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WITH THE COMPLIMENTS OF:



Ministry for Primary Industries
Manatū Ahu Matua



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NEW ZEALAND PLANTATION
FOREST INDUSTRY

FACTS & FIGURES



2012/2013

1,719,500_{HA}

The estimated net stocked forest area increased by 100 ha to 1,719,500 ha as at 1 April 2012. Accompanied by an increase in the average standing volume from 279m³/ha to 284m³/ha means the estimated standing volume of wood in New Zealand's plantation forest is 488 million m³, an increase from 2011 of 1.8%.

44,100_{HA}

The total harvested area increased by 800 ha to 44,100 ha in 2012, compared to 2011, with the volume clearfelled increasing by almost 1.6 million m³.

NZ\$1.6_B

Log exports were static at \$1.6 billion for both 2011 and 2012. Log exports totalled 13.8 million m³, compared to 13.7 million m³ being processed in NZ.

NZ\$4.5_B

Total New Zealand forest product exports were \$4.5 billion, a decrease of 5% from 2011 to 2012.

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FOREWORD



The forest industry continues to make a significant contribution to the New Zealand economy. Commercial forestry is New Zealand's third largest merchandise export earner, contributes around 3 percent of New Zealand's GDP, and employs around 18,000 people.

The industry is well positioned to further increase export earnings. Harvesting has increased significantly over the last five years, buoyed by strong demand from China. Between now and the early 2020s, wood availability is forecast to increase by a further 30 percent from 27 to around 35 million cubic metres. There are also opportunities to increase the value of exports through increased wood processing, manufacturing more engineered timber products, and other new forest products. The Wood Council of New Zealand (Woodco) has recognised this in its *Strategic Action Plan*, which sets out the industry's vision of more than doubling export earnings by 2022.

New Zealand's forest products come from sustainably-managed planted forests. These forests provide many environmental and social benefits to New Zealanders, in addition to their economic contribution.

The information in this publication reflects the long-standing co-operation between the industry that supply the data, and the Ministry of Primary Industries that compiles and publishes it. This is a good example of industry and government working together for sector-wide benefit. The publication is a convenient summary of this important industry.

I look forward to working with the forest industry to ensure it realises its potential economic growth.

A handwritten signature in black ink, which reads "Jo Goodhew". The signature is fluid and cursive, with a long horizontal stroke at the end.

Hon Jo Goodhew
Associate Minister for Primary Industries

NEW ZEALAND PLANTED FORESTRY IN SUMMARY

Area and standing volume statistics	1 April '10	1 April '11	1 April '12
Net stocked forest area (ha)			
Total estimated area	1,738,000	1,719,400	1,719,500
Growth characteristics			
Standing volume (000 m ³)	467,063	479,709	488,437
Average standing volume (m ³ /ha)	269	279	284
Area-weighted average age (years)	15.9	16.3	16.4
Area by species (rounded)(ha)			
Radiata pine	1,556,000	1,545,000	1,543,000
Douglas-fir	110,000	107,000	108,000
Cypress species	10,000	10,000	10,000
Other exotic softwoods	25,000	24,000	24,000
Eucalyptus species	24,000	22,000	23,000
Other exotic hardwoods	13,000	13,000	13,000
	Year ended 31 Dec '09	Year ended 31 Dec '10	Year ended 31 Dec '11
Planting statistics			
New planting (ha)			
Total estimated new planting	4,300	6,000	12,000
Restocking	32,500	35,200	39,300
Harvested area awaiting restocking ³	55,300	54,300	60,500
	Year ended 31 Mar '10	Year ended 31 Mar '11	Year ended 31 Mar '12
Harvesting statistics			
Harvesting (ha)			
Area clear felled (ha)	43,500	43,300	44,100
Volume clear felled (TRVIB ¹ 000 m ³)	20,588	21,725	23,312
Volume production thinned (TRVIB ¹ 000 m ³)	146	201	90
Total volume removed (TRVIB ¹ 000 m ³)	20,734	21,926	23,402
Average clear fell yield (m ³ /ha)	473	505	529
Area-weighted average clear fell age for radiata pine (years)	28.4	28.6	28.6
Estimated planted forest roundwood removal (000 m ³) ²	21,944	25,033	25,971

Notes:

¹ TRVIB is an abbreviation for Total Recoverable Volume Inside Bark.

² This is an indirect estimate based on the application of conversion factors to the various forestry products.

³ Harvested area awaiting restocking is at 1 April.

Source: NEFD 2010, NEFD 2011, NEFD 2012

NEW ZEALAND ECONOMIC INDICATORS

As at 31 March 2012

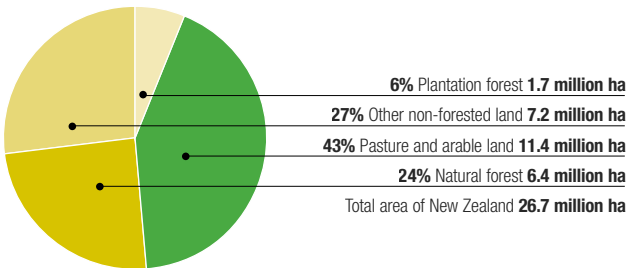
	31 Mar '11	31 Mar '12
Population	4,381,000	4,415,000
GDP \$ billion	135.0	138.4
GDP per capita \$	30,824	30,968
Exports \$ billion	42.9	45.7
Forest products exports total \$ billion	4.7	4.5
Total overseas debt \$ billion	133.6	143.2
Annual percentage change GDP	1.2%	1.7%
Inflation (as measured by annual percentage change in CPI)	4.5%	1.6%
Forestry sector contribution to GDP	3.5%	3.3%

Source: Statistics NZ and FOA

GDP in 1995/96 prices

NEW ZEALAND LAND USE

As at 31 March 2011



Source: MAF and Statistics New Zealand

(Planted forest excludes harvest area awaiting replanting)

NEW ZEALAND HAS 1.7 MILLION HECTARES OF EXOTIC, HIGHLY PRODUCTIVE, SUSTAINABLY MANAGED PLANTATION FORESTS

EMPLOYMENT IN FORESTRY AND PROCESSING ACTIVITIES

Description of activity	Employee count ¹ as at mid-February					
	2007	2008	2009	2010	2011	2012
Forestry	690	740 ^r	600	660 ^r	740 ^r	760
Logging	3,610	3,590	3,330	3,600 ^r	3,920 ^r	3,930
Services to Forestry	2,360	2,440 ^r	2,100 ^r	2,130 ^r	2,270	2,300
Forestry and Logging	6,660	6,770^r	6,030^r	6,390^r	6,930^r	6,990
Log Sawmilling	6,970	6,380 ^r	5,580 ^r	5,480 ^r	5,540 ^r	5,250
Wood Chipping	9	15 ^r	18 ^r	18 ^r	20 ^r	25
Timber Resawing and Dressing	2,220	2,080 ^r	1,700 ^r	1,730	1,660	1,620
Plywood and Veneer Manufacturing	1,760	1,570 ^r	1,350 ^r	1,270	1,220	1,240
Fabricated Wood Manufacture	1,130	1,010 ^r	930 ^r	830	790	790
Pulp, Paper & Paperboard Manufacturing	2,090	2,040 ^r	1,890 ^r	1,860 ^r	1,810 ^r	1,780
Total forestry and first stage processing	20,839	19,865^r	17,498^r	17,578^r	17,970^r	17,695

Source: Statistics NZ

¹ **Employee count** is a head-count of all salary and wage earners for the February reference month. Previous releases in this series described "Persons engaged" (total number of full-time employees and working proprietors (i.e. number of persons working 30 hours or more per week plus half the number of persons working part-time), and so the data is not strictly comparable with previous releases in this series.

^r Revised

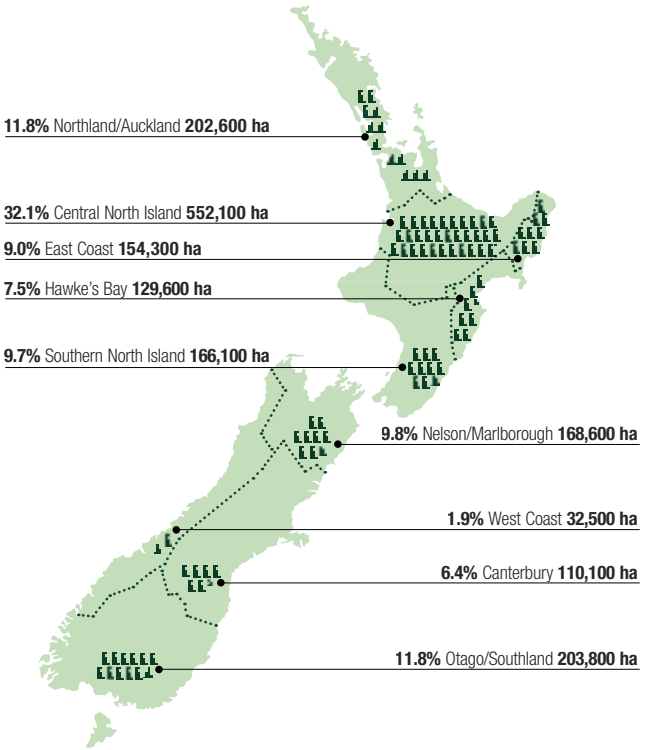
NET STOCKED AREA OF RADIATA PINE

By age class at 1 April 2012



Source: NEFD 2012

WHERE THE PLANTATION FORESTS ARE

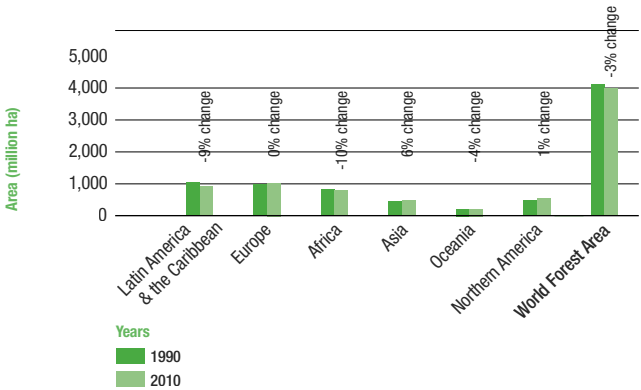


Each complete tree represents 1%

Total 1,720,000 hectares

Source: NEFD 2012

GLOBAL FOREST AREAS BY MAIN REGIONS (% CHANGE FROM 1990 DATA)

