- **Price Point 2 (mill exit) - $0.13m**
- **Price Point 3 (end users) - $0.23m**

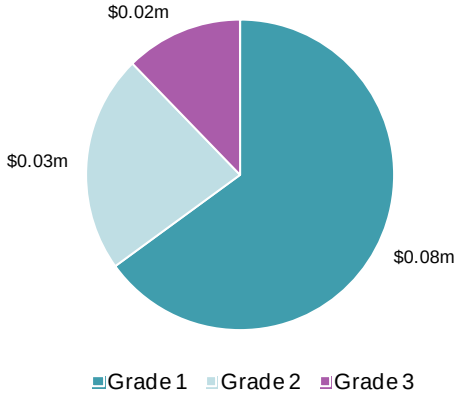
Tawa price data was collected from end users who manufacture flooring and wholesalers. This was applied to the national average harvest rate for tawa.

Tawa revenue generated under current harvest levels



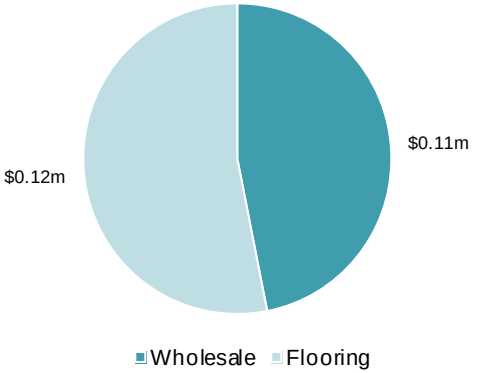
Tawa revenue generated at Price Point 2 (exit from mill)

Tawa is graded into 3 grades on exit from the mill. Tawa grades are described in Appendix D. The pie chart below describes the revenue split by grade.



Tawa revenue generated at Price Point 3 (end users)

The pie chart below describes the revenue generated from end users of tawa.



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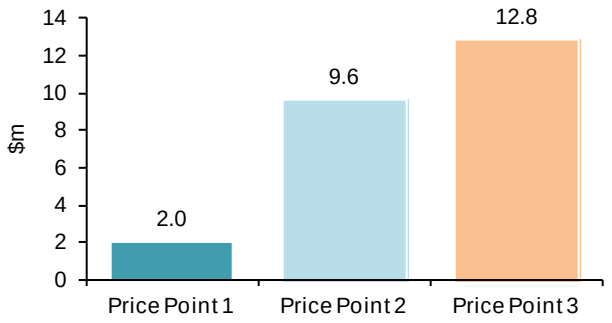
Results – potential annual revenue streams at the current maximum allowable harvest levels

Potential revenue streams at the current maximum allowable harvest levels – Red Beech

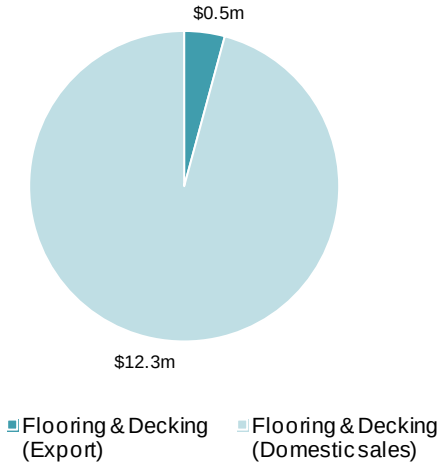
The potential annual revenue streams for red beech under the maximum allowable harvest levels (current SFM Plans and Permits) are estimated to be:

- **Price Point 1 (mill entry) - $2.0m**
- **Price Point 2 (mill exit) - $9.6m**
- **Price Point 3 (end users) - $12.8m**

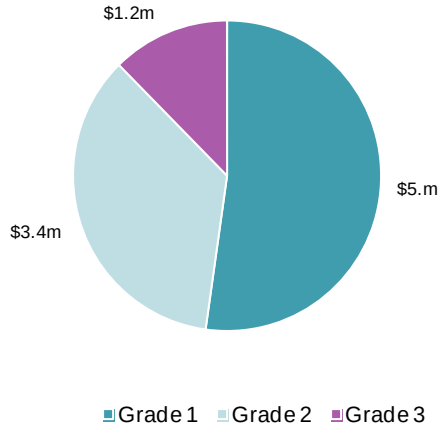
Red beech potential revenues at the current maximum allowable harvest levels



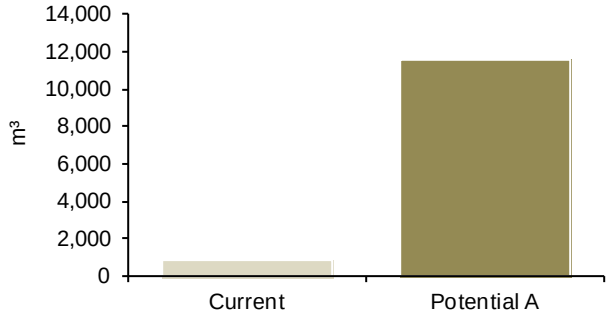
Red beech potential revenue generated at Price Point 3 (end users) at current maximum allowable harvest levels



Red beech potential revenue generated at Price Point 2 (exit from mill) at current maximum allowable harvest levels



Red beech total harvest volumes

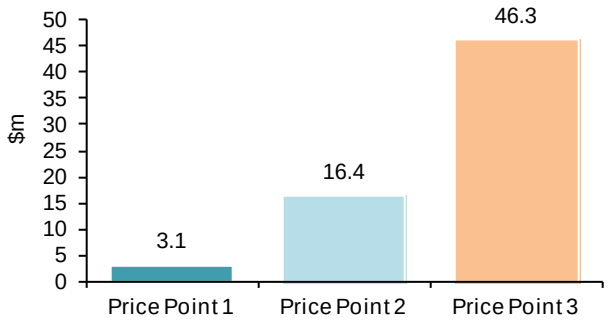


Potential revenue streams at the current maximum allowable harvest levels – Silver Beech

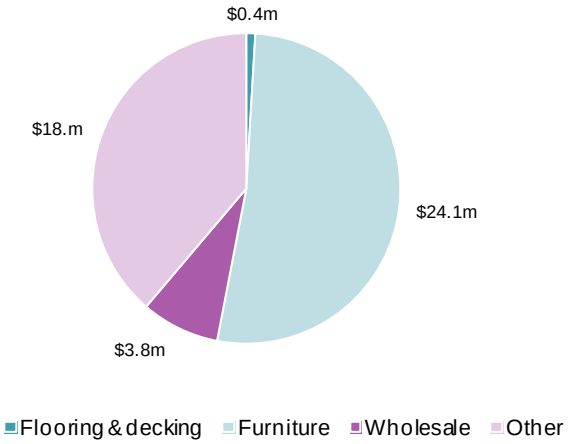
The potential annual revenue streams for silver beech under the maximum allowable harvest levels (current SFM Plans and Permits) are estimated to be:

- **Price Point 1 (mill entry) - $3.1m**
- **Price Point 2 (mill exit) - $16.4m**
- **Price Point 3 (end users) - $46.3m**

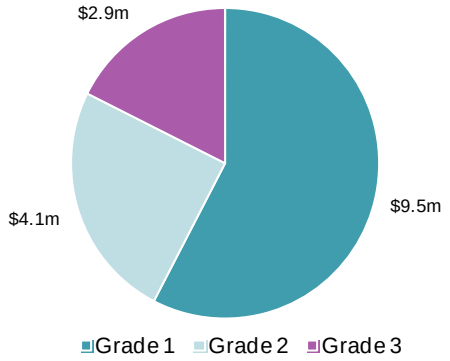
Silver beech potential revenues at the current maximum allowable harvest levels



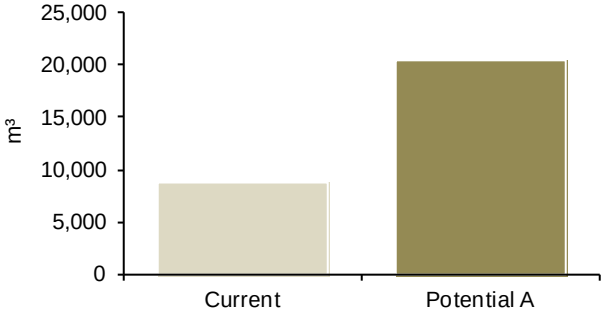
Silver beech potential revenue generated at Price Point 3 (end users) at current maximum allowable harvest levels



Silver beech potential revenue generated at Price Point 2 (exit from mill) at current maximum allowable harvest levels



Silver beech total harvest volumes



Additional assumptions

To calculate the price of silver beech furniture at Price Point 3 we have used the sale price for a table (representing a high value item) and a chair frame (representing a low value item). These two values have been combined and represent the revenue stream estimated from the production and sale of silver beech furniture.

