Report prepared for the Ministry for Primary Industries

Economic Impact of Cyclone Ita Timber Recovery Programme

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Glossary

ACOP	Approved Code of Practice for Safety and Health in Forest Operations
DOC	Department of Conservation
EBITDA	Earnings before Interest Tax Depreciation and Amortisation (EBITDA)
KDRS	Kiln dried rough sawn
MPI	Ministry for Primary Industries
NZQA	New Zealand Qualifications Authority
PCL	Public Conservation Land
RfP	Request for Proposal
RIS	The Regulatory Impact Statement
WCWT Act	The West Coast Wind-blown Timber (Conservation Lands) Act 2014

Executive summary

Cyclone Ita damaged and uprooted indigenous trees across about 40,000 ha of forests on Public Conservation Land (PCL) on the West Coast in April 2014. The West Coast Wind-blown Timber Act 2014 (WCWT 2014) was enacted on 2 July 2014 to allow the removal of irreversibly damaged timber from PCL, managed by the Department of Conservation (DOC). The Act required that the recovery of timber respect conservation and not harm the environment.

Timber was recovered from both PCL and other mostly private land following Cyclone Ita. MPI data shows that around 6,000 cubic metres of indigenous windthrown timber was recovered from non-PCL land in the two years after Cyclone Ita. The vast majority of this timber would have been recovered even if the WCWT Act had not been legislated. A total of 9,239 cubic metres of indigenous timber was recovered from PCL under the WCWT Act as at November 2017. The majority of this timber was rimu. This earned DOC revenues of $1,641,385 from stumpage fees charged to the approved operators. This easily exceeded DOC's direct costs and was to be used in conservation management. Government costs were driven by departmental efforts to ensure operator competence and effective safety management given the dangers of recovering windthrown timber in indigenous forests.

Approved operators whom we interviewed believed that the volumes of Cyclone Ita timber had very little impact on indigenous timber prices. A range of approved operators and wholesalers said that prices for the heart and coloured grades held up well but the lesser sap grades did have some discount for a period. There were a few contrasting views from some not directly involved in the Ita recovery. However, it is not possible to conclude that any fall in prices was caused by timber recovered under the WCWT Act alone because 6,000 cubic metres, or 40 percent of all recovered timber, came from other sources.

Approved operators provided us with a range of average prices for green rough-sawn and kiln-dried rough-sawn (KDRS) timber recovered under the WCWT Act. Based on this information, we assess that the approved operators earned revenues in the order of $11.4 million directly from timber recovered under the WCWT Act. This includes revenues earned from some further processing of the timber by approved operators.

We estimate that the maximum revenue that wholesale merchants of indigenous timber earned from WCWT timber was in the range of $16.4 million to $18.8 million. This was calculated from three sets of wholesale rough-sawn timber prices over the period of the WCWT timber recovery and these were applied to the volumes of WCWT timber recovered. This price information indicated a reasonable mark-up between green rough-sawn timber and the wholesale prices, ranging from about 30 percent to 60 percent.

The value added to wholesale dried indigenous timber by further processing it into veneer, flooring, furniture, joinery, or mouldings ranged from a lower-bound estimate of $33 million to an upper-bound estimate of $60 million. This represents approximately a doubling up to a fourfold increase on the wholesale revenue.

We used estimates of costs per cubic metre for the recovery of WCWT timber, transport to the mill and milling costs to estimate total Earnings before Interest Tax Depreciation and Amortisation (EBITDA) for approved operators as a group at around $5.9 million. This was

after costs of $1.6 million for DOC stumpage, $2 million in recovery costs and $1.9 million in milling costs. This represents an average EBITDA margin of around 50 percent.

The approved operators that we spoke to did not identify any particular new business opportunities that resulted from the WCWT timber. Most commented that the increased timber supplies helped them cover their fixed costs of milling. Merchants commented that as the Ita recovery timber was finite and would end in 2019 they did not develop any particular new business opportunities. However, they did comment that such opportunities might be possible if the supply of timber were more consistent.

We also investigated the economic detriments that may have resulted from the WCWT programme. We interviewed people who were not part of the programme but who were involved in harvesting and selling indigenous timber elsewhere. Their views ranged from believing that Ita timber caused minor short-lived reductions in price for lower grades to a view that there was a material and sustained reduction in prices. However, none of these interviewees believed that the Ita timber should not have been recovered.

Import statistics suggest that timber recovered following Cyclone Ita may have had an impact by reducing the amount of overseas supplied hardwood timber imported into New Zealand for at least two years by around 15 to 20 percent.

There were a number of constraints to recovering more WCWT timber. These included the lack of heavy-lift helicopters and a dearth of qualified bushmen for cutting windthrow. The skill of selecting the right logs was also considered a constraint as selection errors could ruin the economics of recovery given the high cost of helicopter recovery. Most operators believed that more timber could have been recovered and this could have increased their earnings.

If the WCWT legislation were ever applied as a general policy for windthrow events, it would be possible to ameliorate some of the constraints discussed above. Being able to recover and process more indigenous windthrown timber would improve the economics for millers and help to build a more consistent supply of timber to wholesalers and end users. A greater supply of timber may be also be possible from smaller localised windthrow events.

While only 43 percent of the timber authorised to be recovered, was actually recovered, it might have been possible to recover more. This might have been possible if, for example, the 5 percent biomass rule had been more permissive, such as 10 percent (The 5 percent biomass rule allowed for no more than 5 percent of the total biomass from the windthrow area to be recovered).

However, in practice the potential to increase the timber recovered was governed to a significant extent by the specific circumstances of each salvage site. Where there was a significant windthrow area close to road access, it would have been possible to almost double the timber actually recovered. However, where there was not much timber within economic recovery range, and other challenges such as steep terrain or wetland, then this would have been impossible.

As an indicator, if 60 percent of the volume actually recovered under the 5 percent biomass rule had been recovered under a 10 percent biomass rule, it could have resulted in DOC stumpage revenues rising to $2.6 million, revenue for approved operators to around $18 million, wholesalers to around $26 million and the retail level to a range of $52 million to $96 million.

Introduction

Context

1. Cyclone Ita damaged and uprooted many indigenous trees across an estimated 40,000 ha of forests on Public Conservation Land (PCL) and private land on the West Coast on 17 April 2014.

2. The West Coast Wind-blown Timber (Conservation Lands) Act 2014 (WCWT Act) was subsequently enacted on 2 July 2014. The purpose of this Act was to allow the Director-General of Conservation to authorise the removal of timber irreversibly damaged by Cyclone Ita (windthrown timber) from PCL and reserves in the West Coast region. This was permitted for a five-year period.

3. This special legislation was enacted because the Conservation Act 1987 was designed to prevent the harvest of indigenous timber from Public Conservation Lands. Section 30(4) states that conservation strategies or plans cannot allow any indigenous wood to be taken from the conservation area for gain or reward except if under a lease or licence granted before the Act was enacted or if the Director-General authorises it on the basis that it is intended to be used for traditional Maori purposes.[1]

4. The guiding principles for implementing the WCWT Act were that the recovery of timber must not unreasonably affect conservation, that adverse effects to the environment must be minimised, and that there be no significant soil disturbance.

5. The Regulatory Impact Statement (RIS) for the WCWT Act noted that dead standing and fallen trees are an essential or favoured habitat and food source for many species, a normal part of nutrient cycling in forests, and beneficial to regeneration. However, it also documented that given the quantity of windthrown timber caused by Cyclone Ita, some scientists considered that there was potential to recover a proportion of the material without having major effects on natural processes. In addition, the RIS stated that if the income from that timber removal were used for conservation purposes, the net effect on forest ecology might be minor or even positive. The RIS also noted that the Minister of Conservation wanted authorisation processes to be timely and efficient, and operations to be safe. The RIS averred that there could be economic benefits from recovery of timber, assuming that the sudden spike in supply did not damage the overall market for sustainable indigenous timber.

6. The Department of Conservation (DOC), in partnership with local iwi and the Ministry for Primary Industries (MPI), implemented the legislation. The first authority allowing the timber to be recovered by an approved operator was in November 2014. Since then and to December 2017 over 31 sites had been approved to eight approved operators.

[1] http://www.legislation.govt.nz/act/public/1987/0065/76.0/DLM106613.html Section 30,

7. Only trees irreversibly damaged were allowed to be recovered. There was also to be no felling of spars or standing mid-trunk snap trees. A recovery benchmark of 45 degrees or more for leaning trees likely to be irreversibly damaged was established for recovery operations. A significant proportion of dead or dying trees was to be retained to contribute to ecological health and resilience, and to function as a habitat in its own right, a food source and a "slow release fertiliser".

8. On the basis of these principles, a minimum of 50 percent of windthrow habitat was permanently reserved – and was not available for salvage – leaving the other 50 percent available. Within these salvage sites, up to 50 percent of the wood of common species could be salvaged, and a smaller proportion of uncommon species (e.g. matai, totara, miro). Overall no more than 10 percent of the total biomass was to be extracted from any salvage site (i.e. 5 percent of the total biomass from the windthrow area). This rule was set by DOC based on its interpretation of the wording in the Act such as that "adverse effects on the environment are kept to a minimum" and "the activities do not unreasonably affect conservation in the conservation area or reserve…" or cause "significant soil disturbance".