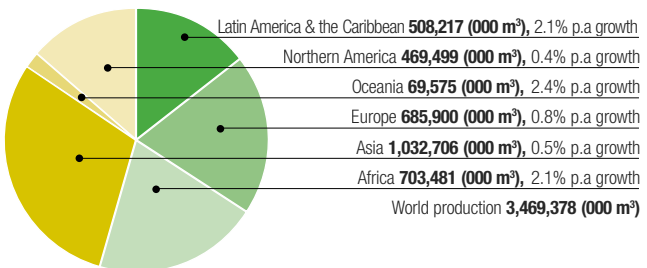


Source: FAO Statistical Yearbook 2013

IN 2010, FORESTS COVERED ABOUT 31 PERCENT OF THE WORLD'S TOTAL LAND AREA – 4,033 MILLION HA. ABOUT 93% OF THE WORLD'S FOREST COVER IS NATURAL FOREST AND 7% IS PLANTED. FROM 1990 TO 2010, THE WORLD FORESTED AREA DECLINED BY 3%

NEW ZEALAND HAS 1.7 MILLION HA OF EXOTIC, HIGHLY PRODUCTIVE, SUSTAINABLY MANAGED, PLANTATION FORESTS AND 6.5 MILLION HA OF NATURAL FOREST

GLOBAL FOREST PRODUCTION BY MAIN REGIONS (PA% GROWTH 1961-2011)



Source: FAO Statistical Yearbook 2013

NEW ZEALAND PLANTED FOREST OWNERSHIP/MANAGEMENT

Forest Owner/Manager	Net stocked forest area (000 ha)		
	As at 1 April 2010	As at 1 April 2011	As at 1 April 2012
Hancock Natural Resource Group	257	235	235
Kaingaroa Timberlands	175	175	174
Matariki Forests	128	124	129
Global Forest Partners LP	96	91	84
Ermslaw One	95	109	109
P F Olsen	n/a	66	71
Crown Forestry (MPI)	61	47	46
Juken New Zealand	55	60	31
Pan Pac Forest Products	35	34	34
GMO Renewable Resources	24	21	26
Hikurangi Forest Farms	25	25	25
Wenita	25	25	25
Roger Dickie NZ	24	24	26
Blakely Pacific	22	23	23
Forest Enterprises	21	21	21
City Forests	16	16	16
Lake Taupo Forest Trust	13	15	16
Others (under 10,000 ha)	666	608	629
Total Plantation Forest Area	1,738	1,719	1,720



NEW ZEALAND PLANTATION FOREST OWNERSHIP – UNDERLYING LAND STATUS

As at 1 April 2013

Productive area (000 ha)	Underlying land status				Total
	Freehold	Leasehold			
		Crown	Māori Inc.	Other	
Hancock Natural Resource Group	106	26	67	48	247
Kaingaroa Timberlands	1		181		182
Matariki Forests	55	36	15	21	127
Global Forest Partners LP	28	55	4	1	87
P F Olsen	49		7	15	71
Ernslaw One	41	47	4	2	94
Crown Forestry ¹		4	42		46
Juken New Zealand	11	21	1		31
Pan Pac Forest Products	4	30			34
GMO Renewable Resources	27		2	1	30
Hikurangi Forest Farms	27		3		30
Wenita	5			20	25
Roger Dickie NZ	26				26
Blakely Pacific	22			1	23
City Forests	14			2	16
Lake Taupo Forest Trust	16				16
Totals	432	219	326	111	1088

¹ Crown land includes land leased under Crown Forest License.



NEW ZEALAND PLANTATION FOREST MANAGEMENT

As at 1 April 2013

Firm/entity	Forest management productive area (000 ha)	
	TIMO	Property Mgmt
Hancock Forest Management (NZ)	247	204
Kaingaroa Timberlands		184
Matariki Forests		127
Global Forest Partners LP	63	24
Ermslaw One		109
Crown Forestry		
Juken New Zealand		32
Pan Pac Forest Products		35
GMO Renewable Resources	29	
Hikurangi Forest Farms		
Wenita		25
Roger Dickie NZ	26	
Blakely Pacific		23
Forest Enterprises	21	
City Forests		16
NZ Forest Managers		55
P F Olsen Ltd	3	142
Forest Management NZ Ltd		26
Totals	389	1002

This table is designed to identify who manages New Zealand forests.

Within "management" there are 2 main categories:

1. **Timberland Investment Management Organisation (commonly referred to as a TIMO)**

These organisations do not own any forest. The forests are owned by retail investors or institutional funds.

2. **Property Management**

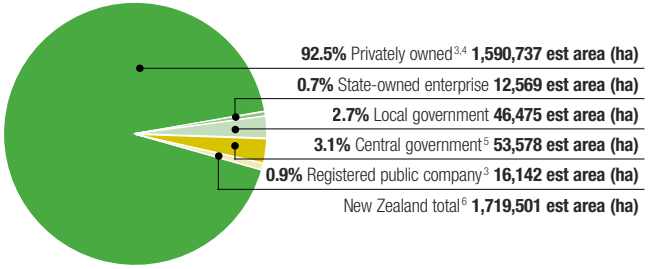
– Planning and managing field operations, mapping and maintaining records.

Some entities carry out both functions within the same organisation, others carry out both for some parts of a forest estate and not others.

Source: FOA

PLANTATION FOREST OWNERSHIP¹

Net stocked planted production forest area as at 1 April 2012



Source: NEFD 2012

Note:

¹ Ownership is based solely on the ownership of the forest irrespective of the ownership of the land.

² Net stocked planted production forest area.

³ Note that significant changes in forest ownership occurred during 2003 resulting in large areas of forest previously owned by public companies now being privately owned.

⁴ "Privately owned" includes all privately owned forests. The legal entities included in this category are private companies, partnerships, individuals and trusts, which include Māori trusts and incorporations.

⁵ "Central Government" forests are predominantly Crown owned forests on Māori leasehold land. These forests are managed by the Ministry for Primary Industries.

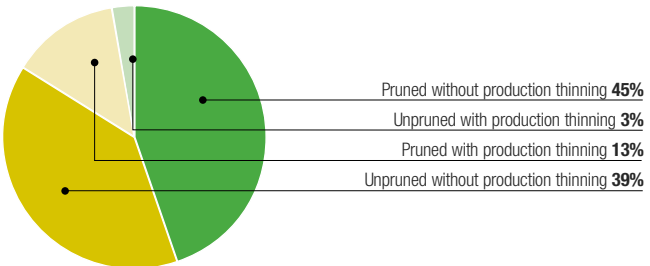
⁶ Individual entries may not sum to total shown due to rounding.

FOREST MANAGEMENT TRENDS – RADIATA PINE

	2007	2008	2009	2010	2011	2012
Pruned without production thinning	47%	45%	46%	46%	45%	45%
Unpruned without production thinning	37%	39%	38%	38%	39%	39%
Pruned with production thinning	14%	14%	14%	14%	14%	13%
Unpruned with production thinning	2%	2%	2%	2%	2%	3%

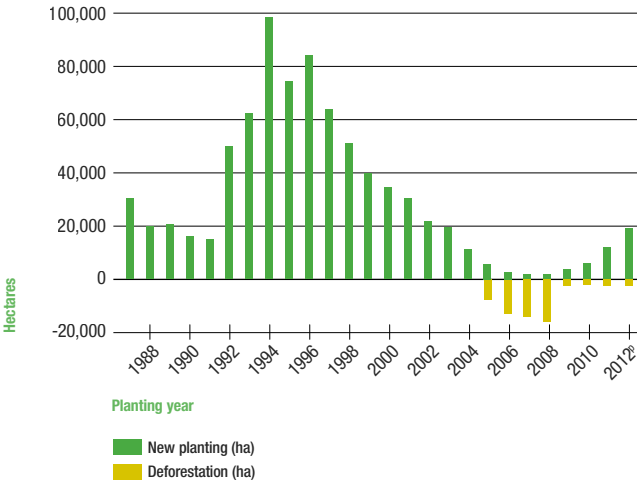
Source: NEFD 2012

FOREST MANAGEMENT TRENDS – RADIATA PINE (2012)



Source: NEFD 2012

NEW FOREST PLANTING (1987) AND DEFORESTATION (SINCE 2005)



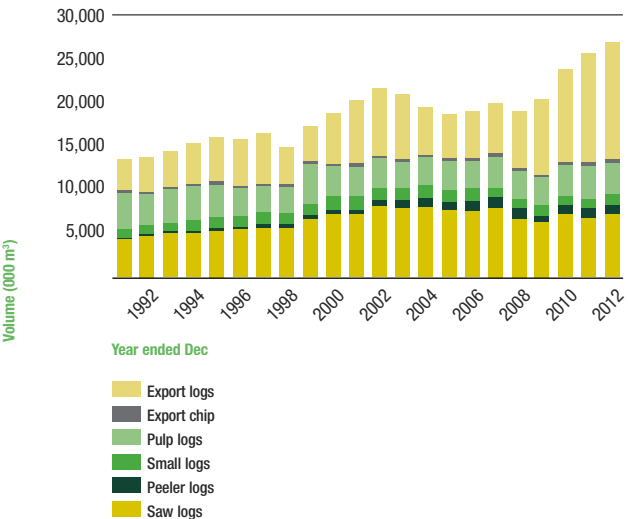
Source: NEFD 2012

Note:

These estimates do not include immature forest cleared for other land uses.