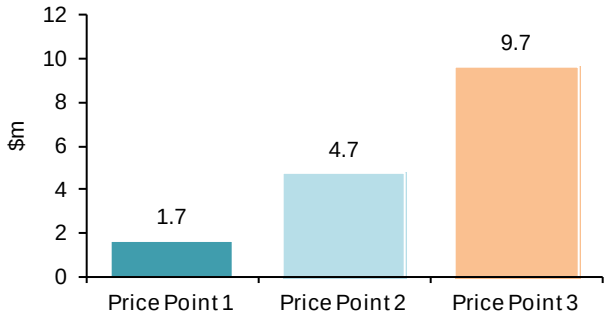
Information received from mill owners has shown that on average 15% of silver beech sales are exported. We have not included any value associated with these sales as the subsequent sale overseas produces no revenue stream for New Zealand.

Potential revenue streams at the current maximum allowable harvest levels – Rimu

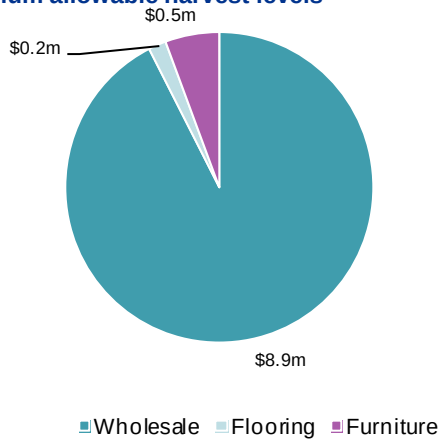
The potential annual revenue streams for rimu under the maximum allowable harvest levels (current SFM Plans and Permits) are estimated to be:

- **Price Point 1 (mill entry) - $1.7m**
- **Price Point 2 (mill exit) - $4.7m**
- **Price Point 3 (end users) - $9.7m**

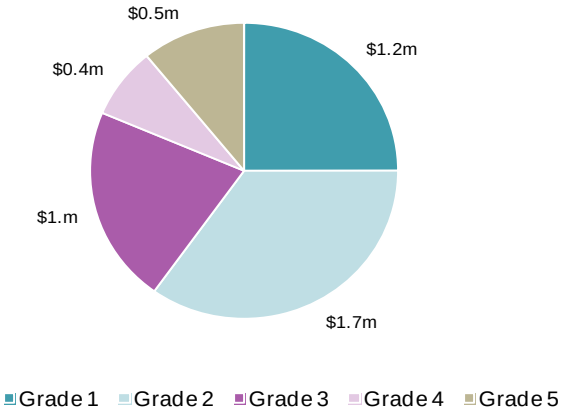
Rimu potential revenues at the current maximum allowable harvest levels



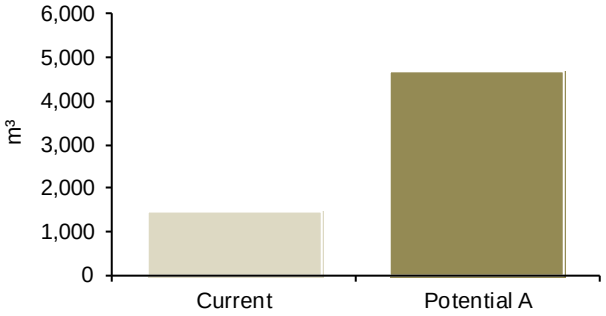
Rimu potential revenue generated at Price Point 3 (end users) at current maximum allowable harvest levels



Rimu potential revenue generated at Price Point 2 (exit from mill) at current maximum allowable harvest levels



Rimu total harvest volumes



Additional assumptions

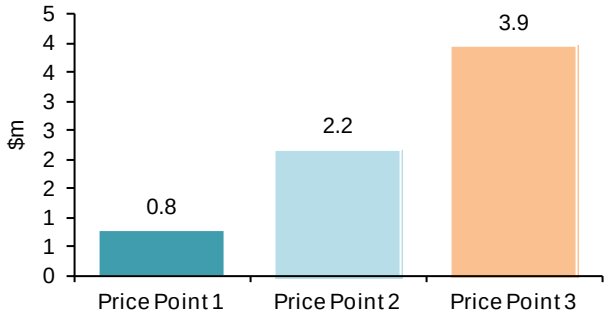
To calculate the price of rimu furniture at Price Point 3 we have used the sale price for a high-value table. This has been used to determine the revenue stream estimated from the production and sale of rimu furniture.

Potential revenue streams at the current maximum allowable harvest levels – Tawa

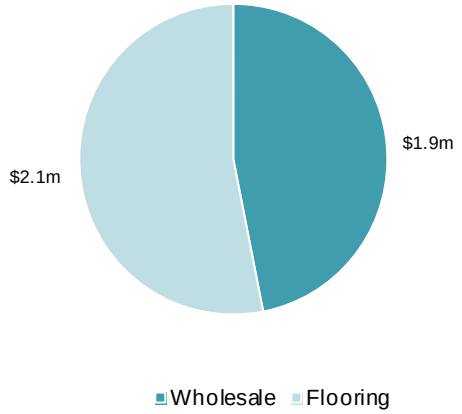
The potential annual revenue streams for tawa under the maximum allowable harvest levels (current SFM Plans and Permits) are estimated to be:

- **Price Point 1 (mill entry) - $0.8m**
- **Price Point 2 (mill exit) - $2.2m**
- **Price Point 3 (end users) - $3.9m**

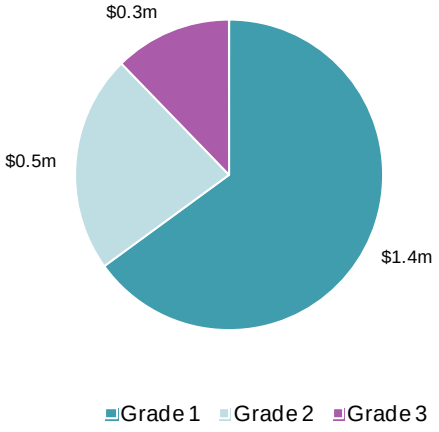
Tawa potential revenues at the current maximum allowable harvest levels



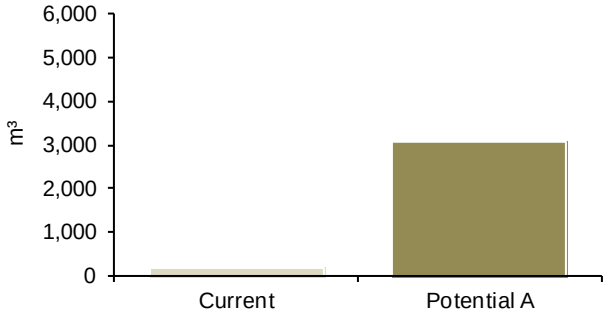
Tawa potential revenue generated at Price Point 3 (end users) at current maximum allowable harvest levels