9. Other rules for the WCWT timber recover meant that soil compaction, disturbance, and saturation were to be avoided through use of existing tracks and roads, no new road construction, and no heavy mechanical ground-based recovery. Foot traffic was also to be minimised.

10. To protect forest regeneration, natural drainage was to be maintained, and damage to the understory and to existing regeneration minimised. Root boles and standing root plates were to be retained where feasible and most root plates to remain in-situ. Crosscutters were encouraged to allow the root plate to return to its depression. The spread of weeds was also to be prevented and the placement of portable mill waste restricted. Enough deadwood was to be retained to act as a barrier to browsing animals.

Figure 1 Before and after, red beech recovered from access road – Grey Valley

Source: MPI

11. The WCWT Act provides a short-term opportunity because it only applies to timber windthrown by Cyclone Ita and only until 2 July 2019. Moreover as the years pass since the cyclone, the quality and quantity of readily available timber have declined, making it generally uneconomic to continue recovery. So the amount of timber recovered and the number of active operators have fallen. Only a couple of operators are still recovering timber or contemplating doing so as at December 2017. For a short video showing some of the issues and practicalities of recovering WCWT timber, click on the following web link: https://vimeo.com/album/4710101/video/227165154. This video was put together by one of the WCWT approved operators.

Scope

12. This report analyses the economic costs and benefits of the WCWT Act, including the short-term increased availability and volume of indigenous timber, and any market barriers. It also examines the economic value that might have been realised if more timber had been recovered. This will contribute to the information base available about the implementation of the WCWT Act and provide an input into whether and how future opportunities are approached.

13. As set out in the RfP, the key outputs sought for this project were :

- A statement of the value to the Department of Conservation (DOC) (gross and net) and contribution to conservation projects in Westland.

- Price of WCWT timber compared with prices paid for timber from private land (South Island and nationally).
- Impact on wholesale sawn timber sales regionally and nationally and duration of any impacts.
- Impact (if any) on merchant prices for kiln-dried timber.
- Uptake of the additional timber volumes into the marketplace, commentary on market impacts, dynamics and substitution effects on other sources of indigenous timber.
- Commentary on commercial impact of intensity of harvest being set at 5 percent of biomass (allowing for wood retention for natural values).
- Commentary on accessibility and economic impact – including heli-harvesting and associated limitations (e.g. flying times).
- Identification of any new business opportunities established within the indigenous forestry sector as a result of WCWT activities, and assessment of the sustainability of these opportunities.

Out of scope

14. This report does not address ecological impacts or ecological strategies adopted in implementing the WCWT Act. It does, however, investigate the economic impacts/implications of the harvest intensity rules adopted to minimise effects of removal of biomass from the forests.

Approach

15. The approach taken to this review is set out in Appendix 1.

Figure 2 Log being prepared for recovery where it fell in the forest

Source: MPI

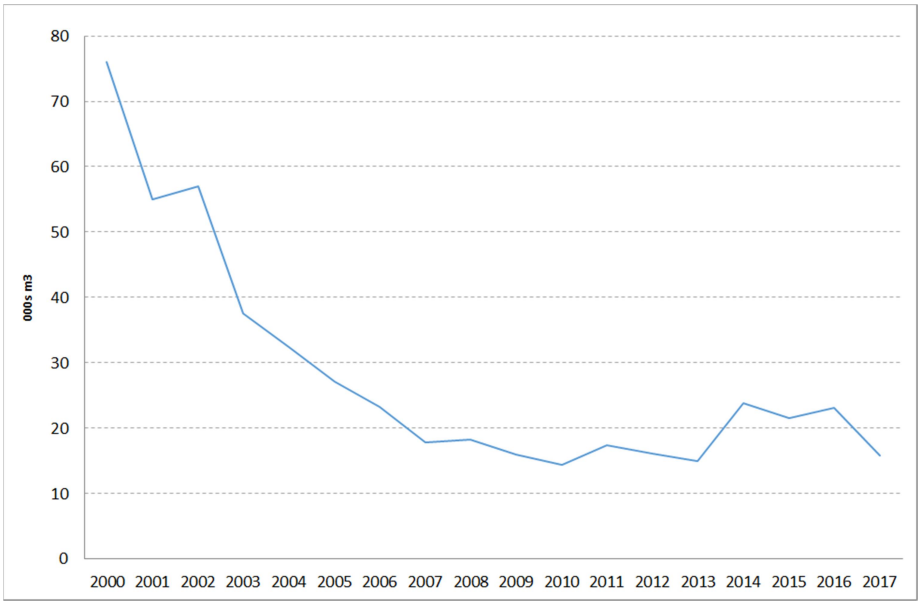
The indigenous timber market

Cyclone Ita windfall bucked a long-term production decline

16. Figure 3 below shows the long-run trend in production of indigenous timber in New Zealand. There has been a decline over the last decade following the cessation of harvesting of indigenous timber on Crown lands in Westland on 31 March 2002. However, a recent increase in total recovery of indigenous roundwood is clearly visible on the right-hand side. It shows total forest removals rose from 15,000 m^3 in the year to 31 March 2013, to 23,834 m^3 in the year to 31 March 2014, a rise of 8,784 m^3.[2] The following year the total fell a little to 21,523 m^3 before rising again to 23,130 m^3 in the year to 31 March 2016.

17. It is most likely that the most recent year shown, the year to 31 March 2017 does not yet include all data. We understand that it is likely to be at about the same level as the previous three years.

Figure 3 New Zealand estimated total indigenous forest removals (roundwood 000s m^3), 31 March 2000 to 2017



Source: MPI

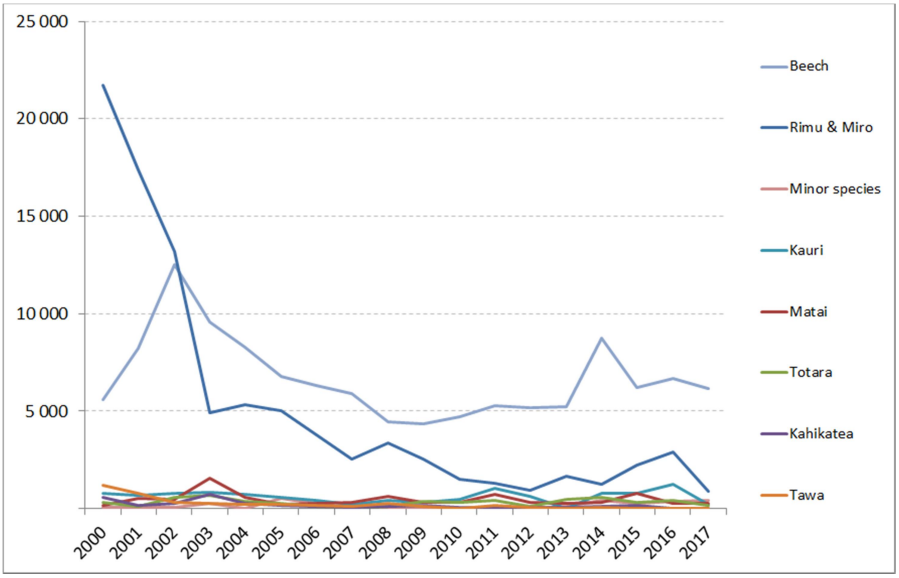
[2] There has been an increase in beech production from sustainably managed forest. MPI are checking for why the volume rose so much before Ita in April 2014. This may be due to errors in the beech production data shown in Figure 4.

18. Figure 3's volumes are measured in cubic metres of roundwood or logs received at mill. This is then milled into rough-sawn timber. In this process sawdust and other waste wood is created. The conversion ratio used in the year to 31 March 2017 to estimate the amount of rough-sawn timber created from a cubic metre of indigenous roundwood was 1.94. This is an average[3] and using it means that for every 10 metres of roundwood entering a mill, on average 5.15 cubic metres of rough-sawn timber are produced.

19. Figure 4 shows the same pattern mapped in Figure 3 but is broken down into the component species and measured at the mill exit point in rough-sawn timber. So the 15,790 m^3 of timber shown in Figure 3 for 2017, converts to rough-sawn timber of 8,138 m^3 - which is the total of all the species shown in Figure 4).

20. Figure 4 shows rimu increased significantly in the year to 31 March 2015 and increased further in the year to 31 March 2016 before falling away in 2017. Recovery of timber following Cyclone Ita probably explains most of this increase in rimu production. The sharp fall in rimu and miro with the end of sustainable harvesting on Crown lands is also evident on the left-hand side of Figure 4. A breakdown of rough-sawn production by species was not available for 2006. Figure 4 also shows a sharp increase in beech extracted as rough-sawn timber in the year to 31 March 2014. This was caused by an error in reported statistics.