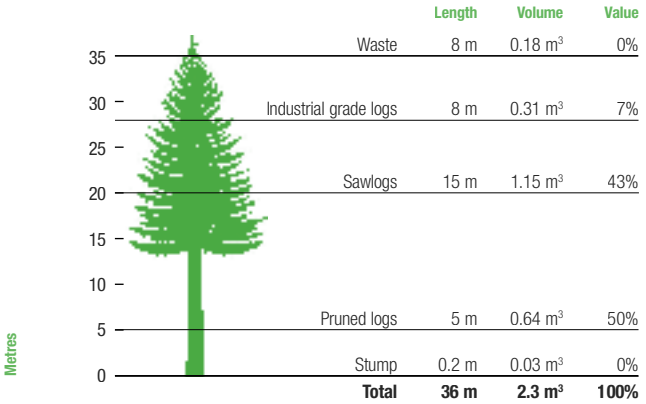
^p Provisional

PLANTATION FOREST HARVEST



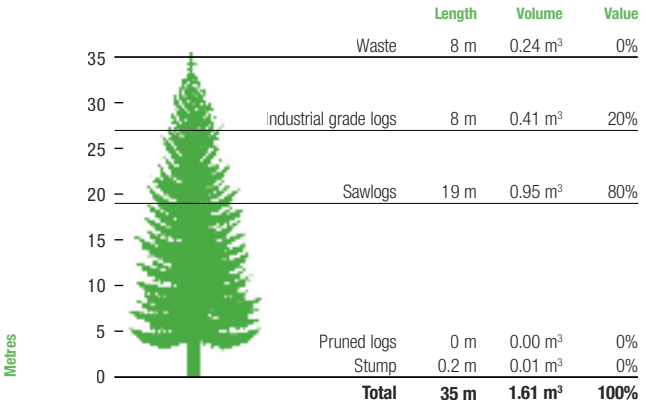
Source: MPI

TYPICAL LOG OUT-TURN



Direct Sawlog Regime

Pruned and thinned to waste. Final Crop Stocking 228 spha.



Structural Regime

No pruning. Thinned to waste. Final Crop Stocking 487 spha.

Average site (Site Index 29 m, 300 Index 23 m³/ha/yr). Clearfelled at 28 years.

Approximately 45% of the pine estate is managed under a regime with pruning and thinning to waste.

Approximately 39% of the pine estate is managed under a regime with no pruning and thinning to waste.

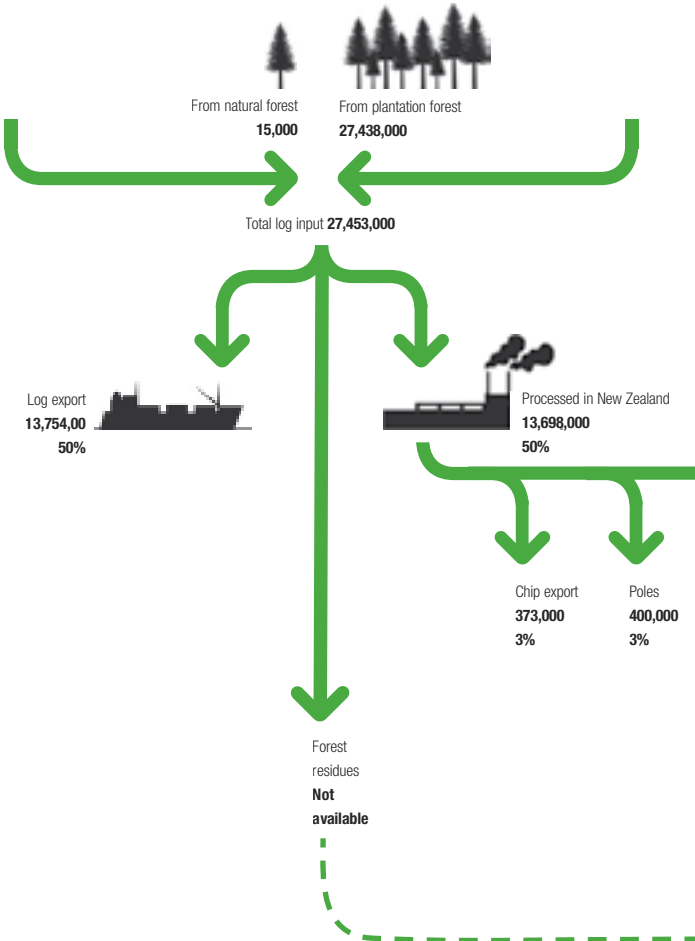
Source: Scion



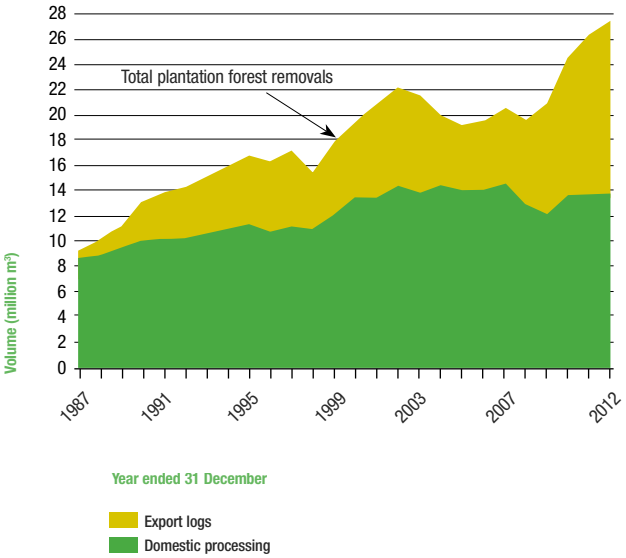
LOG FLOW IN THE NEW ZEALAND FORESTRY INDUSTRY

Volumes in m³ roundwood equivalent. Year ended 31 December 2012

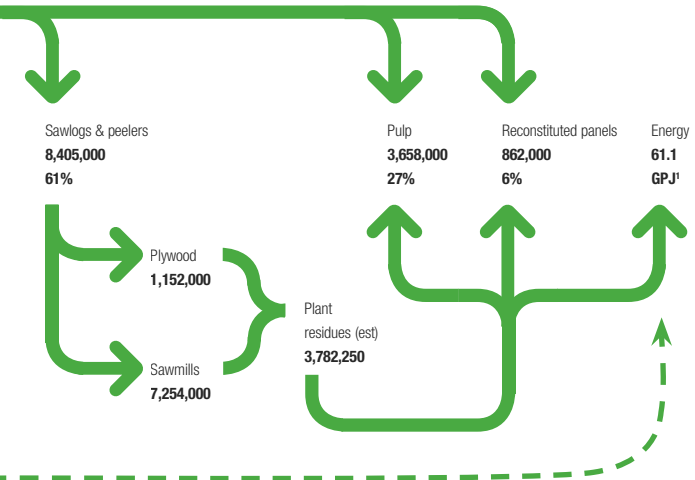
Source: MPI and FOA



PROCESSED IN NZ vs LOG EXPORT



Source: MPI



GPJ: Gross Petajoules

¹ Source: NZ Energy Datafile 2012, Woody Biomass

LOCATION OF MAJOR WOOD PROCESSORS BY WOOD SUPPLY REGION 2012

- Fibreboard
- Particleboard
- Paperboard
- Pulp & Paper
- Plywood
- Veneer/LVL
- Sawmill
- Manufacturers – Solid Wood

Source: FIEA



Northland:

- **A** Juken New Zealand Ltd Triboard Mill (Kaitaia)
- **B** Juken New Zealand Ltd Northland Mill (Kaitaia)
- **C** Carter Holt Harvey Woodproducts, LVL (Marsden Point)

Auckland:

- **D** Thames Timber Ltd (Thames) **50,000-99,999 m³**
- **z** SCFP (Thames)
- **j** Jenkin Timber (Auckland)
- **k** Goodwood Industries (Auckland)
- **t** McIntosh Timber Laminates Ltd (Auckland)



Central North Island:

- **F** Claymark Sawmills Ltd (Katikati) **50,000-99,999 m³ sawn**
- **G** Carter Holt Harvey Woodproducts, Plywood (Tokoroa)
- **H** Carter Holt Harvey Kinleith (Tokoroa)
- **m** Morre Levesque Morris (Cambridge)
- **n** Pukepine Sawmills (Te Puke)
- **I** Claymark Rotorua Sawmill Ltd (Rotorua) **50,000-99,999 m³**
- **J** Tachikawa Forest Products (NZ) Ltd (Rotorua) **> 100,000 m³**
- **o** Lockwood Group (Rotorua)
- **p** Hume Pine (Rotorua)
- **q** Verda (Rotorua)
- **r** Otorohanga Timber Company (Otorohanga)
- **K** Red Stag Timber (Waipa) **> 100,000 m³**
- **L** Carter Holt Harvey Woodproducts, Kawerau Sawmill (Kawerau) **> 100,000 m³**
- **M** Sequel Lumber (Kawerau) **50,000-99,999 m³**
- **N** SCA Hygiene Australasia (Kawerau)
- **O** Carter Holt Harvey Tasman Ltd (Kawerau)
- **P** Norske Skog Tasman Ltd (Kawerau)
- **Q** Carter Holt Harvey Pulp & Paper (Whakatane)
- **R** Laminex Group (Taupo)
- **S** Tenon Ltd (Taupo) **> 100,000 m³**
- **T** Winstone Pulp International (Ohakune) **50,000-99,999 m³**

Hawke's Bay:

- **U** Pan Pac Forest Products Ltd (Napier) **> 100,000 m³**
- **s** Kanuka Engineered Wood Products Ltd

Southern North Island:

- **V** Taranakipine Ltd (New Plymouth) **50,000-99,999 m³**
- **W** Juken New Zealand (Masterton)

Nelson/Marlborough:

- **X** Waimea Sawmillers Ltd (Nelson) **50,000-99,999 m³**
- **Y** Nelson Pine Industries Ltd (Richmond)
- **Z** Southpine (Nelson) Ltd (Nelson) **50,000-99,999 m³**
- **u** Flight Timbers (Blenheim)
- **a** Carter Holt Harvey Woodproducts, Nelson Sawmill (Eves Valley) **> 100,000 m³**
- **a1** Hunter Laminates Nelson Ltd (Nelson)
- **a2** Nelson Forests Ltd (Renwick)

Canterbury:

- **b** Daiken (Rangiora)
- **c** SRS New Zealand Ltd (Rolleston) **50,000-99,999 m³**
- **d** Starwood Products Ltd (Timaru)
- **v** Southern Pine Products (Christchurch)

West Coast:

- **e** International Panel and Lumber Ltd (Greymouth)
- **z** Stillwater Lumber Limited (Greymouth)
- **w** Westco Lagan Limited (Hokitika)

Otago/Southland:

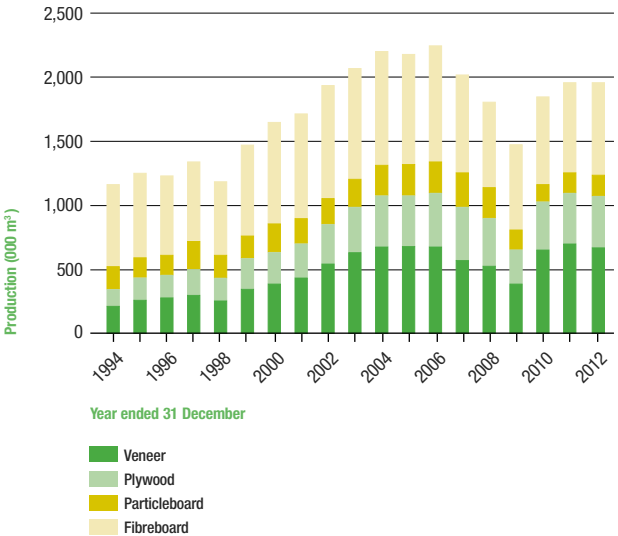
- **f** Dongwha Patinna NZ Ltd (Mataura)
- **g** Southland Veneers (Invercargill)
- **h** Niagara Sawmilling Co. Ltd (Invercargill) **50,000-99,999 m³**
- **x** SFCF (Mosgiel)
- **l** SFCF (Milton)
- **y** Niagara/PT (Invercargill/Ashburton)
- **i** Craigpine Timber Ltd (Winton) **> 100,000 m³**

LUMBER PRODUCTION AND EXPORTS



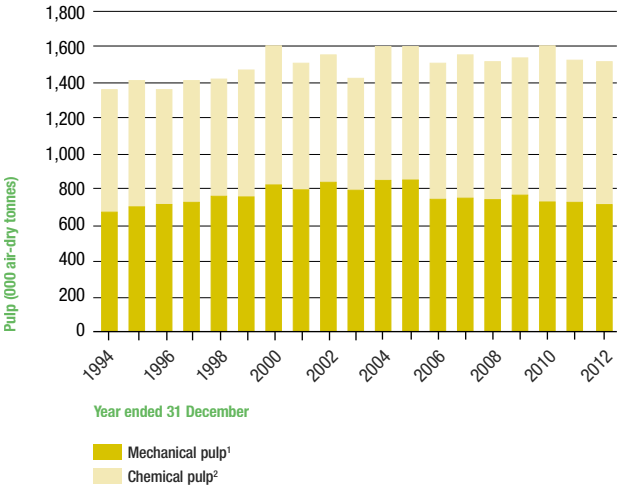
Source: MPI

PANEL PRODUCTS PRODUCTION



Source: MPI

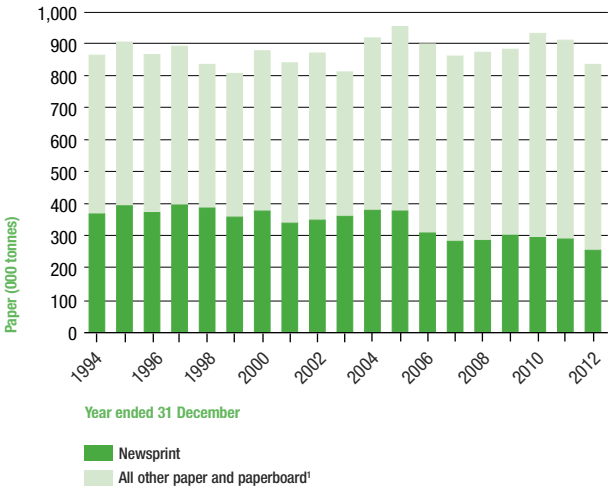
WOOD PULP PRODUCTION



1. Mechanical Pulp is those export items in HS item grouping 4701.
2. Chemical Pulp is those export items in HS groupings 4702, 4703, 4704 and 4705.

Source: MPI

PAPER AND PAPERBOARD PRODUCTION



- 1 All other paper and paperboard includes printing and writing paper, other paper and paperboard.

Source: MPI

TOP EXPORT DESTINATIONS

Exports of forestry products by main countries of destination for the year ended December 2012 by value (

India		Singapore		Thailand		China, People's Republic of	
\$NZ263,520		\$NZ19,904		\$NZ72,765		\$NZ1,454,626	
Logs & poles	62.2%	Logs & poles	0.3%	Logs & poles	5.7%	Logs & poles	71.9%
Sawn timber	1.1%	Sawn timber	26.1%	Sawn timber	40.1%	Sawn timber	11.2%
Wood pulp	3.0%	Wood pulp	30.8%	Wood pulp	27.1%	Wood pulp	11.0%
Paper & paperboard	30.6%	Paper & paperboard	33.0%	Paper & paperboard	14.8%	Paper & paperboard	2.5%
Panel products	1.4%	Panel products	1.9%	Panel products	2.2%	Panel products	1.9%
All other	1.8%	All other	7.9%	All other	10.2%	All other	1.6%



Saudi Arabia

\$NZ27,980

Logs & poles	0.0%
Sawn timber	60.0%
Wood pulp	0.0%
Paper & paperboard	4.3%
Panel products	1.7%
All other	34.0%

Vietnam

\$NZ71,840

Logs & poles	2.8%
Sawn timber	66.2%
Wood pulp	3.9%
Paper & paperboard	3.6%
Panel products	22.2%
All other	1.3%

Malaysia

\$NZ79,216

Logs & poles	0.2%
Sawn timber	11.3%
Wood pulp	24.4%
Paper & paperboard	44.6%
Panel products	19.1%
All other	0.6%

Indonesia

\$NZ132,872

Logs & poles	0.3%
Sawn timber	16.4%
Wood pulp	49.5%
Paper & paperboard	3.7%
Panel products	15.4%
All other	14.8%

Note:

Values are NZ\$ f.o.b.

All other forestry products include chips, mouldings, manufactures of paper and paperboard, furniture and miscellaneous forestry. Other countries are all other countries to which New Zealand has exported forestry products during the year.