Tawa potential revenue generated at Price Point 2 (exit from mill) at current maximum allowable harvest levels



Tawa total harvest volumes



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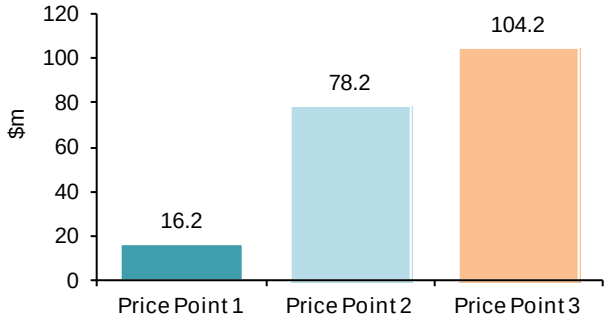
Results – potential annual revenue streams if all privately owned indigenous forest was under an SFM Plan or Permit

Potential revenue streams if all privately owned indigenous forest was under an SFM Plan or Permit – Red Beech

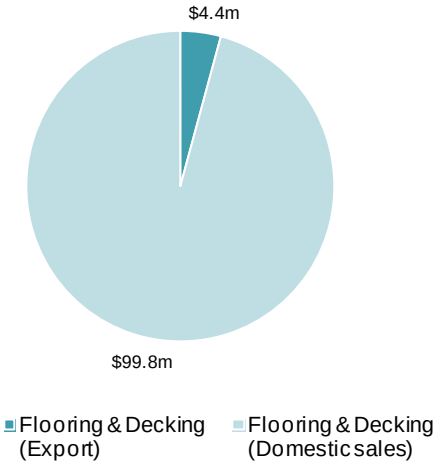
The potential annual revenue streams for red beech if all privately owned indigenous forest was under an SFM Plan or Permit are estimated to be:

- **Price Point 1 (mill entry) - $16.2m**
- **Price Point 2 (mill exit) - $78.2m**
- **Price Point 3 (end users) - $104.2m**

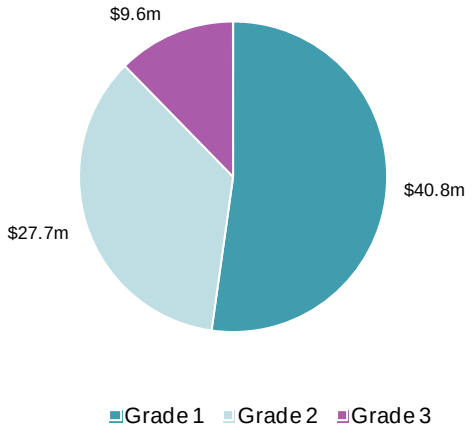
Red beech potential revenues if all privately owned indigenous forest was under an SFM Plan or Permit



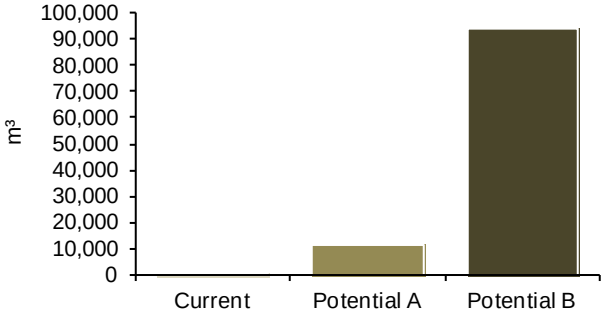
Red beech potential revenue generated at Price Point 3 (end users) if all privately owned indigenous forest was under an SFM Plan or Permit



Red beech potential revenue generated at Price Point 2 (exit from mill) if all privately owned indigenous forest was under an SFM Plan or Permit



Red beech total harvest volumes

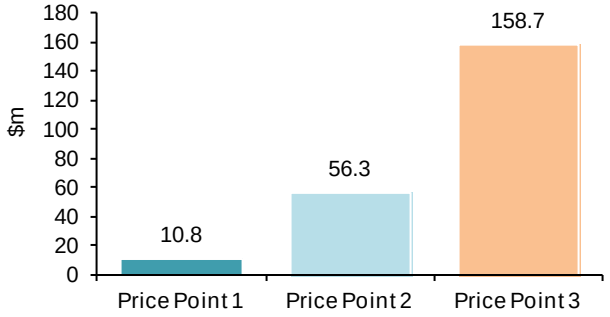


Potential revenue streams if all privately owned indigenous forest was under an SFM Plan or Permit – Silver Beech

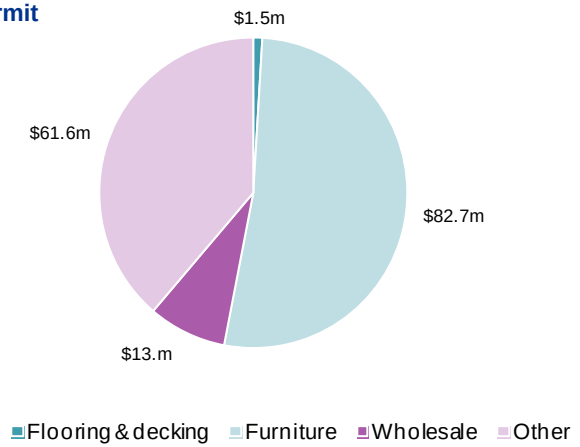
The potential annual revenue streams for silver beech if all privately owned indigenous forest was under an SFM Plan or Permit are estimated to be:

- **Price Point 1 (mill entry) - $10.8m**
- **Price Point 2 (mill exit) - $56.3m**
- **Price Point 3 (end users) - $158.7m**

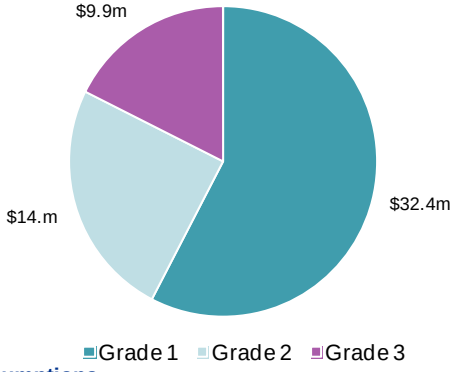
Silver beech potential revenues if all privately owned indigenous forest was under a SFM plan



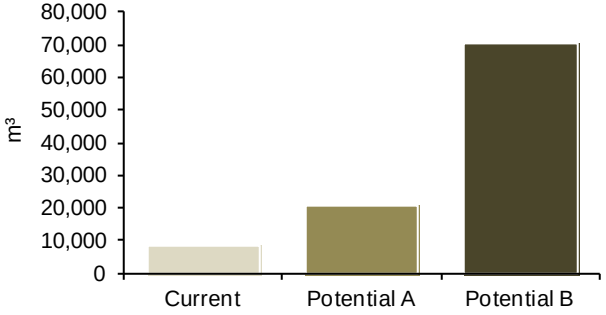
Silver beech potential revenue generated at Price Point 3 (end users) if all privately owned indigenous forest was under an SFM Plan or Permit



Silver beech potential revenue generated at Price Point 2 (exit from mill) if all privately owned indigenous forest was under an SFM Plan or Permit



Silver beech total harvest volumes



Additional assumptions

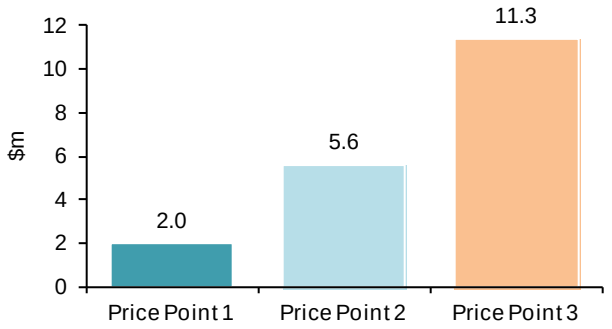
To calculate the price of silver beech furniture at Price Point 3 we have used the sale price for a table (representing a high value item) and a chair frame (representing a low value item). These two values have been combined and represent the revenue stream estimated from the production and sale of silver beech furniture. Information received from mill owners has shown that on average 15% of silver beech sales are exported. We have not included any value associated with these sales as the subsequent sale overseas produces no revenue stream for New Zealand.