Figure 4 New Zealand total production of rough-sawn timber by major species, 31 March 2000 to 2017

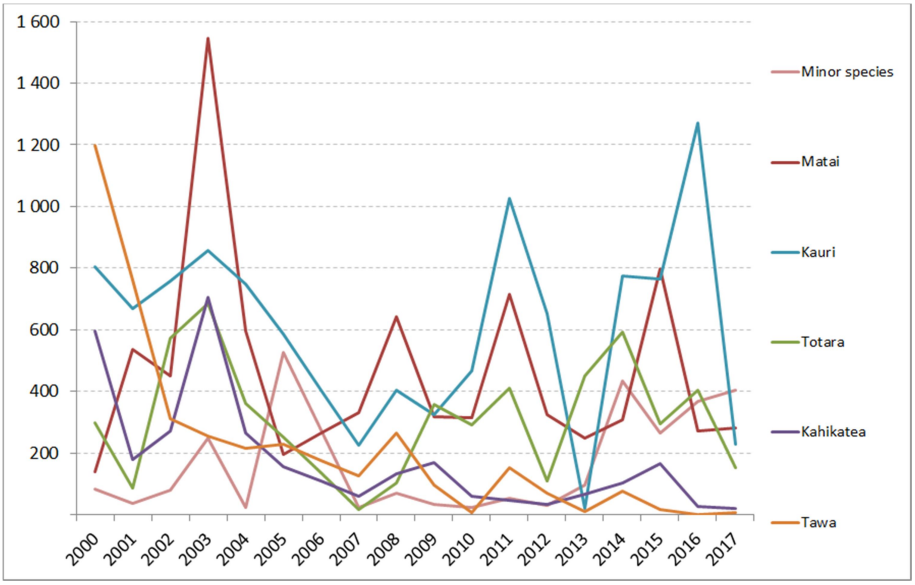


Source: MPI (note: data was missing for 2006 so that year was interpolated)

[3] Different species have different conversion rates.

21. Figure 5 below shows the same data as in Figure 4 but focuses only on the minor species (beech, rimu and miro have been omitted to make the production trends in the minor species more visible).

Figure 5 New Zealand total production of rough-sawn timber by major species without rimu, miro and beech, 31 March 2000 to 2017



Source: MPI (note: data was missing for 2006 so that year was interpolated)

22. Significant fluctuation in production of kauri and matai are visible in Figure 5. The spike in matai production in the year to 31 March 2015 and the increase in totara production in the year to 31 March 2016 can be attributed to Cyclone Ita recovery.

Volume of indigenous Cyclone Ita timber

Private land yielded 6,000 cubic metres

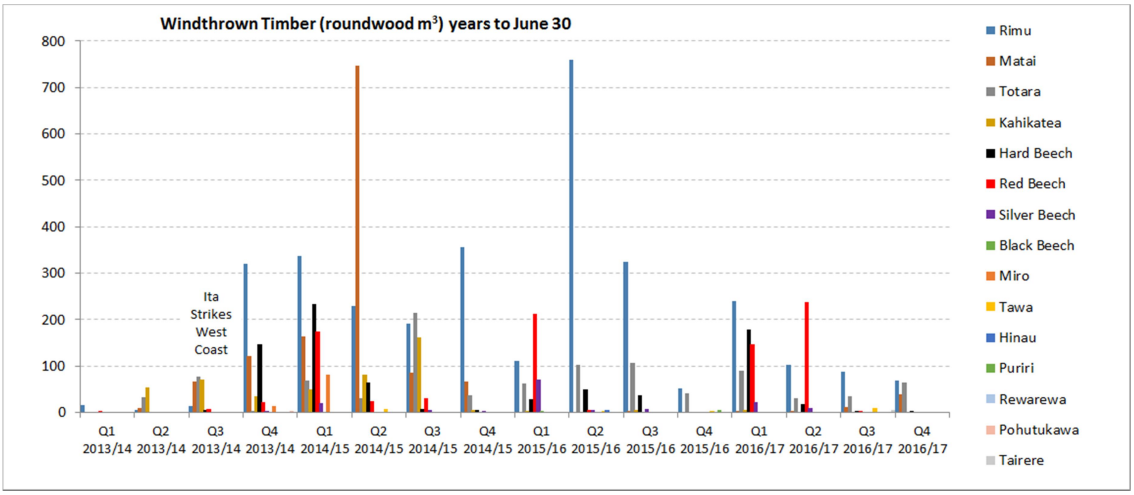
23. Immediately after Cyclone Ita struck on 17 April 2014, bushmen and millers began working in private indigenous blocks. But it was not until November/December 2014 that the first approved operators under the provisions of the WCWT Act began operations.

24. MPI sawmill reports show that around 6,000 cubic metres of indigenous windthrown timber was recovered from non-PCL land in the two years after Cyclone Ita. It is likely that the vast majority of this timber was recovered from timber blown over by Cyclone Ita rather than following other windthrow events.

25. Figure 6 below shows the detail of species recovered from non-PCL windthrown timber. It indicates that recovery of windthrown rimu was around 5 to 15 cubic metres per quarter in the first three three quarters of 2013/14 (before Ita). However, production increased sharply to over 320 cubic metres in the fourth quarter of 2013/14 (after Ita). This level of recovery of windthrown rimu was slightly bettered

in the following quarter (the first quarter of 2014/15), with 338 cubic metres recovered. In the second quarter of 2014/15 a record 747 cubic metres of matai was recovered as well as nearly 230 cubic metres of rimu. This second quarter of 2014/15 was the quarter when the first approved operators began recoveries of timber under the WCWT Act.

Figure 6 Windthrown timber recovered



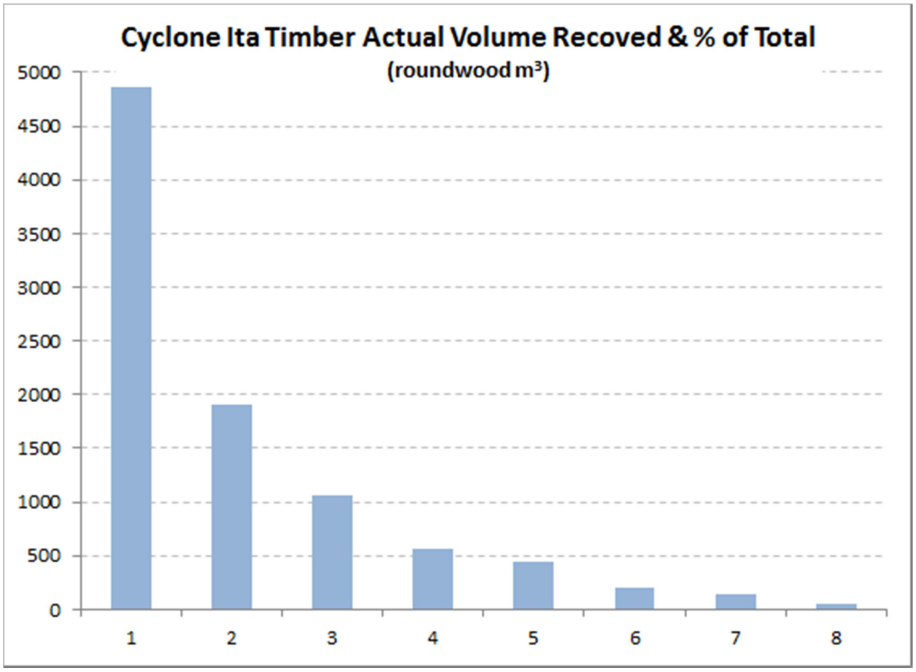
Source: MPI Sawmill Reports

26. Figure 6 illustrates that a significant volume of Ita timber was recovered from sources not operating under the provisions of the WCWT Act. This timber would have been recovered even if the WCWT Act was not legislated. In total it appears to exceed 6,000 cubic metres of indigenous timber (roundwood) recovered in the two years following Cyclone Ita. For more detail on the regulations governing the harvest of indigenous timber from private land, see Appendix 2.

Public Conservation Land yielded 9,239 cubic metres

27. The latest records from DOC show that a total of 9,239 cubic metres of indigenous timber were recovered from PCL managed by DOC as at November 2017 under the WCWT Act. Figure 7 below shows the volumes of roundwood which were recovered by each of the approved operators as well as the percentage of the total that each approved operator recovered. The largest operator recovered 53 percent of the total with the top three recovering 85.2 percent.

Figure 7 Volumes of Ita windthrown timber recovered by approved operators from Public Conservation Land managed by DOC