Source: Statistics New Zealand and FOA

NZ\$000)

Korea, Republic of		Japan		USA		Other countries	
\$NZ392,759		\$NZ542,182		\$NZ185,331		\$NZ211,304	
Logs & poles	64.3%	Logs & poles	17.0%	Logs & poles	0.0%	Logs & poles	0.6%
Sawn timber	10.4%	Sawn timber	5.2%	Sawn timber	70.5%	Sawn timber	32.6%
Wood pulp	18.7%	Wood pulp	13.8%	Wood pulp	0.1%	Wood pulp	10.9%
Paper & paperboard	3.5%	Paper & paperboard	0.0%	Paper & paperboard	2.4%	Paper & paperboard	26.6%
Panel products	2.7%	Panel products	48.3%	Panel products	6.5%	Panel products	3.9%
All other	0.4%	All other	15.8%	All other	20.5%	All other	25.5%



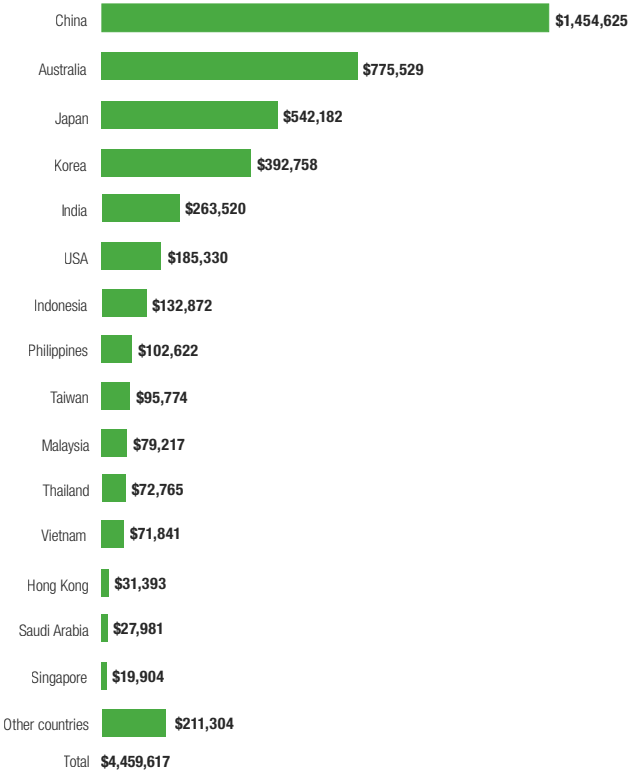
Australia		Philippines		Hong Kong (SAR)		Taiwan	
\$NZ775,529		\$NZ102,623		\$NZ31,393		\$NZ95,774	
Logs & poles	0.0%	Logs & poles	0.0%	Logs & poles	0.1%	Logs & poles	10.5%
Sawn timber	21.4%	Sawn timber	26.8%	Sawn timber	2.1%	Sawn timber	33.2%
Wood pulp	7.8%	Wood pulp	2.8%	Wood pulp	0.0%	Wood pulp	24.2%
Paper & paperboard	22.9%	Paper & paperboard	31.2%	Paper & paperboard	92.5%	Paper & paperboard	23.7%
Panel products	8.4%	Panel products	36.7%	Panel products	1.8%	Panel products	8.3%
All other	39.5%	All other	2.6%	All other	3.5%	All other	0.2%

products.

EXPORTS OF FORESTRY PRODUCTS FROM NEW ZEALAND

For the year ended 31 December 2012^P by value (\$NZ 000)

Top export destinations



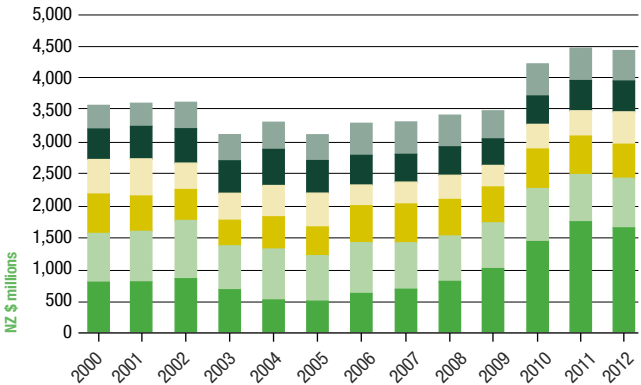
^P Provisional

Source: Statistics New Zealand and FOA

TOTAL FOREST PRODUCT EXPORTS WERE \$4.5 BILLION FOR THE YEAR ENDED DECEMBER 2012, 10% OF ALL MERCHANDISE EXPORTS

EXPORT LOGS ACCOUNTED FOR 35% OF THE VALUE OF FOREST EXPORTS

MAJOR EXPORT EARNERS



Year ended 31 December

- Logs and wood chips
- Sawn timber and sleepers
- Wood pulp
- Paper and paperboard
- Panel products
- Other forestry products

Note:

Values are NZ\$ free on board (f.o.b.).

Other paper and paperboard includes all other paper and paperboard exported but not manufactures of paper and paperboard.

Manufactures of paper and paperboard revised for 2007; accordingly total value is also revised.

Excludes newsprint data for years ended December 2007 - 2011; Includes other paper and paperboard value.

Source: MPI and FOA



PRODUCTION AND EXPORTS OF SELECTED FORESTRY PRODUCTS

Year ended 31 December 2012

Forestry Product	2009 ^r				Total production	Quantity exported ³
	Total production	Quantity exported ³	% Exported	Export value (\$NZm f.o.b.)		
Logs (000m ³)	20,749	8,821	42.5%	952	24,331	10,886
Wood Chips (000BDU)	..	210,366	..	46	..	351,587
Sawn Timber (000m ³)	3,554	1,859	52.3%	727	4,032	2,024
Chemical pulp (tonnes)	767,822	631,414	82.2%	457	873,281	585,825
Mechanical pulp (tonnes)	767,386	251,375	32.8%	113	730,795	194,980
Newsprint (tonnes)	305,639	181,865	59.5%	202	297,822	..
Other paper & paperboard (tonnes)	575,761	353,127	61.3%	343	631,588	393,168
Fibreboard (m ³)	652,096	513,754	78.8%	226	665,787	509,935
Plywood ¹ (m ³)	255,490	55,839	21.9%	102	359,941	85,047
Veneer (m ³)	404,604	122,420	30.3%	40	663,433	174,486
Particleboard (m ³)	155,313	84,156	54.2%	52	142,045	63,324
Cont Shaped Wood	..	..	..	101	..	..
Manufactures	..	..	..	224	..	..
Wooden Furniture	..	..	..	37	..	..
Miscellaneous and other wood products	..	..	..	85	..	..
All forestry products	..	..	..	3,705	..	..
Total New Zealand exports	..	..	..	37,777	..	..
Forest exports as a % of total exports	..	..	..	9.8%	..	..

Note:

Exports excludes re-exports.

¹ Plywood includes laminated veneer lumber.

^r Revised

.. Not available

Source: MPI, Statistics New Zealand and FOA

2010 ^r		2011				2012			
% Exported	Export value (\$NZm f.o.b.)	Total production	Quantity exported ³	% Exported	Export value (\$NZm f.o.b.)	Total production	Quantity exported ³	% Exported	Export value (\$NZm f.o.b.)
44.7%	1,352	26,206	12,802	48.9%	1,655	27,469	13,754	50.1%	1,572
..	75	..	421,457	..	86	..	378,489	..	72
50.2%	842	3,791	1,908	50.3%	751	4,008	2,114	52.8%	789
67.1%	534	796,316	615,605	77.3%	517	800,351	675,407	84.4%	456
26.7%	93	726,261	201,771	27.8%	95	707,568	175,235	24.8%	84
..	235	293,068	..	..	213	264,956	..	68.0%	162
62.3%	392	615,881	392,910	63.8%	402	587,228	367,431	62.6%	351
76.6%	219	706,160	599,679	84.9%	241	720,565	598,844	83.1%	261
23.6%	128	386,632	96,381	24.9%	139	389,955	128,152	32.9%	133
26.3%	60	707,892	170,580	24.1%	59	685,246	162,378	23.7%	53
44.6%	43	155,260	68,632	44.2%	42	157,531	67,324	42.7%	41
..	127	..	..	..	114	..	..	..	111
..	233	..	..	..	255	..	..	..	214
..	32	..	..	..	27	..	..	..	26
..	117	..	..	..	118	..	..	..	133
..	4,482	..	..	..	4,715	..	..	..	4,458
..	41,773	..	..	..	45,921	..	..	..	44,340
..	10.7%	..	..	..	10.3%	..	..	..	10.1%



VALUE OF EXPORTS BY PRODUCT AND DESTINATION

Year ended 31 December 2012

Country of destination	Logs & poles value (\$NZ000)	Lumber value (\$NZ000)
China, People's Republic of	1,045,616	162,392
Australia	24	165,833
Japan	91,952	28,017
Korea, Republic of	252,659	40,936
India	163,824	2,837
United States of America	0	130,698
Indonesia	375	21,750
Philippines	12	27,460
Taiwan	10,068	31,762
Malaysia	127	8,926
Thailand	4,176	26,161
Vietnam	2,034	47,585
Hong Kong (SAR)	21	670
Singapore	65	5,193
Saudi Arabia	0	16,794
New Caledonia	192	8,696
Other countries	979	63,186
Total	1,572,124	788,896

Note:

Values are NZ\$ f.o.b.

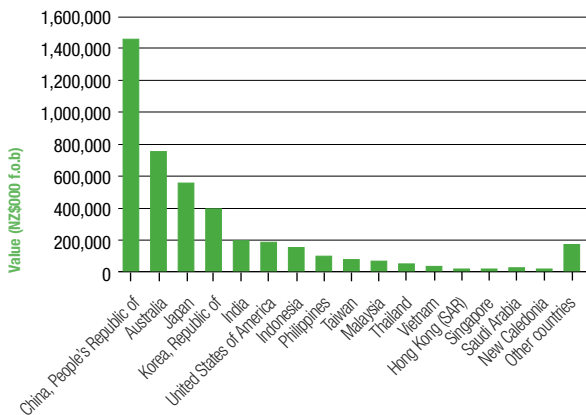
All other forestry products include chips, mouldings, manufactures of paper and paperboard, furniture and miscellaneous forestry products.

Other countries are all other countries to which New Zealand has exported forestry products during the year.