Potential revenue streams if all privately owned indigenous forest was under an SFM Plan or Permit – Rimu

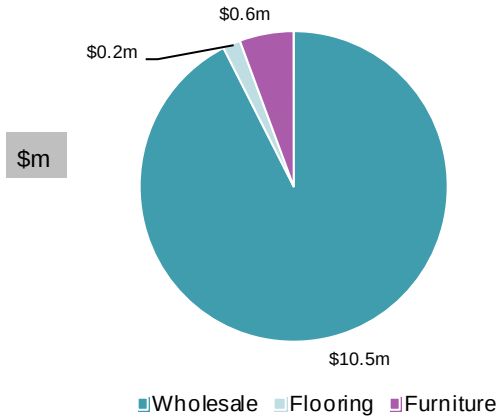
The potential annual revenue streams for rimu if all privately owned indigenous forest was under an SFM Plan or Permit are estimated to be:

- **Price Point 1 (mill entry) - $2.0m**
- **Price Point 2 (mill exit) - $5.6m**
- **Price Point 3 (end users) - $11.3m**

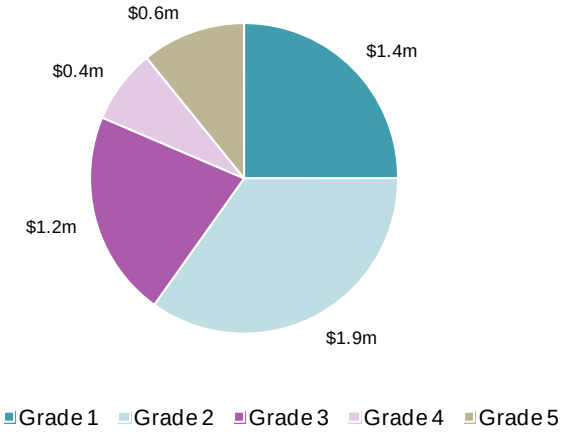
Rimu potential revenues if all privately owned indigenous forest was under a SFM plan



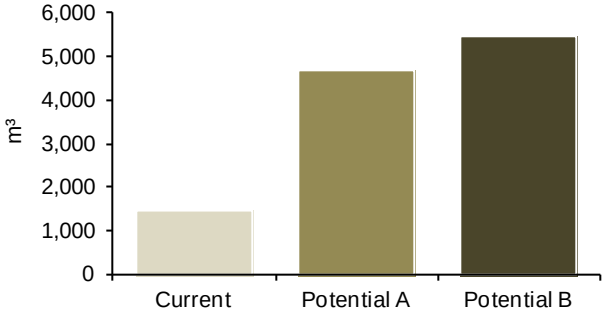
Rimu potential revenue generated at Price Point 3 (end users) if all privately owned indigenous forest was under an SFM plan



Rimu potential revenue generated at Price Point 2 (exit from mill) if all privately owned indigenous forest was under an SFM plan



Rimu total harvest volumes



Additional assumptions

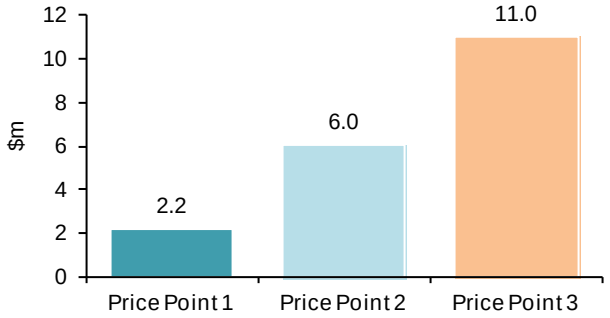
To calculate the price of rimu furniture at Price Point 3 we have used the sale price for a high-value table. This has been used to determine the revenue stream estimated from the production and sale of rimu furniture.

Potential revenue streams if all privately owned indigenous forest was under a SFM plan – Tawa

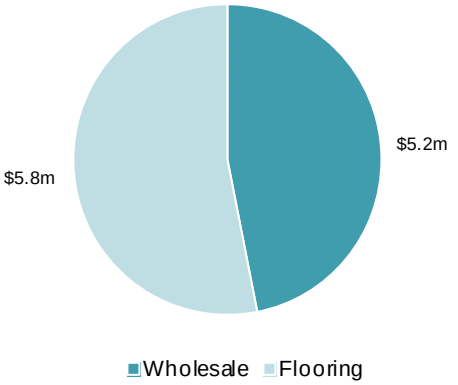
The potential annual revenue streams for tawa if all privately owned indigenous forest was under an SFM Plan or Permit are estimated to be:

- **Price Point 1 (mill entry) - $2.2m**
- **Price Point 2 (mill exit) - $6.0m**
- **Price Point 3 (end users) - $11.0m**

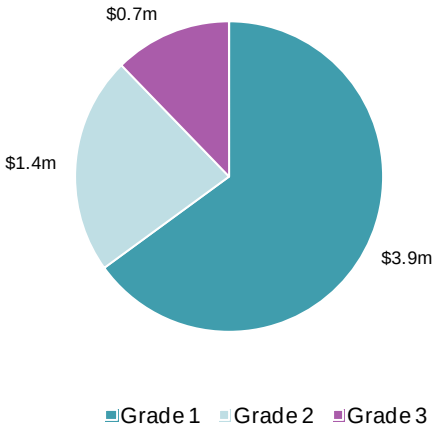
Tawa potential revenues if all privately owned indigenous forest was under a SFM plan



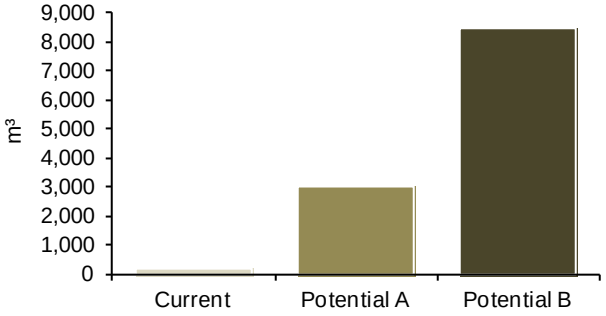
Tawa potential revenue generated at Price Point 3 (end users) if all privately owned indigenous forest was under an SFM Plan or Permit



Tawa potential revenue generated at Price Point 2 (exit from mill) if all privately owned indigenous forest was under a SFM plan



Tawa total harvest volumes



Glossary of terms

Current harvest levels	Average actual sawmill returns for 2009/10, 2010/11 and 2011/12 financial years under the current SFM Plans and Permits.
Potential A harvest levels	Maximum allowable harvests levels permitted under the current SFM Plans and Permits. SFM Permits allow a 'one-off' harvest over a 10 year period; accordingly the allowable harvest levels have been annualised.
Potential B harvest levels	Maximum allowable harvests levels (m^3) permitted if all privately owned indigenous forests were managed under SFM Plans or Permits. Further information is provided in the Appendix.
Price Point 1	The cost or price of logs on entry to the mill.
Price Point 2	The price of milled timber on exit from the mill.
Price Point 3	The price of the finished goods produced using milled timber.
Sustainable Forest Management (SFM) Plan	An SFM Plan entitles the holder to harvest a sustainable annual amount of indigenous forest. SFM Plans are approved by the Ministry for Primary Industries and normally have a minimum term of 50 years.
Sustainable Forest Management (SFM) Permit	An SFM Permit entitles the holder to harvest and mill capped volumes of indigenous forest. An SFM Permit has a term of 10 years.

