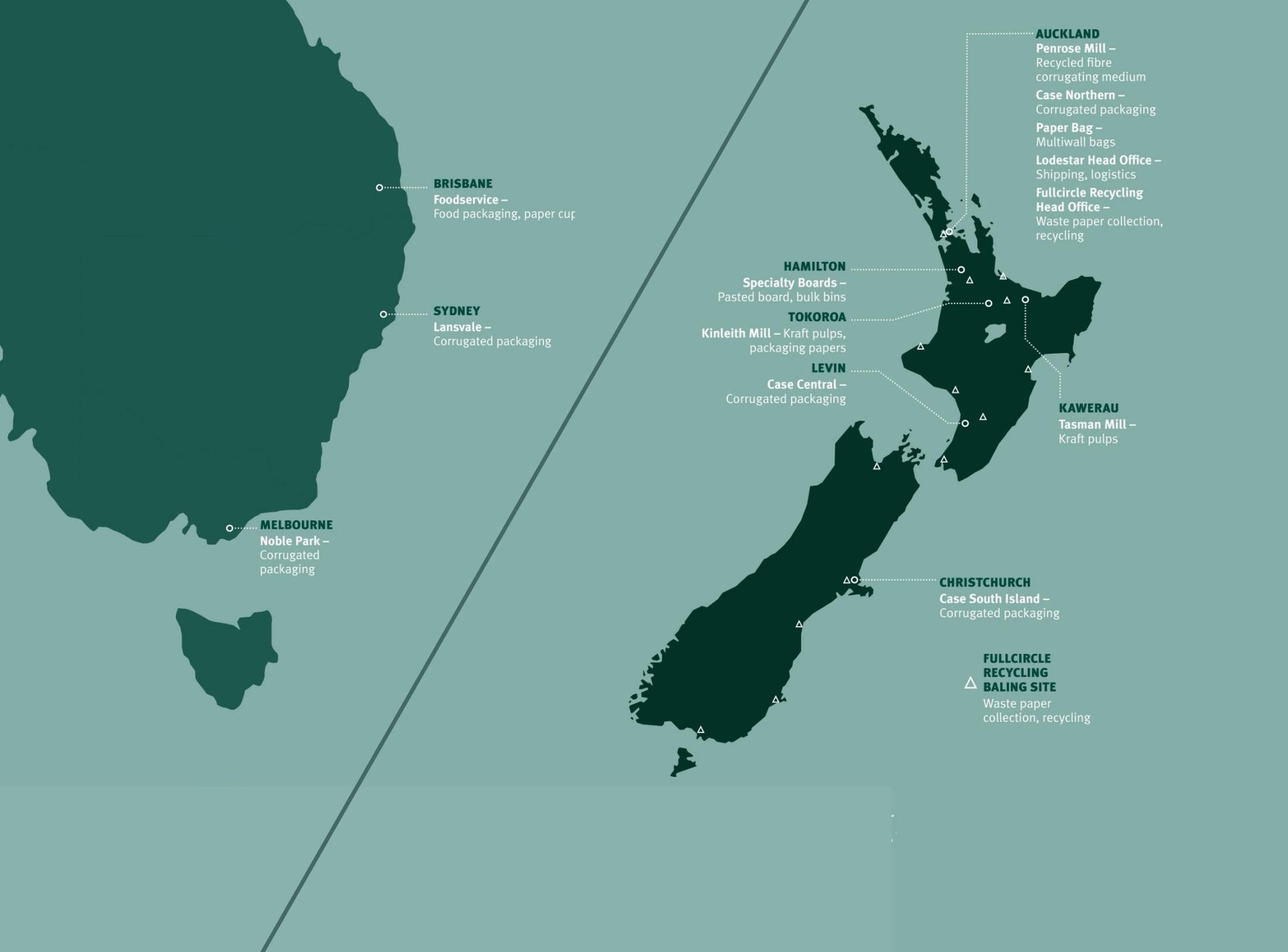


Introduction





BRISBANE
Foodservice –
Food packaging, paper cup

SYDNEY
Lansvale –
Corrugated packaging

MELBOURNE
Noble Park –
Corrugated packaging

AUCKLAND
Penrose Mill –
Recycled fibre
corrugating medium
Case Northern –
Corrugated packaging
Paper Bag –
Multiwall bags
Lodestar Head Office –
Shipping, logistics
Fullcircle Recycling
Head Office –
Waste paper collection,
recycling