Source: Statistics NZ and FOA

Wood pulp value (\$NZ000)	Paper & paperboard value (\$NZ000)	Panel products value (\$NZ000)	All other forestry products value (\$NZ000)	All forestry products value (\$NZ000)	% of Total
160,384	35,926	27,434	22,874	1,454,626	33%
60,236	177,963	65,035	306,439	775,530	17%
74,707	19	262,059	85,428	542,182	12%
73,638	13,561	45,832	1,413	428,039	10%
7,865	80,625	10,552	4,788	270,491	6%
152	4,486	11,994	38,001	185,330	4%
65,837	4,873	20,427	19,610	132,872	3%
2,855	32,034	37,641	2,621	102,622	2%
23,152	22,671	7,961	160	95,774	2%
19,322	35,295	15,096	450	79,217	2%
19,687	10,759	1,578	7,404	69,765	2%
2,789	2,601	15,916	915	71,841	2%
0	29,037	551	1,114	31,393	1%
6,136	6,559	385	1,566	19,904	0%
0	1,200	471	9,515	27,981	1%
0	2,295	1,234	3,203	15,621	0%
22,992	53,830	7,057	50,640	156,433	4%
539,752	513,734	488,972	556,141	4,459,619	100%

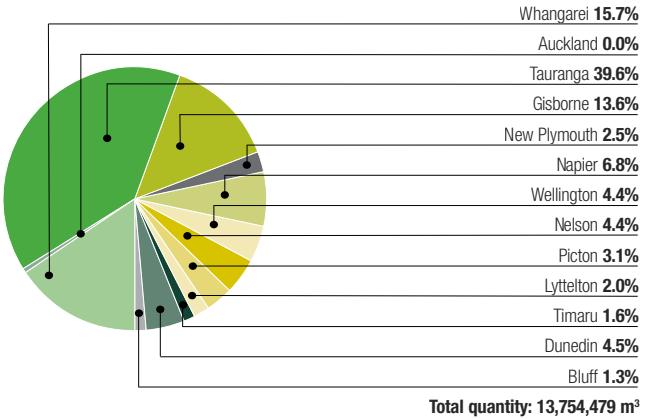
VALUE OF EXPORTS BY DESTINATION



Source: Statistics NZ and FOA

LOG EXPORTS BY PORT

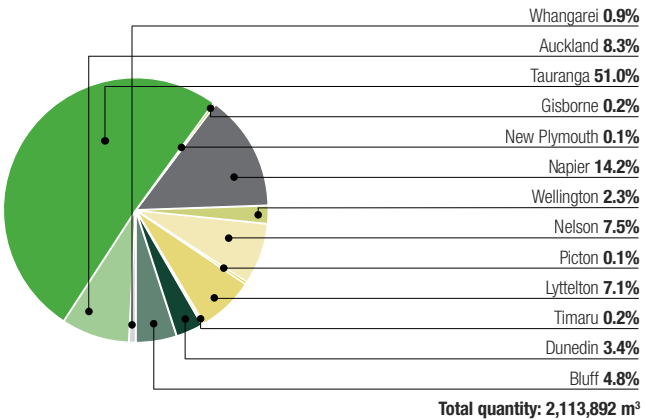
Year ended 31 December 2012



Source: Statistics New Zealand

SAWN TIMBER EXPORTS BY PORT

Year ended 31 December 2012



Source: Statistics New Zealand

FSC CERTIFIED FOREST OWNER/ MANAGER – PLANTATION FOREST

Company	Productive Area (ha)			
	2009	2010	2011	2012
	Area as at 1 July	Area as at 1 July	Area as at 1 July	Area as at 31 Dec
Hancock Forest Management Ltd	222,153	206,921	222,720	204,858
Timberlands Ltd	183,069	182,531	187,544	183,467
Rayonier NZ	38,051	38,055	125,867	126,594
Ermslaw One Ltd	94,186	94,186	102,107	103,398
Nelson Forests Limited	63,040	63,040	65,253	62,567
PF Olsen Ltd	63,145	62,629	63,110	46,543
Juken New Zealand Ltd	60,451	62,331	61,703	32,214
Summit Northern Plantation Ltd	n/a	n/a	n/a	28,993
PanPac Forest Products Ltd	34,271	34,271	33,597	35,040
NZ Forest Managers Ltd	34,052	34,073	33,509	33,878
Crown Forestry, MPI (West Coast)	30,006	29,808	29,733	23,954
Hikurangi Forest Farms Ltd	28,636	29,005	28,605	28,905
Wenita Forest Products Ltd	25,101	25,070	25,460	25,180
Blakely Pacific Ltd	23,287	22,206	22,385	22,919
City Forests Ltd	16,044	15,997	15,997	16,114
Southland Plantation Forest Company of NZ	10,544	10,130	9,900	10,507
Craigpine	3,371	3,371	3,371	3,371
Total FSC Plantation Productive Area	929,407	913,624	1,030,861	988,502
% FSC Certified	52%	51%	58%	56%
NZ Productive Plantation Area (ha)	1,794,700	1,793,300	1,773,700	1,780,000
Lindsay and Dixon (naturally regenerated)	11,719	11,719	11,719	11,719
Total NZ FSC	941,126	925,343	1,042,580	1,000,221

Note: Productive Area = Net Stocked Area + Area Awaiting Restocking.

Some forest companies manage forests for multiple owners, some of which are certified and some of which are not certified.

Source: FOA

**FSC TOTAL CERTIFIED AREA:
181,112,619 HA**

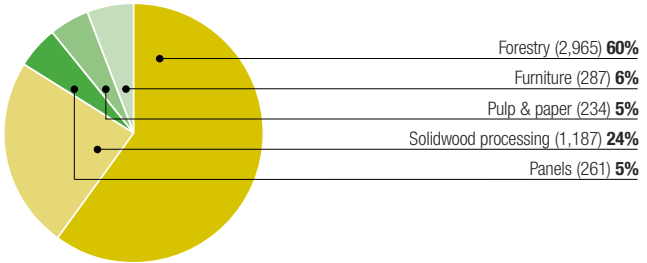
NO. COUNTRIES: 80

TOTAL NO. CERTIFICATES: 1,216

FOREST INDUSTRIES TRAINING STATISTICS

TRAINEES BY SECTOR

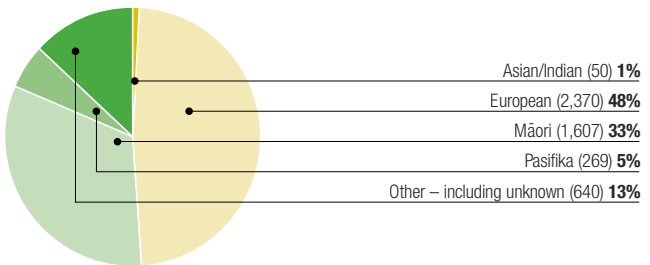
as at December 2012



Source: Kompetenz - Unaudited figures

TRAINEES BY ETHNICITY

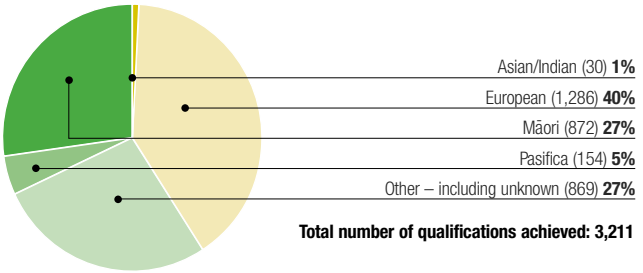
as at December 2012



Source: Kompetenz - Unaudited figures

QUALIFICATIONS ACHIEVED BY ETHNICITY

as at December 2012



Source: Competenz - Unaudited figures





SECTOR AGREEMENTS

Members of the New Zealand Forest Owners Association are committed to the following agreements:

New Zealand Forest Accord 1991

The New Zealand Forest Accord 1991 was updated in 2007 to reaffirm the principles of the 1991 Accord and respond to the threat of climate change. It is an agreement between conservation groups and most major plantation growers and users to:

- Define areas unsuitable for forestry
- Acknowledge that existing natural forest should be maintained
- Recognise commercial forests as essential
- Ensure any use of wood from indigenous forests is on a sustainable, value-added basis
- Ensure new plantation forests will not disturb areas of natural indigenous vegetation

www.nzfoa.org.nz

New Zealand Climate Change Accord 2007

Acknowledging, inter alia:

- The environmental benefits delivered by indigenous and plantation forests
- That carbon sequestration by forests is a key mechanism to offset greenhouse gas emissions
- That policies must be consistent with the Polluter Pays Principle, be broad-based and cover all greenhouse gases in all sectors, should avoid net increases in greenhouse gases, should promote the retention and expansion of indigenous forests and the replanting and expansion of plantation forests; ensure all sectors are taking responsibility, be consistent with customary rights and the Treaty of Waitangi and acknowledge that wood is a renewable reusable and recyclable resource.

www.nzfoa.org.nz

Eliminating illegal forest products

On 14 August 2008 a statement was signed in which the signatories called on the New Zealand government, importers, processors, retailers, New Zealand forest and plantation managers and processors of forest and plantation products to support their call to strongly oppose the import and the use of illegally harvested and traded forest products in New Zealand. Trading in illegal products contributes to deforestation, biodiversity loss, poverty and other adverse social effects, and undermines the viability of legal forest products.

Prohibition of the import of these products will benefit New Zealand's legal forest products industries; assist in improving the producer countries' social, environmental, and economic well being; and show that New Zealand is responsibly addressing the problem. Illegal logging is not sustainable and thus eliminating illegal logging is an important step towards achieving sustainable forestry globally.