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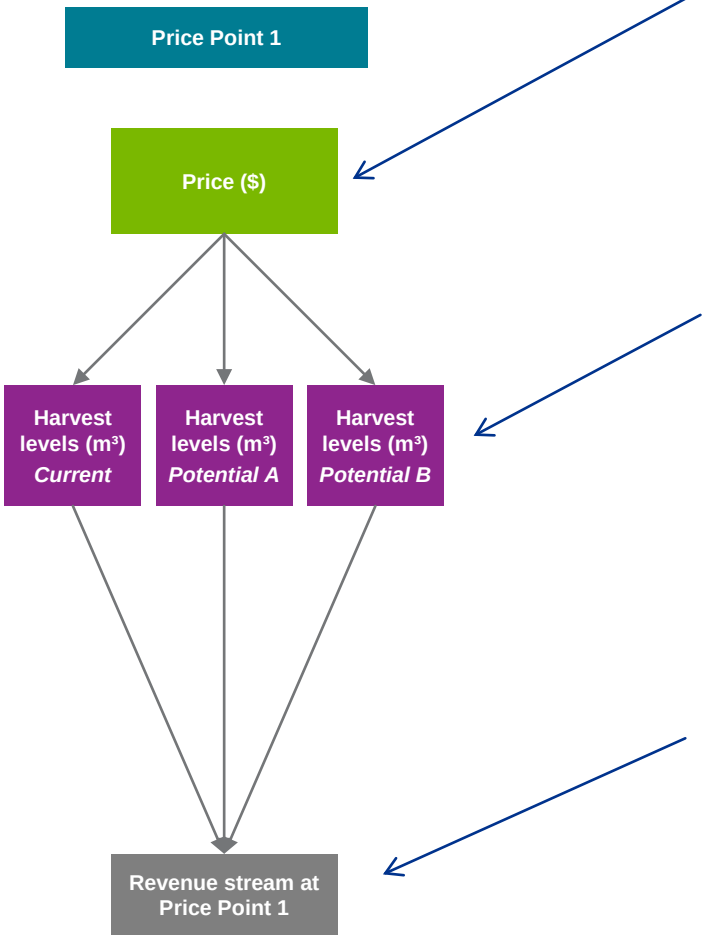
Appendices

Detailed methodology – Price Point 1

Price Point 1 is the mill door entry point



Price

- Two types of data were collected at Price Point 1 (mill entry), the cost of harvesting logs and the cost of purchasing logs from a Plan or Permit owner. Data was collected for the 2009/10, 2010/11 and 2011/12 financial years from a selection of industry representatives. A weighted average price was calculated for each species based on the volume of logs associated with each price.

Harvest levels

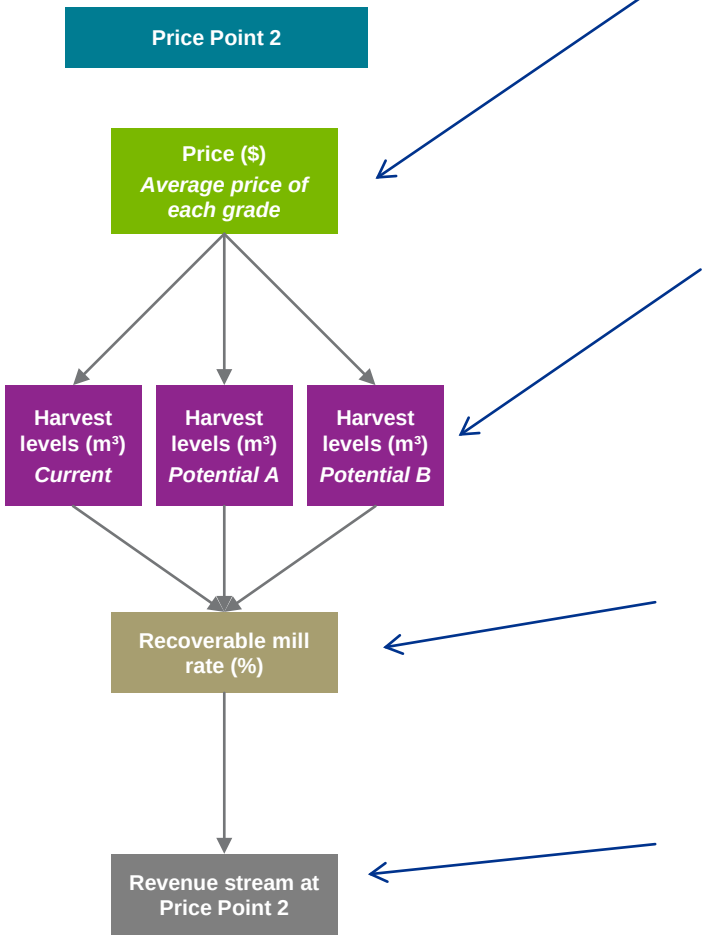
- **Current:** Average actual sawmill returns for 2009/10, 2010/11 and 2011/12 financial years under the current SFM Plans and Permits.
- **Potential A:** Maximum allowable harvests levels permitted under the current SFM Plans and Permits. SFM Permits allow a 'one-off' harvest over a 10 year period; the allowable harvest levels have been annualised for the purposes of this work.
- **Potential B:** Maximum allowable harvests levels permitted if all privately owned indigenous forests were managed under SFM Plans or Permits (see the Appendix for additional detail).

Revenue stream at Price Point 1

- Estimate of the revenue stream generated at the mill entry door.

Detailed methodology – Price Point 2

Price Point 2 is the mill door exit point



Price

- Following milling, timber is graded using species-specific criteria . The timber is then priced according to grade. Price data has been sourced from a selection of industry representatives for each species by grade. Weighted average prices for each species have been calculated and applied to total harvest levels for each species.

Harvest levels

- **Current:** Average actual sawmill returns for 2009/10, 2010/11 and 2011/12 financial years under the current SFM Plans and Permits.
- **Potential A:** Maximum allowable harvests levels permitted under the current SFM Plans and Permits. SFM Permits allow a 'one-off' harvest over a 10 year period; the allowable harvest levels have been annualised for the purposes of this work.
- **Potential B:** Maximum allowable harvests levels permitted if all privately owned indigenous forests were managed under SFM Plans or Permits (see the Appendix for additional detail).