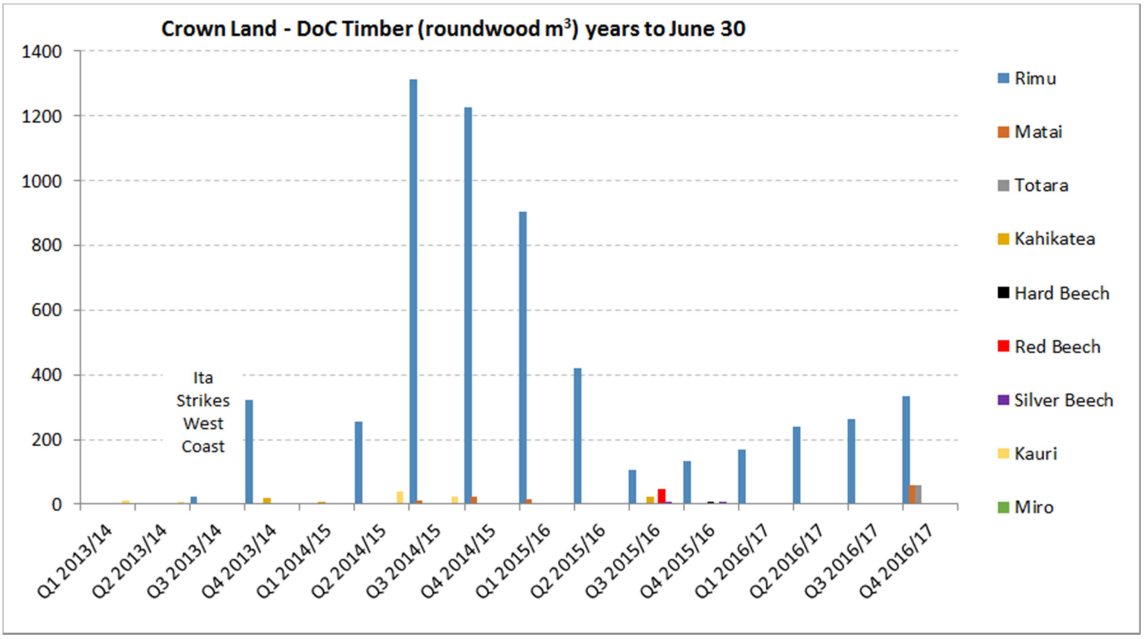
Source: DOC

28. Figure 8 shows quarterly volumes of Ita timber recovered from PCL, broken into its component species. The data is collected from MPI sawmill reports and clearly shows rimu as the majority, at 95 percent.[4] This may be overstated due to some data which is yet to be recorded in these reports. In contrast, data collected by DOC shows that 79 percent of the timber recovered from conversation land was rimu and 21 percent beech, as well as a small amount of kahikatea.

29. There was also early Ita timber recovered from PCL land immediately after the cyclone, some 323 m^3 of rimu, which appears in Figure 8 in Q4 2013/14. This predated the approval of WCWT-licensed operators and resulted from clearance of windfallen and badly leaning trees around highways and secondary roads. A small volume of this was attributed to road reserve and the remainder to adjacent DOC land.

[4] MPI is investigating why the sawmill reports registered such a small amount of beech compared to beech recovery reported by DOC data.

Figure 8 Volumes of Ita windthrown timber recovered by species from Public Conservation Land managed by DOC

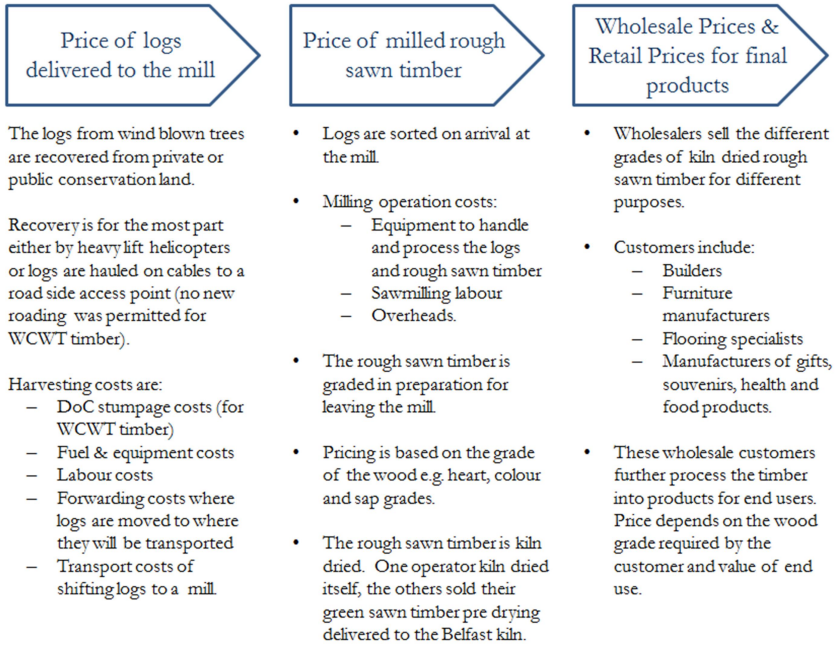


Source: MPI Sawmill Reports

Market structure

30. Figure 9 below shows a general description of the Cyclone Ita value chain, with key comparison points being the logs delivered to the mill, green-sawn timber pre-drying, and kiln-dried rough-sawn timber sold by merchants. All but one of the WCWT-approved operators we interviewed milled the timber they recovered from the bush and sold the overwhelming majority of it green-sawn prior to drying at the Belfast Timber Kilns Limited. There was one exception, an operator that has its own kilns which are fuelled with wood waste, allowing them to dry their timber at a significant discount to Belfast's listed drying prices. This approved operator was therefore selling its own dried timber. Where approved operators processed their timber into flooring, veneer or other products, they were able to capture added value. The wholesale timber merchants also had varying approaches to on-selling the timber. Most was on-sold as dried rough-sawn timber to others for further processing into flooring, furniture or mouldings etc, while some was further processed by the wholesalers.

Figure 9 Value chain of recovered windthrown Cyclone Ita timber



Source: Sapere

WCWT Act timber had minimal price impact

31. A number of interviewees explained that WCWT timber was generally of higher average value than standard harvested indigenous timber, because it was on the whole selected from the best available logs among the trees blown over by the Cyclone. They explained that when indigenous timber was harvested from standing timber, more and lower-value parts of the tree were generally also recovered.

32. Approved operators interviewed by us in general believed that WCWT Act timber had very little impact on indigenous timber prices. Some commented that it was difficult to sell green-sawn timber for a period as there was a spike in the volume available on the market. Others said that prices for the heart and coloured grades held up well but the lesser sap grades did have some discount for a period.

33. A South Island merchant told us that prices fell by about 15 percent when all the timber recovered after Cyclone Ita became available but he corroborated the view of the approved operators that the prices for the heart and colour grades held up well while the sap grades were discounted. Part of the reason for the price holding up, according to this merchant, was because of the high number of insurance rebuilds following the Christchurch earthquakes that required a like-with-like replacement, so indigenous flooring in particular was in some demand.

34. However, others we talked to, who were not involved directly in WCWT timber recovery, pointed to a general decrease in prices resulting specifically from WCWT windthrown timber recovery increasing supplies of indigenous timber in the market.

One interviewee indicated that the price impact was in the order of a 16 to 25 percent discount in pricing over two years.

35. As discussed above, the total amount of WCWT timber recovered over the three years between November 2014 and November 2017 was 9,199 cubic metres. But, as set out in Figure 6, a significant volume of Ita timber, circa 6,000 cubic metres over two years was recovered from sources not operating under the provisions of the WCWT Act. This timber would have been recovered even if the WCWT Act had not been legislated. If this is accurate, Ita timber not recovered under the WCWT Act amounts to nearly 40 percent of all Ita timber recovered. Given this, it is difficult to separate out the impact that timber recovered under the Act had on the indigenous timber price.

Green-sawn timber prices

36. Most of the approved operators we interviewed sold their timber as green-sawn, delivered to Belfast Timber Kilns Limited. Green-sawn prices were often contracted in this way, with the wholesale merchant or furniture manufacturer etc paying for kiln-drying. The cost of kiln-drying rimu has in the past ranged from $116 for timber thickness up to 25mm to $210 for timber from 75mm to 100mm thickness for rimu sap, $142 to $245 for the same thicknesses of rimu colour and $150 to $245 for heart rimu.[5] We have used a generic discount of $130 cubic metre to calculate green-sawn prices compared to dried prices on the basis of advice from an approved operator.

Merchant prices of kiln-dried timber

37. Approved operators provided us with a range of average prices that they received for green-sawn and kiln-dried timber recovered under the WCWT Act. These prices were consistent with the range that could be expected from eight approved operators of differing size and experience contracting with a variety of timber merchants and others in the indigenous timber value chain.

38. In our modelling of the value of WCWT Act timber, we used a representative price series for a range of grades of rimu provided by an approved operator. We checked these against other prices provided by other operators for consistency. The prices we used are shown in Table 1 below.

Table 1 Representative grade prices for kiln-dried WCWT rimu

Grade	Price per cubic metre
Veneer Flitch Sap & Heart	$3,000.00
Dressing A Heart	$2,887.50

[5] Source: Belfast Timber Kiln Limited price list for 2012.

Grade	Price per cubic metre
Dressing B Colour	$2,362.50
Dressing A Sap	$1,780.00
Dressing B Sap & B H/C	$1,391.00
Mixed Arisings (offcuts)	$800.00

Source: Approved operators

39. We also obtained a range of advice from approved operators about the quantities of timber that graded into heart and colour combined versus sap. In our analysis we decided to use an average split of 45 percent heart and colour and 54 percent sap wood.[6] We checked this with a number of approved operators. This was further broken down into the percentage of WCWT timber that graded as shown in Table 1.

Finished timber prices

40. We contacted a number of timber merchants to discuss wholesale prices for indigenous WCWT timber. We sourced a range of wholesale prices for rimu and matai in particular which indicated a material mark-up between the green rough-sawn timber and the wholesale prices in yard that ranged from about 30 percent to 60 percent.

41. Wholesale timber was destined to be further processed into flooring, furniture, mouldings and joinery. A considerable amount of value is added to the timber as it goes through these production processes before being sold on at the retail level.[7] The inputs of time and capital required to undertake these processes vary significantly between these end uses, e.g. between flooring and furniture manufacture.