HAMILTON
Specialty Boards –
Pasted board, bulk bins

TOKOROA
Kinleith Mill – Kraft pulps,
packaging papers

LEVIN
Case Central –
Corrugated packaging

KAWERAU
Tasman Mill –
Kraft pulps

CHRISTCHURCH
Case South Island –
Corrugated packaging

**FULLCIRCLE
RECYCLING
BALING SITE**
Waste paper
collection, recycling

New Ownership – Late 2014



Beyond the Boundaries

Oji Holdings (60%)

- One of the world's largest pulp & paper companies
- Committed to NZ (e.g. PANPAC)
- An “Innovative Value-Creating Company”



Innovation Network Corporation of Japan (40%)

- Sponsored by the Japanese govt. and Japanese private enterprise
- Promoting innovation and enhancing the value of Japanese businesses

Kinleith Mill

- 650,000 ha of exotic forests within economic distance
- 90km rail link to Port of Tauranga
- Adjacent to water resource



Why Commission this Work?

Keen to be involved with collaborative process

Land-use change is a crucial strategic issue

A response to questions from stakeholders

Working under co-funding agreement with
Waikato Regional Council

Two Simple Questions

- 1. What are the risks to Kinleith of land-use change?**
 - Margules Groome

- 2. How much do different land-uses contribute to the region, considering the full value chain?**
 - Scion



The Studies

Risks to Kinleith Pulp & Paper Mill from Conversion of Forest to Dairy in the Waikato River Catchment



24 July 2015

STUDY OBJECTIVE

To assess and quantify the risks and impacts to the Kinleith Pulp and Paper mill of deforestation occurring predominantly for dairy conversion in the Waikato River Catchment (WRC).