Recoverable mill rate

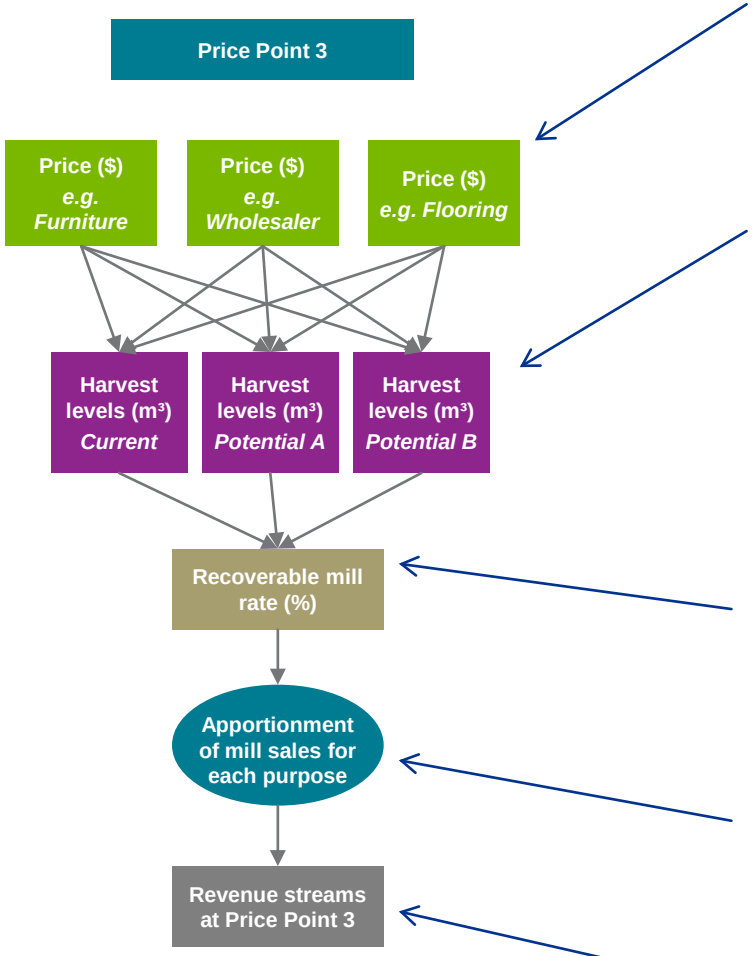
- The Recoverable Mill Rate is the proportion of milled timber volumes that are subsequently available for sale. The Recoverable Mill Rate has been averaged across all mill owners.
- It has been assumed that any increase in harvest volumes would not affect the Recoverable Mill Rate.

Revenue stream at Price Point 2

- Estimate of the revenue stream generated at the mill exit door.

Detailed methodology – Price Point 3

Price Point 3 is the finished goods point



Price

- Milled indigenous timber is transformed into a variety of finished goods. The types of finished goods are largely determined by the suitability of the species and quality of the timber. Price data has been sourced from a range of timber end users, but this list of end user is not exhaustive. Average end user prices have been calculated and applied to total harvest levels.

Harvest levels

- **Current:** Average actual sawmill returns for 2009/10, 2010/11 and 2011/12 financial years under the current SFM Plans and Permits.
- **Potential A:** Maximum allowable harvests levels permitted under the current SFM Plans and Permits. SFM Permits allow a 'one-off' harvest over a 10 year period; the allowable harvest levels have been annualised for the purposes of this work.
- **Potential B:** Maximum allowable harvests levels permitted if all privately owned indigenous forests were managed under SFM Plans or Permits (see the Appendix for additional detail).

Recoverable mill rate

- The Recoverable Mill Rate is the proportion of milled timber volumes that is subsequently available for sale. The Recoverable Mill Rate has been averaged across all mill owners.
- It has been assumed that any increase in harvest volumes would not affect the Recoverable Mill Rate.

Apportionment of mill sales

- A breakdown of timber sales by customer type has been used to apportion sales by customer type according to milled timber volumes.

Revenue stream at Price Point 3

- Estimate of the revenue streams generated by end users of the milled timber.

Methodology

We have elected to use discounted cash flows (DCF) methodology to assist us to determine the revenue streams generated by New Zealand's indigenous forestry sector.

Under this approach forecast cash flows are discounted back to the starting date of the forecast.

Discounted Cash Flow

- We have applied a value analysis methodology to New Zealand's indigenous forestry sector as an asset (on the basis that it is an asset that generates cash flows).
- We have selected the discounted cash flows ("DCF") as the most appropriate methodology to provide a forecast of revenue streams generated each species of indigenous tree.
- Under a DCF forecast, cash flows are discounted back to the starting date of forecast, generating a net present value for the cash flow stream of the industry. A terminal value at the end of the forecast period is then determined, which is also discounted back to the starting date to give an overall value.
- As all costs associated with the milling and production of indigenous forests are outside the scope of this project, we have not included these in the DCF.
- Typically a forecast period of at least five years is required. We have elected to use a forecast period of 50 years (this being the time that SFM Plans are valid).
- The rate at which future cash flows are discounted ("the discount rate") should reflect the time value of money and the risk associated with future operations. We have applied The Treasury discount rate of 8% in this analysis.

Growth Rate

- Historical price data and discussions with industry indicate that the cost incurred at the mill door has remained static over the last number of years. This is unlikely to be sustainable, therefore a growth factor of 1% per annum has been applied to the average price.

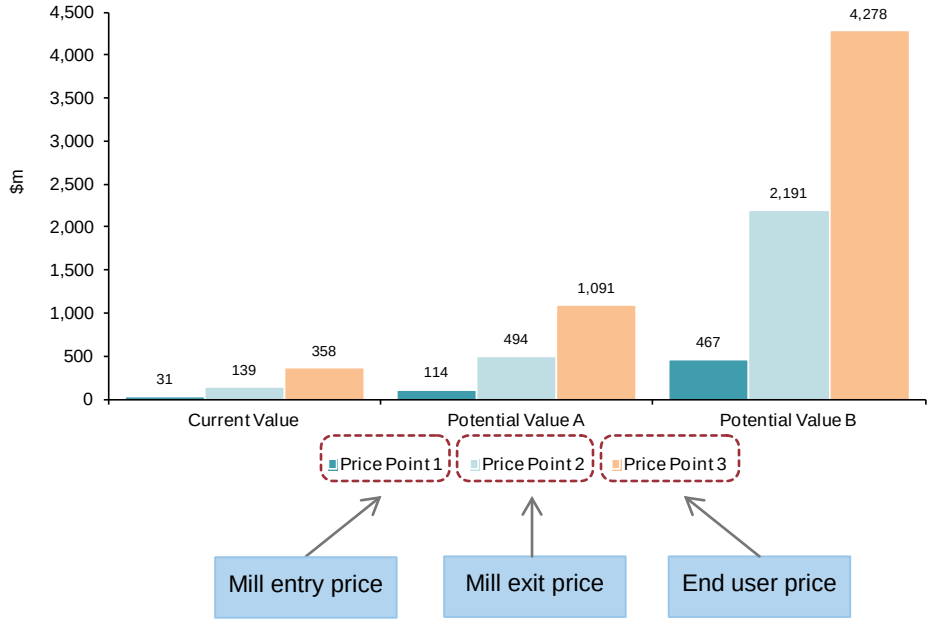
Harvest levels

- **Current:** Average actual sawmill returns for 2009/10, 2010/11 and 2011/12 financial years under the current SFM Plans and Permits.
- **Potential A:** Maximum allowable harvests levels permitted under the current SFM Plans and Permits. SFM Permits allow a 'one-off' harvest over a 10 year period; the allowable harvest levels have been annualised for the purposes of this work.
- **Potential B:** Maximum allowable harvests levels permitted if all privately owned indigenous forests were managed under SFM Plans or Permits (see the Appendix for additional detail).

Indicative value analysis of forecast revenue streams

The graph illustrates potential estimated revenue derived from indigenous forests under a Discounted Cash Flow model.