6 The actual split would have varied around this average (perhaps significantly in some cases).

7 The KPMG report noted that the revenue stream from indigenous timber increases tenfold on average between the entry of the round timber into the mill and the sale of the final goods made from the milled timber. KPMG Report, Indicative value analysis of New Zealand's privately owned indigenous forests, 1 October 2013.

Revenue and profitability

Revenues

Approved operators earned revenues of $11.4 million

42. We estimate that the approved operators earned revenues in the order of $11.4 million directly from timber recovered under the WCWT Act. This estimate is based on the prices set out in Table 1, the volumes shown in Figure 7 and using the estimate of an average of 45 percent heart + colour and 54 percent sap wood.[8] The largest three operators earned 88 percent of this ($10.1 million). Our analysis includes further processing of the timber by approved operators where we were aware of this. A few approved operators added value to their rough-sawn timber in a number of ways, for example by drying it themselves, processing it into veneer or into flooring. Our estimate includes an assumption that one small operator did not earn any revenue due to problems selling his timber.

43. To test the importance of the assumption about the split between heart and colour combined versus sap wood to our total revenue estimates, we changed it from 45 and 54 percent to 30 and 70 percent respectively. This split was indicated to us by some interviewees as a common outcome for harvest of standing indigenous timber. Using this more conservative level of the higher-value heart + colour did not affect the estimate of total revenue much, as it only lowered the estimated $11.4 million recovered from WCWT timber by around $1 million to $10.4 million.

Wholesale merchant revenue ranged from $16.4 million to $18.8 million

44. We estimate that the maximum that wholesale merchants of indigenous timber could have earned in revenues from WCWT timber sales was in the range of $16.4 million to $18.8 million. This was calculated from three estimates of wholesale rough-sawn timber prices offered in wholesalers' yards over the period of the WCWT timber recovery, using the volumes of WCWT timber monitored by DOC. These prices averaged 40 percent more than the prices received by approved operators.

45. The actual amount made by wholesalers as a group may have been less than this because a number of end users bought green rough-sawn WCWT timber directly from approved operators, thereby cutting wholesalers out of the value chain. This value was therefore shared between the approved operator and the manufacturer. One furniture manufacturer we talked to bought the majority of its WCWT-sourced timber directly from approved operators and only topped up its timber supplies from wholesalers. In addition, some approved operators further processed their milled

[8] The actual level of sap wood was lower than in normal recovery operations because the approved operators could select the best logs for recovery with higher colour and heart wood content. As the WCWT recovery progressed there was more damage to the sap wood so the percentage of sap wood recovered diminished.

timber and sold it on to end users, thus also cutting out the wholesalers. So these revenue estimates represent the value available to be earned at the wholesale level but this value may have been captured by approved operators or end users rather than wholesalers.

46. Similarly, some wholesalers' businesses also included further processing of the timber, so they may have earned more revenues from selling flooring, for example, to end users.

Retail end user revenue ranged from $33 million to $60 million

47. The value added to the wholesale dried indigenous timber by further processing it into veneer, flooring, furniture, joinery, mouldings and specialist wood products such as souvenirs etc was challenging to estimate because of a lack of data, and varying end uses with varying values and levels of wastage in processing. We gathered a range of estimates from wholesalers, a furniture manufacturer and the listed prices of a wholesaler.[9] These indicated that the likely value of this revenue would be somewhere in a range between $33 million as a lower bound and $60 million as an upper bound. This represents a range of double to a fourfold increase on the wholesale revenue, equivalent to a range of 9 to 16 times stumpage and recovery costs. This assumed that most of the timber went into flooring with a smaller amount used for the manufacture of mouldings and furniture.

Costs

48. The costs discussed below all represent revenues for those providing services to recover, further process and sell the WCWT timber. These are flow-on economic benefits of the programme and were material for a number of businesses, including companies providing helicopters, cartage, drying, and services to the wholesale and retail businesses involved in trading in WCWT timber.

Recovery costs averaged $218 per cubic metre

49. One of the larger approved operators provided an estimate of costs of the recovery of WCWT timber and transport to the mill of $218 per cubic metre. This covered the recovery work plan costs (including the health and safety plan), landing work and preparation, road control cost (needed in an estimated quarter of recoveries), bushwork and log preparation, breaking out, wheel loader and fleet loading, helicopter positioning to site, helicopter recovery and cartage to the mill. We checked this estimate against information provided by other approved operators and believe it to be reasonable.

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[9] This wholesaler's (TimSpec) prices for floorboards ranged from $13,000 per cube for piece lots to circa $9,800 per cube for larger orders. We used an average of prices for the larger orders to reflect the likely weighted average value and the potential for discounts for bulk orders.

Helicopter recovery

50. Helicopter lifting was the single most important cost driver according to the approved operators we interviewed. Ground recovery was lower-cost and involved hauling pre-trimmed logs to an existing roadway. However, around 89 percent of the WCWT timber was extracted by helicopter with 11 percent being ground-hauled.

51. A medium-lift helicopter was most commonly used, along with existing roads and landing sites for the cartage of the logs to the mill. The operator is based in Greymouth and could relocate over a range of 130 km within half an hour. Helicopter recovery had little effect on the remaining forest. Operators had varied opinions about viable flight distances but around 2 kilometres for rimu was commonly quoted.

52. The helicopter recovery process is separated into lift preparation and the actual recovery. The root plate is cut off, then the stem is measured and lift weights calculated. Any obstacles to the helicopter's grapple hook or sling need to be cut, e.g. branches or other obstacles cleared from the log. When the log is ready for recovery, the bushmen call in the helicopter. When the grapple is used, it weighs approximately 120 kg and is placed on logs. Lifts ranged between 900 kg and 1800 kg. Generally lifts averaged 1,500 kg or less.

53. Wind of 10 knots is ideal as well as cooler thicker air, as these assist the rotor and aid lift efficiency. When the wind shifts it is necessary to change flight paths and entry vectors. Working in windthrow sites often meant that surrounding vegetation required power hovering, and sometimes necessitated longer recovery distances as the clearest entry and exit vectors were not necessarily those that were available.

54. Some logs needed to be split in half using a variety of chainsaw power heads, including swordfish , Alaskan etc. These were the heavier logs, so splitting them in half achieved better effective length within the constraints of the helicopter's lifting capabilities. Having the loader clear the landing site between fuel cycles was helpful at the transport site as the landing area was able to be kept clear.[10]

55. The table below sets out the details of the methods of recovery:

[10] These four paragraphs were drawn from a speech by Jon Dronfield of NZSFP titled "Extracting wind-blown timber from the West Coast Conservation Estate".

Table 2 Helicopter and ground recovery methods

Means	Method	Details
Aerial – Bell UH1-L	Bell Helicopter using Grapple	1.5 to 1.8t maximum payload. Method used for the vast majority of lifts. Smaller helicopters were used for both timber extraction and transport of crews and equipment, forest assessment and transport into the forest. Grapple requires less ground prep to set log up for lifting. However, on almost all occasions the breaker-out was required to assist grapple placement. This required its own set of health and safety standards. Grapple and cable weigh circa 148 kg – which means less payload available for logs, which thus have to be made shorter. More time for helicopter to position grapple – more expensive.
Aerial – Bell UH1-L	Bell Helicopter using Slings	Method used for a few of the latter lifts. Same 1.5 to 1.8t payload. More ground prep time putting on slings but less helicopter time overall. Helicopter uses lightweight cable and hook which allows a greater log payload. Slings simply slotted through hook for quicker turn around – less helicopter time to pay for.
Ground	Using cable winches mounted on excavators or skidders	No helicopter costs. 3 to 5 tonne payload – good log length and able to extract whole section of the tree.
Aerial – Squirrel	Heavy-lift Squirrel Helicopter	0.8 to 1t payload. Flitches and split logs. Considerable time preparing logs of suitable weight in forest.

Means	Method	Details
Aerial – R44	Robinson R44 Helicopter	250kg payload. Only suitable to lift packs of sawn timber from forest. Used for the one in-forest portable mill operation.

Source: DOC

56. All the approved operators we interviewed told us that the costs of helicopter recovery were critical to their operations. A number of approved operators quoted those costs as being $3,300 per hour and this was confirmed with the main helicopter operator. Our discussions revealed that 26 flights per hour was considered a good turn-around rate, while rates in the teens were generally thought uneconomic. The main helicopter operator told us that flights per hour varied significantly from around 11 to 35. The main variable affecting this was the distance to the skid site and topography. The 11 flights per hour involved a recovery site 2 to 2.5 km away from the skid site while for the 35 flights per hour the recovery and skid sites were only a few hundred metres from each other.

57. To get an average estimate of helicopter costs per cubic metre, as a cross-check on the total recovery costs, we made a number of assumptions as follows:

- A tonne of rimu would yield 0.912 cubic metres of wood (estimate sourced from an approved operator);
- 20 flights per hour (confirmed the with main helicopter service operator as about the average);
- An average of 1.45 tonnes per flight;
- 1.5048 cubic metres per flight; and
- 30.01 cubic metres per hour.

58. Using these assumptions we estimated that the average cost of helicopter recovery was $125 per cubic metre. This is approximately 57 percent of the $218 per cubic metre cost of the recovery of WCWT timber and transport to the mill. One approved operator provided a differing estimate of 63 percent. However, some variation can be expected in these costs due to the different recovery practices of the approved operators as listed in Table 2, different weather and lift distances, and varying capability of the team.