The organisations that signed the statement were: the Ecologic Foundation, Environment & Conservation Organisations of New Zealand (ECO), Greenpeace Aotearoa New Zealand, New Zealand Forest Owners Association, New Zealand Farm Forestry Association, New Zealand Pine Manufacturers Association, Royal Forest and Bird Protection Society, Sustainable Energy Forum, Wood Processors Association of New Zealand and WWF New Zealand.

www.nzfoa.org.nz

Log Transport Safety Accord

Log truck operators and forest owners on 7 August 2008 signed an updated Log Transport Safety Accord designed to further improve the safety of all road users. Since the Accord was first signed in 2001 there has been a 65% reduction in log truck crashes, and a 75% reduction in rollover crashes, during a time of rapid growth in the logging industry. The Accord has been updated with the aim of reducing the rollover crash rate even further.

www.nzfoa.org.nz

Principles for Commercial Plantation Forest Management in New Zealand

To promote understanding between the signatory parties with a view to New Zealand achieving environmental excellence in plantation forest management and participating as an effective advocate internationally for the sustainable management of plantation forests and the protection, preservation, and sustainable management of natural forests. These principles are complementary to the New Zealand Forest Accord (August 1991).

www.nzfoa.org.nz



NZ WOOD



Wood is the world's most renewable raw material. For this reason forests and the wood they provide are vital in the fight against climate change. As the effects of global warming impact on our environment, the use of renewable and sustainable building materials has never been so important.

The stages of the wood story – planting and renewal, growth, harvesting and use – are part of a renewable cycle that takes and stores carbon dioxide from the atmosphere, making wood a better-than-carbon-neutral building material.

Wood is the only construction material which has absorbed CO₂ from the atmosphere when produced, not emitted more

During its production, one tonne of:

- concrete – has released 159 kilos of CO₂ into the atmosphere
- steel – has released 1.24 tonnes of CO₂ into the atmosphere
- aluminium – has released 9.3 tonnes of CO₂ into the atmosphere
- wood, however, has absorbed a net 1.7 tonnes of CO₂ from the atmosphere, over and above the energy expended in growing, harvesting and processing.

The more timber you use in a house, the more CO₂ you remove from the atmosphere

- It takes around 20 trees to build an average house frame
- A steel house frame has added 4.5 tonnes of CO₂ to the atmosphere
- A wooden house frame has absorbed 9.5 tonnes of CO₂ from the atmosphere
- Choosing timber options for an average house can take around 20 tonnes net of CO₂ out of the atmosphere (saving the equivalent of 150 trips Auckland to Wellington, or 7.1 years of car use)
- Using alternative materials (concrete, steel, brick and aluminium) can add 24 tonnes net CO₂ to the atmosphere (costing the equivalent of 180 trips Auckland to Wellington, or 8.6 years of car use)

Using wood is something we can all do to help the environment. By demanding and using more sustainably produced wood, we can ensure that more trees will be planted and more carbon dioxide will be absorbed from the atmosphere.

The result is a better world for ourselves, our families and future generations. It's simple.

Wood. Our most renewable raw material.

<http://www.nzwood.co.nz>



MAJOR NEW ZEALAND FORESTRY SPECIES

There are a range of New Zealand plantation-grown exotic and indigenous species to suit a variety of applications including structural, appearance, engineered wood products, furniture and joinery.

Radiata Pine

Radiata Pine has a number of uses including framing, decking, fencing, exterior cladding, window sashes, pergolas, landscaping, shingles, barge boards and exterior trim. Untreated, it can be used for furniture, mouldings, trim and panelling. Panel products, such as plywood, MDF and laminated veneer lumber, are also available from radiata pine resources.

Douglas-fir

Douglas-fir can be used for roof trusses and framing, internal panelling, and glue-laminated beams. As well as being popular for light timber framing, the larger dimensional stock is sought after for exposed interior posts and beams because of its good stability and freedom from twist. Glue lamination to produce beams, arches and scaffold planks is also common.

Macrocarpa

Macrocarpa has a range of uses including ceiling sarking, exposed beams, flooring, wall panelling, framing, furniture, solid wood bench tops, architraves and skirtings. It can be used outside for weatherboard, soffit, fascia, pergolas, decking and outdoor furniture. It is not recommended in-ground for construction purposes (including in-ground posts for fencing, decking and pergolas).

Eucalypts

Eucalypts have a number of applications. The Blue Gum group is suitable for tongue and groove flooring, in-sequence parquet, overlay, joinery stairs, doors, furniture, panelling, decking, outdoor furniture, and sliced veneer. The Stringybark group is suitable for flooring, joinery, decking, cross arms (mainly *E. microcorys*), and sliced veneer. The Ash group is suitable for furniture, joinery, and sliced veneer.

Source: <http://www.nzwood.co.nz/species/>



NEW ZEALAND FOREST AND WOOD PRODUCTS STRATEGIC ACTION PLAN

The Strategic Action Plan provides a pathway to shape a strong forest and wood products sector for the future.

The New Zealand forest and wood products industry is based on wholly renewable resources, producing 100% of its products from plantation forests and recycled waste fibre; is New Zealand's largest biomaterial recycler and has a very low carbon footprint. In the future it will be substantially independent of non-renewable energy inputs apart from transport fuel (and even this could be sourced from New Zealand wood in the long run). The industry already provides greenhouse gas offsets, reducing New Zealand's overall carbon footprint.

Vision for the Plan

In the ten years to 2022 annual export earnings will more than double to \$12 billion from a New Zealand forest and wood products industry that is:

- Delivering innovative wood-based solutions from a sustainable resource to meet our customers' needs;
- manufacturing a range of high-value, fibre-based products, including new biochemical and biofuel value streams;
- recognised as a world-leader in timber-engineered building solutions;
- underpinned by forest growing as a valued and profitable land use;
- recognised as a key New Zealand growth industry, delivering strong economic and environmental benefits;
- connected and collaborative across the value chain, from end-product to seedling;
- characterised by industry players that have pride in each other, with the sector regarded as a preferred career option for our brightest talent.

Forest product export earnings for 2012 were \$4.5 billion. On the current path of development by 2022 export earnings will be \$6.1 billion. The Strategic Action Plan provides an alternative path targeting \$12 billion export earnings by 2022.

CURRENT PATH: DOMINATED BY LOG EXPORTS

ALTERNATIVE PATH: STRONG PROMOTION OF WOOD, DIVERSE EXPORT MARKETS, TRANSFORMED CONSTRUCTION INDUSTRY, HIGH-VALUE WOOD-BASED MANUFACTURING STREAMS, GROWING DOMESTIC PROCESSING CAPACITY, SUPPORTED BY COLLABORATIVE AND ALIGNED INDUSTRY SECTORS

TERMS AND THINGS

Area and volume

- A hectare (ha) = 100 x 100 metres (about the size of two rugby fields).
- A cubic metre (m³) = 1 metre x 1 metre x 1 metre (about three times the size of a household dishwasher).
- An average radiata pine tree yields 2.4 m³ of wood at harvest.
- 1 hectare of 28 year-old radiata pine contains between 650 and 800 m³ of wood.
- 1 hectare grows up to 28 m³ of wood each year.
- NZ radiata pine plantations yield up to 30% more wood per hectare than they did 60 years ago.
- A log truck and trailer contains approximately 30 tonnes of logs.
- A log ship contains approximately 30-35,000 tonnes of logs.

Costs and values

- It costs 18 - 24 cents to truck one m³ of wood one km (for 100 km that is \$18 - \$24 per m³).
- Harvesting costs begin around \$15 - \$24 per m³ – increasing with steeper terrain, environmental sensitivities, smaller trees etc.
- Depending on market conditions, the average radiata pine tree when harvested is worth \$50 - \$200 to the grower.
- The value of wood being grown (added) each year in one hectare of forest is between \$500 and \$1,500.
- High quality pruned stands, well located to the market can sell for as much as \$50,000 per hectare net to the owner, while unpruned stands may net less than \$10,000 – particularly if logging and cartage costs are higher.

Note: Prices are indicative only.



CARBON EMISSIONS AND SEQUESTRATION

The Carbon Cycle

Planting trees begins a cycle that continuously removes, releases and reabsorbs greenhouse gases such as carbon dioxide. As trees grow, they absorb carbon dioxide through the process of photosynthesis.

The carbon dioxide absorbed by the growing forest remains stored within the wood products used throughout the lifetime of the building structure or product.

At the end of a structure's or products lifetime, the carbon dioxide is released back into the atmosphere when the wood decays or is burnt as fuel.

Wood can be recycled to extend its lifetime and slow down the natural release of carbon dioxide back into the atmosphere. Once the carbon dioxide is released, it is available to be re-absorbed by growing trees.

When wood materials decay or are burnt as fuel they release carbon dioxide that was absorbed during the growth of the trees and are therefore carbon neutral.

New Zealand's Greenhouse Gas Inventory is the official annual report of all human caused emissions of greenhouse gases in New Zealand. The complete inventory submission is available on the Ministry for the Environment's website at www.mfe.govt.nz/publications/climate/

Key Points

In 2011, New Zealand's total greenhouse gas emissions were 72.8 million tonnes of carbon dioxide equivalent (Mt CO₂-e), which means total emissions are now 13.2 Mt CO₂-e (22.1 per cent) higher than the 1990 level of 59.6 Mt CO₂-e.