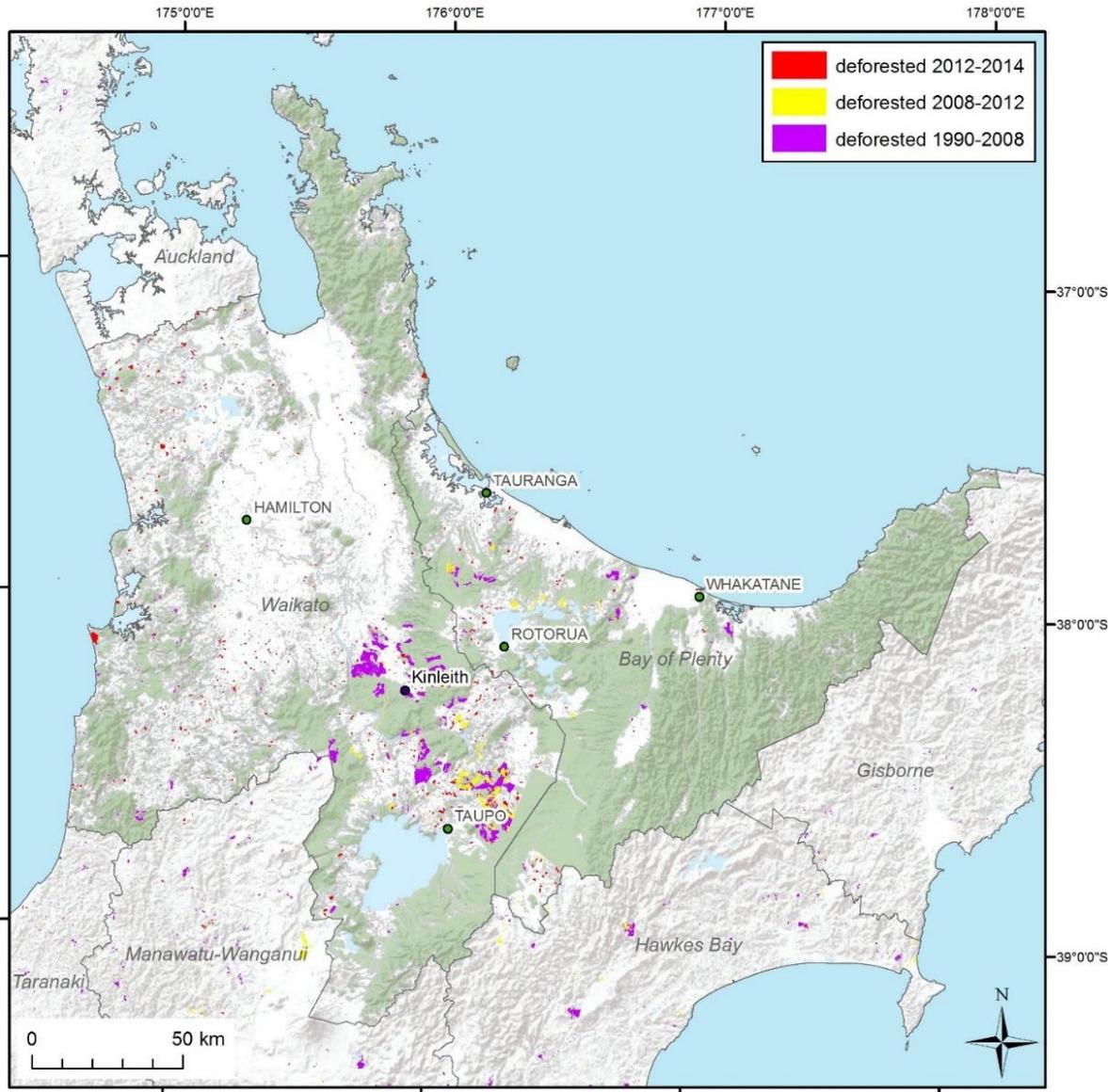
PRECURSORS

The Ministry of Primary Industries delineated Central North Island (CNI) Wood Supply Region is the core of New Zealand's Forest Industry which in total produced over \$5 billion in export receipts in 2014;

The CNI contains the majority of New Zealand's forest products processing infrastructure including pulp and paper mills, sawmills, plywood, remanufacturing plants and panel plants;

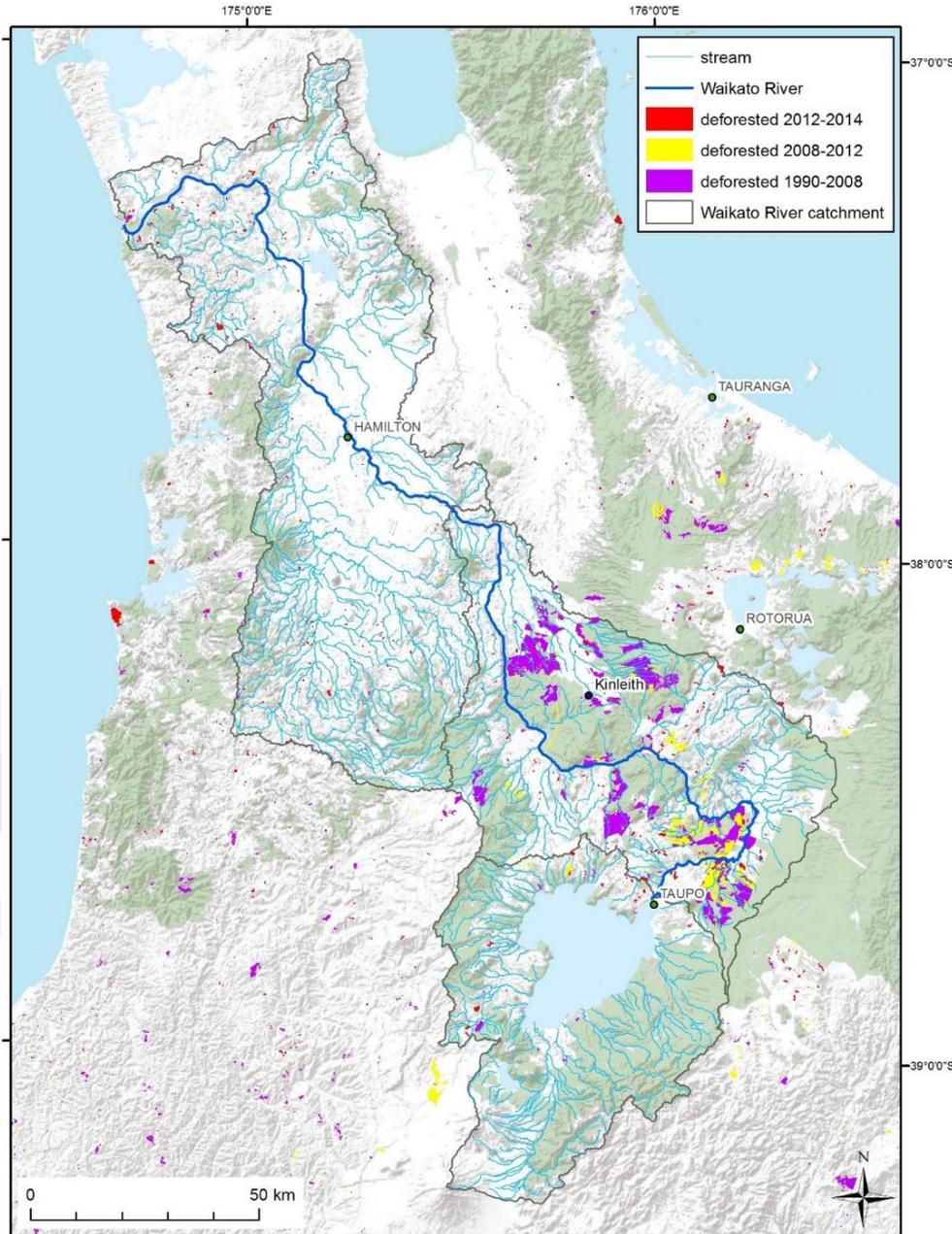
The CNI effectively consists of two regional council jurisdictions, Waikato and Bay of Plenty. The WRC is a part of the Waikato region and provides a major component of the Kinleith mills supply catchment and is of key importance in maintaining an economically viable landed cost of fibre;