Labour costs

59. An approved operator gave us an approximate breakdown of his labour costs both in the bush and at the mill. In his view he needed two bushmen for two weeks every two months over the two years which covered the majority of the WCWT recovery. This provides a way of calculating an estimate of the labour costs involved in the recovery: around $48 per cubic metre.

60. Given the estimate of average costs of $218 per cubic metre and the estimate of helicopter recovery costs at $125, subtracting this estimate of in-bush labour costs of $48 leaves a residual cost of approximately $45 per cubic metre for other recovery costs, e.g. work plans, health and safety plans, road control, wheel loader and fleet loading and cartage to the mill.

61. This residual amount cross-checks with estimates of transport costs for radiata (estimated as 30 km haulage at $15 per m^3, 50km at $18per m^3, 60km at $19 m^3, 120km at $25 m^3). Transport costs are probably a little higher for West Coast indigenous timber transport due to the likelihood that haulage would have less efficient loads and longer delays (loading/unloading etc) compared to radiata.

Mill costs averaged $400 per cubic metre

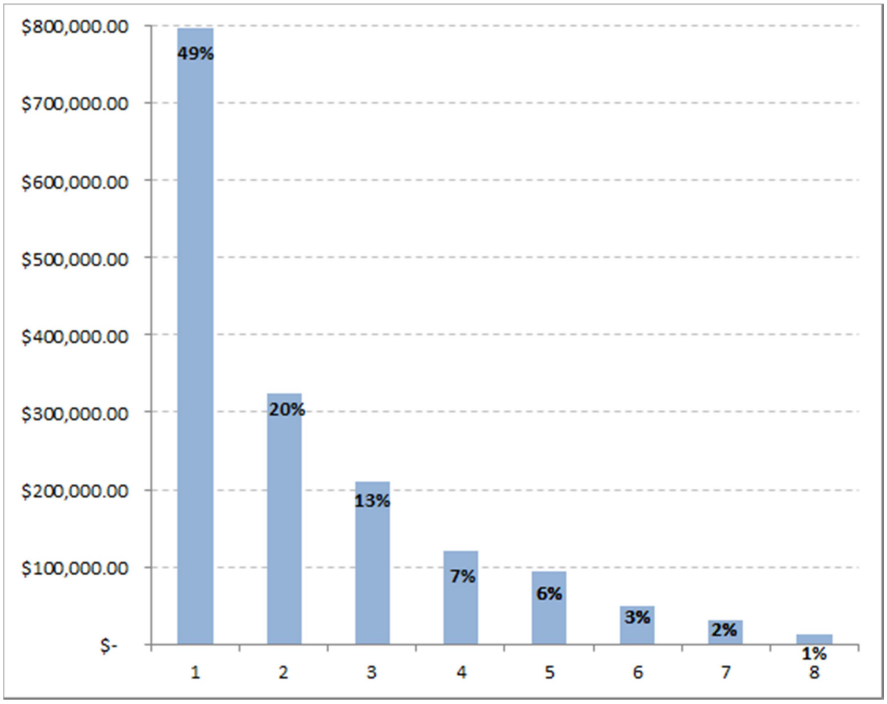
62. An approved operator provided us with an estimate of milling costs per cubic metre for indigenous timber. This was approximately $400. We made adjustments to take account of whether approved operators were kiln-drying their production or not and the costs of this. These costs cover capital assets, consumables and utilities and labour. Labour was a major part of this cost at circa 70 percent.

63. Another approved operator gave us an alternative view of mill costs of labour based on his view that the extra costs of milling WCWT timber amounted to around two men for three days a week over two years. We estimate that this amounts to around $70 per m^3 which is a smaller component of estimated total milling costs than we sourced from the other approved operator. This may indicate that for the smaller approved operators milling costs can be lower than for larger operators. We took a conservative view of these costs and used the more thorough and higher estimate of mill costs in our estimate of the Earnings before Interest Tax Depreciation and Amortisation (EBITDA) that the approved operators are likely to have earned from WCWT timber.

Stumpage costs: DOC earned $1,641,385

64. In the period from the first approval of an operator in November 2014 to November 2017, DOC earned a total of $1,641,385 from stumpage fees charged to the approved operators. This money was to be used in conservation management. This sum is broken down by operator and the percentage of the total paid by each operator in Figure 10 below.

Figure 10 Cyclone Ita timber stumpage paid and by each approved operator, with percentage



Source: DOC

65. Figure 10 shows that two approved operators made up nearly 70 percent of total stumpage paid.

66. For the WCWT programme it was decided that a standard single stumpage rate would be charged covering all grades. This was believed to be a simple and cheap approach, as well as incentivising approved operators to select the best quality logs. This represented a change from Timberlands West Coast Limited's approach, which up to 2002 marketed podocarp logs by grade.

67. Initially rimu extracted by helicopter was valued at between $200 and $250 per cubic metre with an average of around $230. The stumpage for ground-recovered rimu, which had a lower cost of recovery, was generally an extra $100 ($300 to $350 per cubic metre).

68. The stumpage rate was revisited and renegotiated after about 18 months for some logs because sap stain was creeping in the wood, but most logs remained at the standard stumpage for another 12 months. By mid-2016 most rimu sapwood was rendered low value by damage and stumpage was reduced to $150 per cubic metre. Then by mid-2017 all rimu sapwood and most smaller logs were rendered low value and stumpage was reduced further to $80 per cubic metre. Matai stumpage followed the same pattern as rimu. Stumpage for beech remained the same throughout the programme at between $50 and $80 per cubic metre. Kahikatea stumpage varied from $50 to $250 per cubic metre. Totara was not extracted until late in the

programme and tended to be small diameter and with little heart wood. It had deteriorated, so stumpage was $80 per cubic metre.

Administration cost DOC around $220,000

69. The administration of the WCWT programme involved assigning people from DOC and MPI to this work. Direct DOC involvement included the full-time work of a Senior Ranger based in Hokitika who managed the programme for two and a half years. This then went down to about a quarter of his time in 2016 and only around 5 percent of this time in 2017. A Senior Advisor from MPI was seconded for 26 months full-time. The DOC permissions team spent about 50 percent of their time helping with authorities in the first year and 25 percent over the next half year. It is estimated by DOC that this amounted to about 1 FTE over a year and a half. Without factoring in employment overheads, the DOC administration costs sum to around $220,000.[11]

70. Most of the administration effort went into managing the health and safety and operational supervision of the recovery work, given DOC's responsibilities as land manager for the Crown. These costs can be looked at in a number of ways. If they are viewed as a straight subtraction from the stumpage revenues DOC earned, then the net earnings from the WCWT programme to the Government would be in the order of $1.1 million.

71. This assumes that all this effort was incremental and that if the WCWT programme had not existed then these people would not have been employed by either DOC or MPI. However, this is very unlikely. It is more likely that they would have been assigned to other tasks within their respective organisations. Taking this to be the case, then the net costs of the WCWT programme for DOC and MPI would be the difference between the value they earned in their alternative activities and what was earned by the WCWT programme. Given their activities earned the Government $1.1 million, it seems unlikely that alternative activities would have earned more. If they had been engaged in similar or lower-value activities, then the full $1,638,905 from stumpage fees or more could be seen as a fair assessment of the net value to these agencies of the programme because not only did the programme bring in $1,638,905 in stumpage fees but it avoided the Government getting less valuable returns from these personnel working on other lower-value activities.[12]

72. The initial set-up of the programme required considerable MPI resources, covering in-forest assessment and log measurement, recovery systems, in-forest health and safety requirements, log-skid health and safety, and traffic management.

73. The first assessment of operational plan areas focused on health and safety and achieving the goal of zero harm. This started by investigating whether the forest

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11 MPI absorbed the costs of its person dedicated to the WCWT programme.

12 Valuing alternative work is very challenging because, for example, it could involve attempting to estimate the value of protecting and managing the environment which could involve total economic value or eco-systems services approaches.

could be harvested within the guidelines of the Approved Code of Practice for Safety and Health in Forest Operations (ACOP). There were 14 expressions of interest received. After discussion and assessment, eight of these expressions advanced through to contract.

74. According to MPI there was a noticeable change in culture of indigenous harvesting after two years of WCWT operations in challenging forest, with helicopter recovery and difficult weather, wind and soils. It is very positive and encouraging that as the programme nears completion there have been no accidents or lost time for injuries.

Strong earnings for some approved operators

75. Based on the revenues and costs estimated above, we estimate that the total EBITDA that approved operators achieved as a group was around $5.9 million. This was after costs of $1.6 million for DOC stumpage, $2 million in recovery costs and $1.9 million in milling costs were deducted from estimated total revenue to the approved operators of approximately $11.4 million. This represents an average EBITDA margin for all the approved operators of around 50 percent. This is a good return relative to many other businesses. Some approved operators achieved more than this due to adding value to their sawn timber by producing flooring or veneer. However, the majority achieved lower EBITDA margins which, for those that made net earnings, ranged upwards from 23 percent.

No new business opportunities established

76. The approved operators that we spoke to did not identify any particular new business opportunities that resulted from the WCWT timber they recovered. Most commented that the increased supplies of indigenous timber helped them cover their fixed costs of milling. In addition, due to the generally higher value of the WCWT timber, they were able to sell more, higher-grade timber than was normally the case with other indigenous timber. A few of the approved operators shifted from pursuing other revenue-earning activities to recovering WCWT timber.