Estimated total current and potential revenue streams generated by red beech, silver beech, rimu and tawa



The bar chart above outlines the estimated combined total revenue streams from red beech, silver beech, rimu and tawa at:

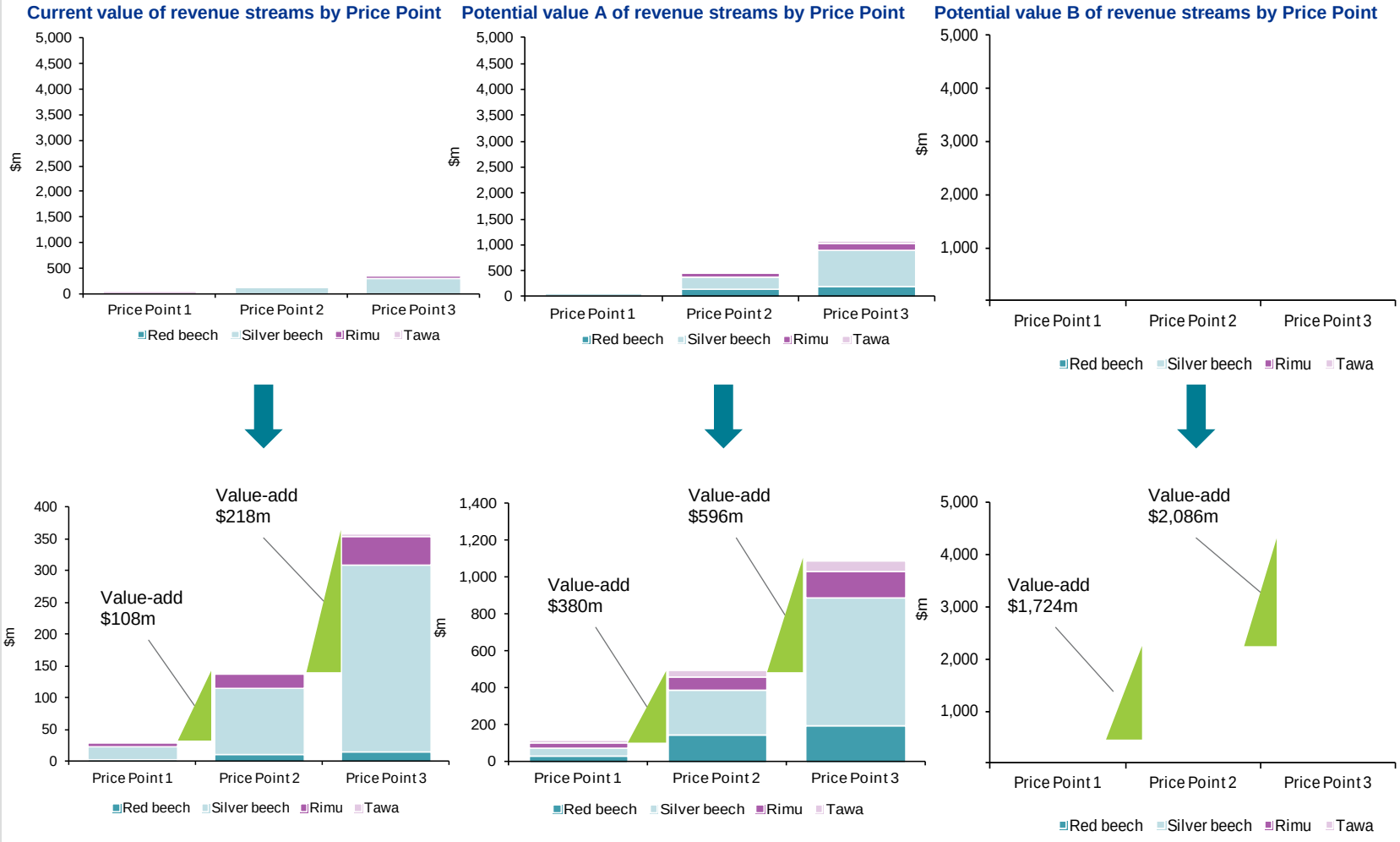
- Current levels
- Potential levels if harvest levels were at the current maximum allowable harvest level (Potential Value A)
- Potential levels if all privately owned indigenous forest was under a SFM Plan or Permit (Potential Value B)

Observations

- At a simplistic level, assuming no price variance relating to the level of supply, the analysis indicates that increasing volumes could significantly increase revenues derived from indigenous forests. We suggest further work is carried out to determine both demand for the product and price points to test the validity of this assumption.
- We further note the growth is likely to be constrained by infrastructure, for example a significant increase in drying capacity will be required to process increased volumes.

Appendix B

Revenue streams under a DCF forecast



Appendix C

Ministry of Primary Industries assessment of privately owned New Zealand indigenous forest

The appendix consists of a report provided by MPI to inform the estimate of potential harvest levels if all privately owned indigenous forest was under an SFM Plan or Permit.

Summary

This report has been compiled by the Ministry for Primary Industries (MPI) following an analysis using Geographic Information System (GIS) technology and drawing on information held by the Ministry. There are two key components to the analysis – description and mapping of NZ's indigenous forests and GIS analysis to isolate potentially manageable forest classes on unfettered private land.

Forest Classification

The forest classification system and essential quantitative data (stem frequency, density and basal area) are extracted from a Landcare Research report commissioned by the Department of Conservation (DoC) and the Governance Group for the Sustainable Farming Fund (SFF) project: Expanding Economic Viability for Sustainably Managed Indigenous Forests SFF Project 05/08, May 2011. The Landcare report summarises work by Hurst and Wiser (2010), in conjunction with DoC, using the Carbon Monitoring System database and predictive models to map and describe New Zealand's indigenous vegetation in a number of well defined classes.

GIS Analysis

The analysis by MPI of the GIS mapping base and quantitative data resulting from the Landcare / DOC project, specifically addresses forest classes with a significant commercial species component and summarises these by region, area and species.

The GIS analysis undertaken by MPI excludes indigenous forest land in a number of tenures (Conservation land, local body land, LINZ leases, Defence land and private land under protective covenants (Nga Whenua Rahui and QEII covenant), so as to provide a layer of unfettered private land. Further areas have been excluded as follows:

- Areas that are less than 4 hectares per class and appear isolated;
- Areas of classes that are poorly represented in any region (usually less than 10 hectares and therefore not generally a sustainable management proposition);
- Areas of land excluded using the Environmental Limiting Factors (ELF), devised to identify Kyoto compliant land (i.e. land capable of supporting species reaching at least 5 m in height and 30% crown cover).

The specific factors defined by ELF are:

- Upper altitudinal limits 225 m below the treeline;
- Frost flats;
- Geothermal areas;
- Areas that too dry;
- Wetlands;
- Gumlands;
- Pakihi;
- Saline and coastal areas; and
- Predominantly rocky areas.

The GIS analysis identified up 1.163 million hectares as having indigenous forest on private land that may have potential for sustainable management.

Ministry of Primary Industries assessment of privately owned New Zealand indigenous forest

The net areas of those Forest Classes deemed to have potential for sustainable forest management for four species with the greatest potential / market acceptance (rimu, tawa, red beech and silver beech), are summarised in Table 1.

Table 1. Net Areas By Selected Forest Class

Class No	Class	Area(ha)
2	Black/mountain beech forest	7,650
3	Silver beech – red beech – black/mountain beech forest	3,035
7	Black/mountain beech – silver beech forest/subalpine shrubland	1,480
8	Silver beech – broadleaf	2,269
10	Kamahi – podocarp forest	48,528
11	Kamahi forest	30,482
12	Silver beech – red beech – kāmahi forest	23,212
13	Marbleleaf - pepperwood - wineberry forest	13,160
14	Pepperwood - hardwood forest and successional shrubland	106,392
15	Kamahi – hardwood forest	6,740
24	Tawa forest	116,381
Total		359,329

Notes:

1. Isolated class areas of less than 4 hectares were removed as not practically manageable.

2. Where the area in one region was less than 10 hectares it was also removed.

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Estimation of Forest Resources

Indicative estimates are made of the timber volumes that may accrue to forest class and species. These data are presented for rimu, tawa, red beech and silver beech for all private land that is potentially available for management (i.e. unfettered by covenants) and subject to the area exclusions described above. In addition further exclusions have been made of classes or areas on the basis of frequency of occurrence, low basal areas and low densities of the target species, such that intensive silvicultural management on a sustainable basis is unlikely to be viable. For instance, with the exception of rimu, forest classes have been excluded where the frequency of occurrence of the target species in the plots falling in that class is very low (e.g. 30 – 50%), and where basal areas and therefore extrapolated stand volumes are also low (basal areas of less than 5 m2/ha and extrapolated stand volumes of less than 50 m3/ha).