In 2011, the net amount of carbon dioxide removed from the atmosphere (net removals) due to afforestation, reforestation and deforestation under the Kyoto Protocol was 16.8 Mt CO₂-e.

Agriculture was the largest contributor to New Zealand's emissions in 2011 (47.2 per cent) closely followed by the energy sector (42.6 per cent).

New Zealand's net emissions are less than the average annual assigned amount units for the first commitment period (2008–2012). We are on track to meet our Kyoto Protocol target for the first commitment period.

How much does each sector contribute to total emissions?

In the inventory, emissions are categorised into six different sectors:

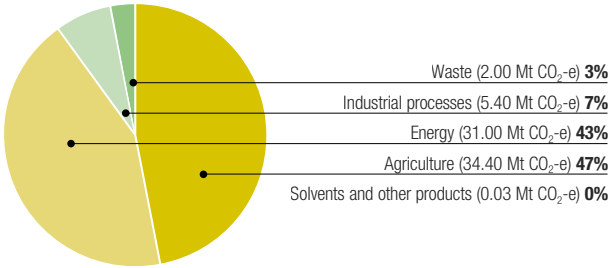
- energy (eg, road transport and electricity production)
- industrial processes (eg, metals, minerals and chemicals)
- solvent and other product use
- agriculture (eg, agricultural soils, enteric fermentation and manure management)
- land use, land-use change and forestry (LULUCF)
- waste.

Agriculture was the largest contributing sector to New Zealand's emissions in 2011. It contributed 34.4 million tonnes of carbon dioxide equivalent (Mt CO₂-e), and comprised 47.2 per cent of total emissions (see figure on the following page). Energy was the second largest sector, contributing 31.0 Mt CO₂-e, 42.6 per cent of total emissions.

Industrial processes, waste, and solvents and other products are smaller sectors, contributing 5.4, 2.0 and 0.03 Mt CO₂-e respectively (making up 7.5 per cent, 2.7 per cent and 0.04 per cent of total emissions respectively).

GREENHOUSE GAS EMISSIONS BY SECTOR

as at December 2011



How much carbon is removed from the atmosphere by New Zealand's forests?

A carbon sink is a natural or human-made reservoir that removes and stores more carbon than it releases. Forests act as a carbon sink as they grow by absorbing carbon dioxide from the atmosphere and storing it in their trunks, branches, leaves and roots.

A key factor affecting the rate at which a forest absorbs and stores CO₂ from the atmosphere is its age. A newly planted forest is slow at removing CO₂, but once established it will enter a period of rapid growth during which it will absorb the most CO₂. Once a forest has reached maturity, its growth slows and the rate at which it absorbs CO₂ decreases.

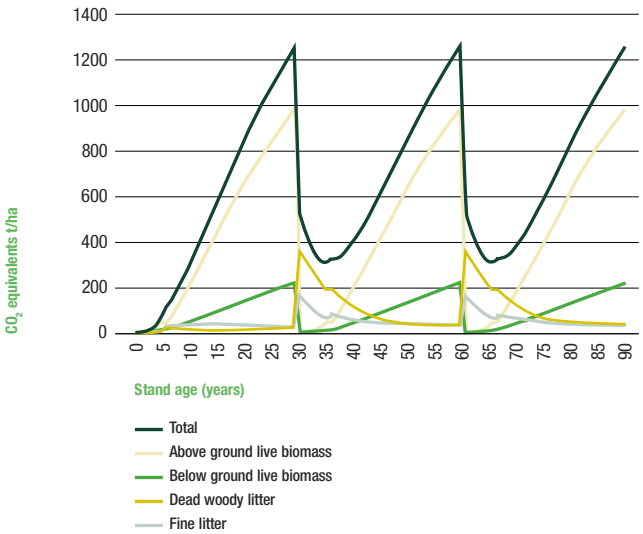
When forests are harvested, they switch from being a carbon sink to a carbon source, releasing carbon into the atmosphere rather than removing it. The speed at which the stored carbon is released from the harvested wood is hard to predict, as it depends on the type of product that the wood is transformed into. Under the first commitment period of the Kyoto Protocol (2008–2012) it is assumed that all the carbon stored in wood is emitted at time of harvest.

Consequently, planting and harvesting cycles have a large impact on the amount of CO₂ removed by our forests.

In 2011, under UNFCCC reporting, New Zealand's net removals from land use, land-use change and forestry (LULUCF) were 13.5 Mt CO₂-e.

Source: MfE: New Zealand's Greenhouse Gas Inventory & Net Position Report 1990-2011
Snapshot April 2013

CARBON YIELD: MULTIPLE ROTATIONS



Growth Modelling region: Waikato Taupo, Latitude 37.8, Altitude 495 m
300 Index 29.0 m³/ha/year, Site index 34.8 m

Source: MPI

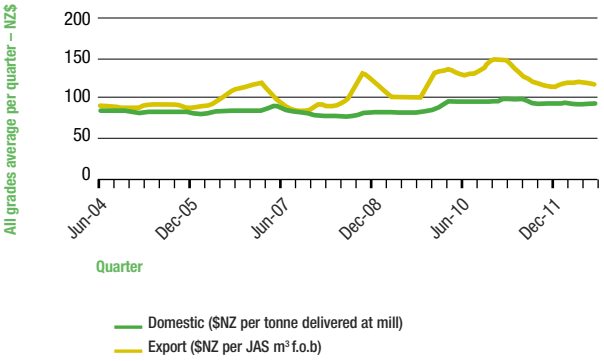
This is the classic sawtooth carbon sequestration graph for a plantation stand. It shows the sequestration and loss of carbon in the system over time. It records the gradual sequestration of carbon in the different layers (leaves, roots and litter) and the assumed release when the crop is harvested. Note the difference in release at harvesting time for the different layers, with a level of carbon being retained as sequestered, despite the crop being harvested.

The graph is for an unpruned stand, harvested age 30, waste thinned at age 6 to 450 spha.

The choice of harvest age is dependent upon the crop owner's principal stand objective (timber, carbon, etc).

Graph shows CO₂ equivalent (CO₂ tonnes = 44/12xCarbon tonnes).

EXPORT AND DOMESTIC LOG PRICING



Source: MPI



LOG PRICING DATA

Log type, pricing point and market	Mar-08	Jun-08	Sep-08	Dec-08
	Quarter	Quarter	Quarter	Quarter
Export (\$NZ per JAS m³ f.o.b)				
Pruned – Japan, Korea	121-165	121-165	122-175	198-216
A Grade – Japan	92-96	93-98	88-103	121-133
J Grade – Japan	80-85	70-84	90	112
K Grade – Korea	76-82	70-87	80-93	106-116
Pulp	45-62	58-62	68-76	75-93
All grades average per quarter	93	90	101	132
Domestic (\$NZ per tonne delivered at mill)				
P1	118-141	118-132	120-130	116-126
P2	92 -107	92-105	93-105	89-109
S1	82-87	81-87	80-87	89-96
S2	57-88	61-85	57-85	78-89
L1 and L2	57-70	57-76	60-69	69-75
S3 and L3	57-69	61-65	57-65	63-67
Run of bush	..	..	..	..
Pulp	40-51	40-55	39-56	41-62
All grades average per quarter	80	80	79	84

* Limited response – very small volume traded

.. Data not available

Source: MPI



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 MANAGEMENT**



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Mar-09	Jun-09	Sep-09	Dec-09	Mar-10	Jun-10	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12	Sep-12	Dec-12
Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter	Quarter
169-206	126-158	125-175	110-172	151-189	154-187	148-219	176-203	179-197	155-181	161-173	146-155	144-513	154-163	153-166	144-190
95-131	95-106	91-104	82-103	129-156	127-144	118-121	114-136	132-144	133-148	123-132	112-122	110-117	110-122	116-118	103-125
116	85	87	74	79	*	*	*	*	*	*	*	*	*	*	*
86-116	85-102	81-99	74-110	98-137	115-140	109-118	106-130	130-148	125-145	108-114	105-112	94-109	104-116	103-110	90-121
56-94	65-86	69-77	65-92	80-116	105-127	103-105	100-120	129-137	110-176	109-118	98-112	87-100	84-111	91-120	79-102
119	103	103	103	132	137	130	136	150	147	130	120	114	121	122	119
116-128	116-135	120-139	121-143	125-145	125-161	125-156	130-154	128-147	130-152	132-152	127-134	120-134	127-170	120-136	122-149
95-107	93-107	93-111	94-114	98-117	104-131	108-127	109-132	110-127	122-130	114-130	111-128	110-127	110-123	111-126	111-123
85-97	84-90	84-92	93-97	88-97	95-102	97-130	97-100	88-98	99-125	99-105	99-103	95-100	95-98	95-102	95-104
75-88	77-87	80-85	82-87	88-91	94-103	89-101	92-102	92-103	86-105	94-108	93-101	88-100	88-97	88-96	90-97
70-76	68-72	65-76	68-83	67-85	73-109	71-99	73-102	72-103	74-115	78-95	76-91	90-110	83-92	80-89	77-96
64-69	64-67	64-75	67-74	72-77	75-84	81-94	80-86	82-92	81-92	82-89	79-87	66-81	76-79	77-80	77-86
..
40-64	40-62	40-59	40-55	43-57	44-57	44-59	46-58	47-57	48-61	49-61	49-54	49-55	49-55	47-49	48-53
84	83	85	86	89	97	97	97	96	101	99	95	95	95	93	95