77. Merchants commented that due to the fact that they knew that the Ita recovery timber was finite and would end in 2019, they did not develop any particular new business opportunities. However, they did comment that this might have been possible were the supply of timber more consistent.

Some businesses report negative economic impact

78. We also investigated the economic detriments or disruption to the indigenous timber market that may have resulted from the WCWT timber recovery programme. To do this we interviewed people who were not part of the programme but who are involved in extracting and selling indigenous timber in New Zealand.

79. These businesses believed that the WCWT programme had affected their commercial opportunities. In one example, an indigenous forest block owner with a

sustainable management plan under the Forests Act said he was affected by the amount of timber which became available as a result of Cyclone Ita. This person generally biennially contracted his allowable harvest under the Forests Act. When Ita timber became available it was not possible for him to attract interest in extracting his allowable harvest so he delayed contracting for a year. He stated this was unusual and that it had been possible to find acceptable contracts for harvesting his timber in previous years. This land owner was therefore unable to sell his indigenous timber for at least a year when he would normally have been able to. The volume of timber he can sell has, however, not changed.

80. Another interviewee said he was badly affected by the volumes of Cyclone Ita timber that came onto the market. He had contracted to harvest indigenous timber with land owners at a high stumpage price which was then undercut by the availability of cheaper Cyclone Ita timber. This person supported the view that Ita timber tended overall to be of higher quality because there were no branches etc included in the harvested timber.

81. Another interviewee suggested that Cyclone Ita resulted in a low level of pricing in certain lower-value timber grades in the indigenous timber market. None of these interviewees believed that the Ita timber should not have been recovered. However, they did suggest that the timber should perhaps have been held and fed out into the market over a long period to avoid the supply shock that they stated had affected them.

82. However, as discussed earlier in the section headed WCWT Act timber, it is not possible to be definitive that timber recovered under the WCWT Act caused the difficulties faced by these landowners and millers. This is because while 9,199 cubic metres have been recovered under the WCWT Act to date, over 6,000 cubic metres[13] were recovered from other sources over the two years following the Cyclone. It is possible that this 6,000 cubic metres may have caused difficulties for these firms even without the volumes added by the recovery of WCWT timber.

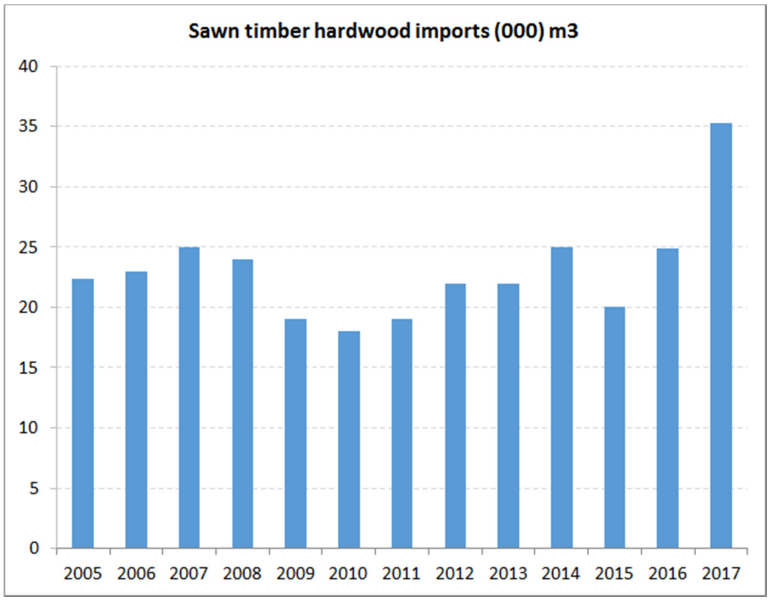
83. It is also possible that other issues made it challenging for these land owners and millers to sell their timber. For example in the case of the landowner who could not get an acceptable contract to harvest his timber during the Ita recovery period, accessibility of this timber may also have been a challenge. This is because we understand the helicopter recovery distances in his case were further than was generally considered viable by the approved operators working on WCWT and other timber.

[13] This was from New Zealand in total but the majority of the timber recovered over those two years can be attributed to Cyclone Ita.

Significant import substitution of hardwood timber

84. Import statistics show that timber recovered following Cyclone Ita may have had an impact by reducing the amount of overseas timber imported into New Zealand. This is visible in Figure 11 below which shows cubic metres of sawn timber hardwoods imported by June year.

Figure 11 Sawn timber hardwood imports 2005 to 2017



Source: Statistics New Zealand

85. The volume of these imports appears to have fallen significantly twice over the last 12 years. In 2009 after the great financial crisis and in 2015. The latter fall may well have been the result of the displacement of imports by the timber recovered from Cyclone Ita. The Ita timber helped the industry as it was easy to access reasonable volumes of timber. This appears to have reduced imported timber for at least two years by around 15 to 20 percent. A wholesaler and a furniture manufacturer we interviewed both told us that they have increased their purchases of imported American oak or ash as a result of the fall in the availability of Cyclone Ita timber over the last year.

Could more timber have been recovered?

Low and inconsistent volumes create capacity bottlenecks

86. We discussed barriers to the recovery of WCWT with the approved operators. One of the larger operators commented that his operation had a high proportion of fixed costs, meaning that it would have been possible to process greater volumes of timber. However, the lack of any heavy-lift helicopters (able to lift over 4 tonnes) was a major barrier. He stated that there was not the work to support having such helicopters available since the end of sustainable harvesting of timber on Crown lands in Westland ending on 31 March 2002. Because of that, the medium-lift Bell had become the mainstay but their capacity was less than a third that of some commercial heavy-lift helicopters.

87. Another barrier to greater levels of timber recovery that was mentioned by an approved operator was the availability of fully trained indigenous timber bushmen to prepare the logs for being hauled or lifted out. This approved operator told us that there were only a few people who were fully certified to work in indigenous windthrow sites like those WCWT timber was recovered from. This operator was referring to competent persons under the Approved Code of Practice for Safety and Health in Forest Operations (ACOP). The NZQA unit standards for tree fellers are New Zealand Certificates in Forest Harvesting Operations (Level 3 and 4) Tree Felling Strand. When bushmen hold these certificates they are considered qualified and able to work without supervision.

88. In the case of WCWT timber, DOC required the relevant NZQA standards for people recovering the timber. Chainsaw competency NZQA 1270 is required for cutting windthrow.[14] This standard is not commonly held by bushmen and is the most difficult of the chainsaw competencies to get at short notice. When machinery was used, e.g. skidders, loaders or excavators, the appropriate NZQA competency for that activity was required.

89. Another approved operator believed he would not have been able to increase the amount of timber he recovered because he didn't have anyone available, other than himself, that he trusted to select stems for recovery. This was important, in his view, because given the costs of helicopter recovery at $3,300 per hour, any selection of poorer logs could be very costly and quickly make his recovery efforts uneconomic. He commented that moving around in the windthrow sites selecting logs was a time-consuming, demanding and difficult task. A lot of factors needed to be assessed

[14] Page 8 of Treefelling Best Practice Guide, May 2016. The Guide recommends that manually felling and working with windthrown trees is very hazardous and should only be attempted by competent fellers or those under close supervision. Competent bushmen need NZQA 1270 to deal with windthrown trees (Page 66, Rule 11.11.2).

before a log was selected as being of a quality and accessibility to be worth recovering.

90. Most operators did not think that limits placed on haulage distances from road access points were a constraint because they roughly matched the capabilities of the hauling equipment. DOC applied a maximum hauling distance of 100 metres. Hauling was only allowed where it was possible to do so without causing significant damage. Most hauled logs were within 50 metres of the road.[15] One operator commented that a more permissive maximum hauling distance could have helped him recover more timber but it was specific to the circumstances at each site.

91. Many operators commented that they managed their labour costs by ensuring that they employed additional people on a flexible basis. Often those people had other employment in dairying or were semi-retired, and the work in the forests or in the mills represented additional earnings for them. In this way the approved operators were able to scale up to deal with the increased volumes of recovered timber but also return to normal operations afterwards.

92. If the WCWT legislation were ever applied as a general policy for windthrow events, then it would be more possible to ameliorate some of the constraints discussed above. Being able to recover and process more indigenous windthrown timber would improve the economics for millers and help to build a more consistent supply of timber through to wholesalers and end users.

93. There have been a number of historic severe weather events on the West Coast.[16] Such events could be the source of a greater supply of timber from smaller, more localised windthrow events. The economics of indigenous timber recovery could then improve for the helicopter firms. It seems unlikely that there would be enough of these events to attract larger helicopters into the market. However, it would be more worthwhile for people to train up to the appropriate NZQA standards if it were possible to recover timber from windthrow events where recovery was viable. It might even build the experience of those selecting logs in the bush to overcome that particular constraint.

5 percent biomass rule was a major constraint

94. The timber actually recovered was only 43 percent of the timber that was authorised to be recovered.[17] However, the authorised amount was a notional estimate based on an average rate of 43 cubic metres per hectare, which did not necessarily match

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15 Interview with DOC 17/11/17, and email of 17/1/18.