Examples of classes excluded on the basis of high variability and low levels of manageable timber resources are:

1. Forest Class 22 (silver fern – hangehange forest), where tawa is present in 58% of plots in this class but the basal area is a low 3.66 m2/ha;

2. Forest Class 9 (kamahi – rata forest), where rimu is present in 31% of plots at low basal areas of 3 m2/ha and in the same class silver beech frequency is 53% and basal area a low 3.48 m2/ha.

In such classes the assumption has been made that sustainable forest management of the beech species would not be viable and as the most sought after timber for a long period, the actual remaining rimu resource is generally less than these average class figures indicate as rimu and tawa in particular have been exploited over much of the accessible private estate.

The Effect of Mean Stand Values Masking True Stand Values on Private Land

The volume estimates extrapolated from the basal area information in the Landcare report are based on a review of average basal area:stand volumes exhibited by registered sustainable forest management plans which have comprehensive inventory data as their base. The stand volume figures for the private estate are subject to significant though unknown margins of error. Because the area of protected indigenous forest land comprises about 80% of the total indigenous forest in NZ, the average values calculated from the CMS plots are likely to be positively skewed in favour of the larger area of Crown and other protected land, most of which has not been subjected to harvesting in the past and which is often more intact. In an attempt to recognise this, pro rata reductions to derived sustainable harvest volumes for private land have been made to reflect the much higher degree of past modification through historical logging, especially of lowland podocarp – hardwood forest.

The most accurate means of establishing accurate resource estimates would be a stratified inventory of the private indigenous estate. However the resources required to achieve this would be prohibitive. What could be done to improve the available resource information however, would be to have the “metrics” developed by Landcare Research to be re-analysed, but only for those plots that fall into the private indigenous forest estate. While the number of plots and therefore sample limits may be a little wider the mean values produced would certainly be more indicative of the true values within the private forest estate.

It would be useful to recalculate the metrics (stem density, basal area and species frequency), for only those plots that fall in the private indigenous forest estate. This would provide greater accuracy and confidence in estimating forest resources on private land.

Ministry of Primary Industries assessment of privately owned New Zealand indigenous forest

Pro-rata Adjustments to Resource Figures

In addition to the impacts of past exploitation on forest resources, the extent and variability of forest fragmentation at the local level is likely to have an impact on the potential of some of this forest land to lend itself to long term sustainable forest management. Also the impact of the RMA through restrictions in District and Regional Planning rules add a further layer of complexity. For all these reasons substantial pro rata adjustments have been made to the modelled harvests for rimu and tawa (25% and 50% respectively of the gross modelled harvests), and a lesser reduction for the two beeches (67% of the estimated gross modelled harvests).

Conversion of Standing Volumes to Log Volumes

The following conversion rates have been applied to the standing volumes presented in Table 2:

Red beech – 60%

Silver beech – 60%

Rimu – 90%

Tawa – 60%

Table 2: Estimated Class Areas and Sustainable Harvests by Regional Groupings

RIMU

	Area (hectares)				Total Area	Standing	Gross Ann.	Potential
Class	Upper North Is	Lower North Is	Upper South Is	Lower South Is	(ha)	Volume(m3)	Harvest (m3)	Harvest (m3)
10	0	0	34393	14135	48528	4885945	19544	4886
11	3754	24852	1876	0	30482	1207087	4828	1207
Total	3754	24852	36269	14135	79010	6093032	24372	**6093**

TAWA

Forest	Area (hectares)				Total Area	Standing	Gross Ann.	Potential
Class	Upper NI	Lower NI	Upper SI	Lower SI	(ha)	Volume(m3)	Harvest (m3)	Harvest (m3)
24	45385	70996	0	0	116381	5665194	28326	14163
Total	45385	70996			116381	5665194	28326	**14163**

RED BEECH

Forest	Area (hectares)				Total Area	Standing	Gross Ann.	Potential
Class	Upper NI	Lower NI	Upper SI	Lower SI	(ha)	Volume(m3)	Harvest (m3)	Harvest (m3)
11	3754	24852	1876	0	30482	5739455.8	43046	28841
14	19671	67487	16836	2398	106392	17970673	134780	90303
8	12	219	1485	553	2269	155630.71	1167	782
12	0	1959	17307	3946	23212	4928487.9	36964	24766
13	0	85	4988	8087	13160	905144.8	6789	4548
2	78	0	5799	1773	7650	812506.5	6094	4083
3	0	0	2414	621	3035	774440.95	5808	3892
Total	23515	94602	50705	17378	186200	31286339	234648	**157214**

SILVER BEECH

Forest	Area (hectares)				Total Area	Standing	Gross Ann.	Potential
Class	Upper NI	Lower NI	Upper SI	Lower SI	(ha)	Volume(m3)	Harvest (m3)	Harvest (m3)
11	3754	24852	1876	0	30482	812040	6090	4081
14	19671	67487	16836	2398	106392	15559830	116699	78188
15	0	0	64	6676	6740	1582619	11870	7953
8	12	219	1485	553	2269	550142	4126	2764
12	0	1959	17307	3946	23212	2389908	17924	12009
13	0	85	4988	8087	13160	1801472	13511	9052
7	322	378	50	730	1480	212054	1590	1066
3	0	0	2414	621	3035	403443	3026	2027
Total	23759	94980	45020	23011	186770	23311508	174836	**117140**

Note 1 The tawa & podocarp classes are lowland classes with the greatest degree of modifcation.

Note 2 unmodified forest. The quantitative class data comes from the LUCAS CMS plot network, which includes all Crown land i.e. c. 75% unmodified by past logging, unlike private land.

Note 3 Variables that aren't well researched are: impacts of the RMA, forest block fragmentation, and highly variable class composition & species frequencies.

Ministry of Primary Industries assessment of privately owned New Zealand indigenous forest

Conclusion

With all these caveats, caution is recommended in interpreting the data presented. The analysis indicates that there are about 359,300 hectares of private indigenous forest consisting of tall forest classes that have varying representations of targeted commercial species present. A significant proportion of the areas of some classes may not be commercially viable due to two principal reasons; variable species distribution and the target species not acquiring sufficiently high standing resources in all locations to be economically viable. If the forest area is reduced proportionately to the frequency of occurrence of target species in forest class samples, then the size of the areas of each of the forest classes likely to carry manageable resources of rimu, tawa, red beech and silver beech would be 44,400, 111,700, 104,200 and 104,700 hectares respectively, covering a total area of 251,800 hectares (70% of the total area identified).

In gross, it is conservatively estimated the private indigenous forest resource could support the production of about 300,000 cubic metres of timber (standing volume), of which about 200,000 cubic metres would constitute timber of sawlog quality, with at least 90% of this beech.

Appendix D

Industry description of timber grades

	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Red beech	Classic / DA Heart	Heritage / DA colour	Natural	N/A	N/A
Silver beech	Dressing A / DA Heart	Factory / Classic / DA Colour	Select Appearance / Natural	N/A	N/A
Rimu	DA Heart	DA Colour	DA Clean White	DB Colour Narrows	DB Sap
Tawa	DA Clean White / Clean White / Clear White	DA Coloured / Coloured / A Colour	DB / B Colour	N/A	N/A

Note

The table above shows the names or descriptions of each grade of timber as provided by industry. In many cases different industry representatives had different names for each grade of timber; in these cases the grading was discussed with each industry representatives to ensure grade comparisons were appropriate.