16 For example, since 1970 NIWA's time series of NZ Historic Weather Events Catalog at https://hwe.niwa.co.nz/ shows 13 high wind events on the West Coast. 3 were major storms or ex tropical cyclones like Ita. In addition, the following report "A chronology of flooding events on the West Coast, South Island, NZ" 1846 to 1990 by J.L. Benn lists a number of severe weather events that occurred between 1970 and 1990. Three events involved winds over 110 kmph and 2 others involved strong winds. http://www.wcrc.govt.nz/Documents/Natural%20Hazard%20Reports/A%20Chronology%20of%20Flooding%20WC%201846%20-%201990%20J%20Benn%201990.pdf

17 9,239 cubic metres compared to 21,345 cubic metres.

conditions on the ground. Other constraints meant that it would not have been easy to have significantly increased recovered timber. These include the availability of skilled bushmen and the availability and lift capability of helicopters.

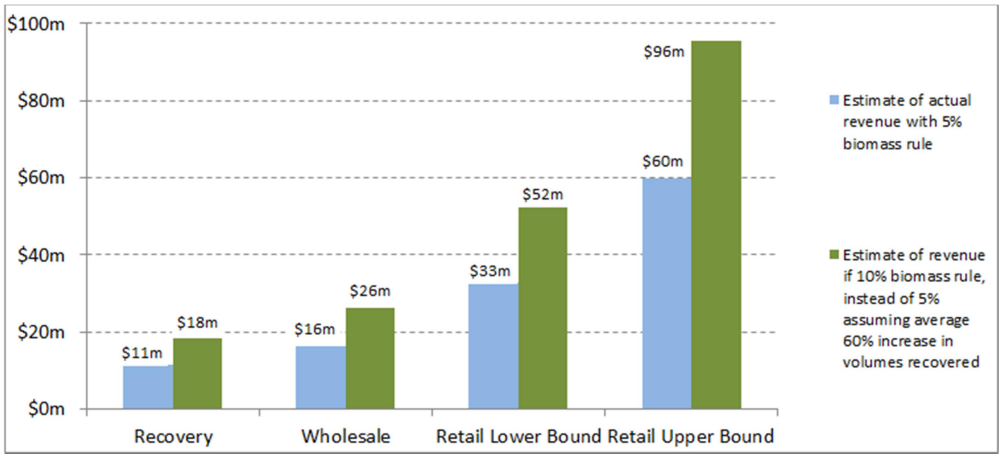
95. On the other hand, the EBITDA margins we have estimated for the more successful approved operators indicate good earnings potential from recovering more timber. This would be an incentive to scale up production if this were permitted.

96. We investigated whether it might have been possible to recover more timber if the 5 percent biomass rule had been more permissive. For illustrative purposes we assume it could be 10 percent. This would have been possible if a less conservative view had been taken of the requirement within the WCWT Act that the Director-General of DOC should be satisfied that "adverse effects on the environment are kept to a minimum" and "the activities do not unreasonably affect conservation in the conservation area or reserve…" or cause "significant soil disturbance".

97. Approved operators' views ranged from very little additional timber to almost double. This was because their opinions depended to a significant extent on the sites they were working with. Where there was significant windthrow in a concentrated area close to road access, then a 10 percent biomass rule would have allowed for almost doubling of the timber recovered from an area. However, there were areas where the amount of fallen timber within economic range for recovery wasn't high, which when combined with other challenges, such as steep terrain or wetland, would have meant a 10 percent biomass rule would not have affected by much the amount of timber recovered. Our discussions with approved operators suggested that a lot more timber could have been recovered from the majority of recovery areas.

98. Figure 12 below shows the revenue that might have been achieved if 60 percent of the volume actually recovered under the 5 percent biomass rule had been recovered under a hypothetical increase of the biomass rule to 10 percent. This could have resulted in an increase in milled revenue from around $7 million to around $18 million, and an increase in revenue at the wholesale level of around $10 million to circa $26 million. The estimates of the lower bound and upper bound of retail revenue would have increased by $19 million and $36 million respectively so that the range of retail revenue could have been between the totals of $52 million and $96 million.

Figure 12 Revenue estimates by sector of value chain



Source: Sapere

99. A 60 percent increase is a rough estimate only. It is possible more than 60 percent additional timber could have been recovered if a 10 percent biomass rule had been in place as the larger operators indicated to us that their blocks could have provided this extra timber without any significant constraints. They believed that they could employ enough additional staff to process this additional timber.

100. If legislation similar to the WCWT Act were passed in the future, the experience of implementing the 2014 Act is likely to mean more timber could be recovered. This is because, based on what was learned from the 2014 Act, the systems and processes could be put in place by DOC more quickly a second time. This means more timber could be recovered because operators could be approved more quickly following a future major windfall event.

Appendix 1: Approach to review

101. The reviewers (Peter MacIntyre and Ashley Milkop, Sapere; John Schrider, Forme Consulting) appraised a wide range of information about the implementation of the WCWT Act, including:

- Assessment of Cyclone Ita Wind-blow Damage to West Coast Indigenous Forests, MPI Technical Paper No: 2014/41, Prepared by: Ian Platt, Alan Griffiths, Matt Wootton, ISBN No: 978-0-478-43792-8 (online) ISSN No: 2253-3923 (online), November 2014
- West Coast Wind-blown Timber Act, Environmental Principles, Guidelines and Management Approach, Tim Shaw (DOC) and Craig Trotter (MPI), docdm-1472252, Date: 16 September 2014;
- Minutes of the West Coast Wind Blown Timber Meeting held on 26 June in MPI's Christchurch offices.
- Two Sawmill Reports, Annual Source Volume by Species (All Sources/Classifications) from MPI
- Spreadsheets from MPI, including:
  - Estimated roundwood removals from New Zealand forests, year ended 31 March, 1951 to 2017
  - Production of indigenous forest rough-sawn timber for all species, year ended 31 March 2017
  - Production of rough-sawn timber by major species, 2000–2017
  - Production of rough-sawn timber in New Zealand, 1970–2017
  - Production of rough-sawn timber from roundwood removals from New Zealand forests by species and wood supply region, 2000–2017.
  - Sawmill conversion factors in New Zealand, 1990–2017

102. The review team also had meetings and exchanges of information and discussion with MPI and DOC employees, including:

- Alan Griffiths, Senior Technical Adviser, Sustainable Forest Management, Spatial Forestry and Land Management, Regulation & Assurance, Ministry for Primary Industries, on the overall report and our analysis.
- Tim Shaw, Senior Ranger, Department of Conservation, Hokitika.

103. The review also involved discussions with a range of stakeholders in the West Coast region. These included most of the 8 approved operators.

Appendix 2: Indigenous timber harvesting on private land in NZ

104. Harvesting & Milling Indigenous Timber on Private Land[18]

105. Owners of land with indigenous forests have several options if they wish to harvest and mill indigenous timber. The milling of native timber is regulated by the Forests Act, which was amended in 1993 for the purpose of "the promotion of sustainable management of indigenous forests". There are approximately 1.2 million hectares of privately owned indigenous forest in New Zealand, of which 25 percent may be suitable for sustainable management and ongoing production of a relatively small quantity of indigenous timber.

106. There are four approval types:

- Sustainable Forest Management (SFM) Plans. Long term (50 year) approval of an annual allowable harvest, set at a rate that the forest could sustain in perpetuity.
- Sustainable Forest Management (SFM) Permits. Shorter 10 year term approval of a capped volume.
- Personal use approvals.
- Milling Statements for trees that fit specified circumstances, e.g. dead standing or windthrown trees or salvage timber, planted indigenous forests etc.

107. Currently there are 82,000 ha of privately owned indigenous forests being managed under sustainable management Plans and Permits. Sustainable forest management prescriptions minimise the effects of the harvest by restricting harvest intensity and impacts so the forests natural values will be maintained. If there is insufficient natural regeneration, prescriptions may require exclusion of stock, control of pests and/or planting of seedlings at the rate of five per harvested tree. Approximately 23,000 m^3 of indigenous logs reach sawmills each year.

108. The control point of the Forests Act is the sawmill. A sawmill may only cut indigenous timber if it is registered with MPI and there is an approval issued by MPI for the timber consignment. The Forests Act definition of a sawmill is very broad. Anything that produces sawn timber or woodchips is defined as a sawmill, so portable sawmills and Alaskan-type chainsaw mills are included. There are 167 sawmills registered to mill indigenous timber in NZ, a third of which have received indigenous timber in the last six months.

109. Planted indigenous forests certificates can be issued by MPI to owners of indigenous plantations. The certificates provide evidence the indigenous forest is a plantation for

[18] Source : http://www.nzffa.org.nz/specialty-timber-market/headlines/harvesting-milling-indigenous-timber-on-private-land/ June, 2017, 1. Stephen Rolls. Senior Forestry Analyst, MPI.

the purposes of obtaining a milling statement at a later date. Planted indigenous forests are not subject to sustainable forest management prescriptions.

110. MPI does not charge any fee for processing and issuing Forests Act approvals. There is a sawmill registration fee for sawmills, however, of $115 a year. Milling indigenous timber without an approval and/or a registered sawmill is an offence under the Forests Act with a penalty of up to $200,000.