DEFORESTATION IN THE CNI 1990 – MARCH 2015

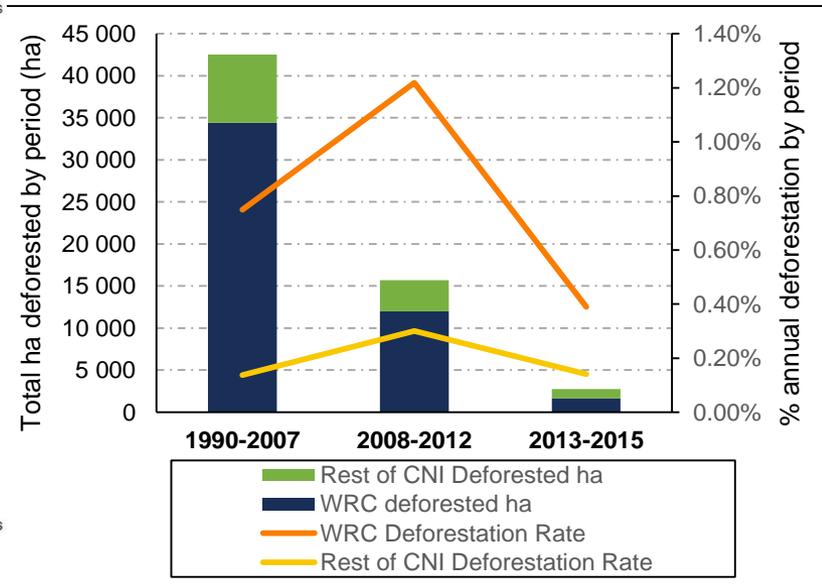


In the total CNI deforestation from 1990 to 2015 amounts to some 61 000 ha or 10% of the estate.

DEFORESTATION IN THE WAIKATO RIVER CATCHMENT



- Most of the deforestation in the CNI (79%), has occurred in the WRC.
- Further, this has been concentrated in the Southern portion of the WRC in Kinleith's primary wood supply catchment.
- This has averaged 2 000 ha/yr or 0.8%/annum.



DEFORESTATION EXPECTATIONS

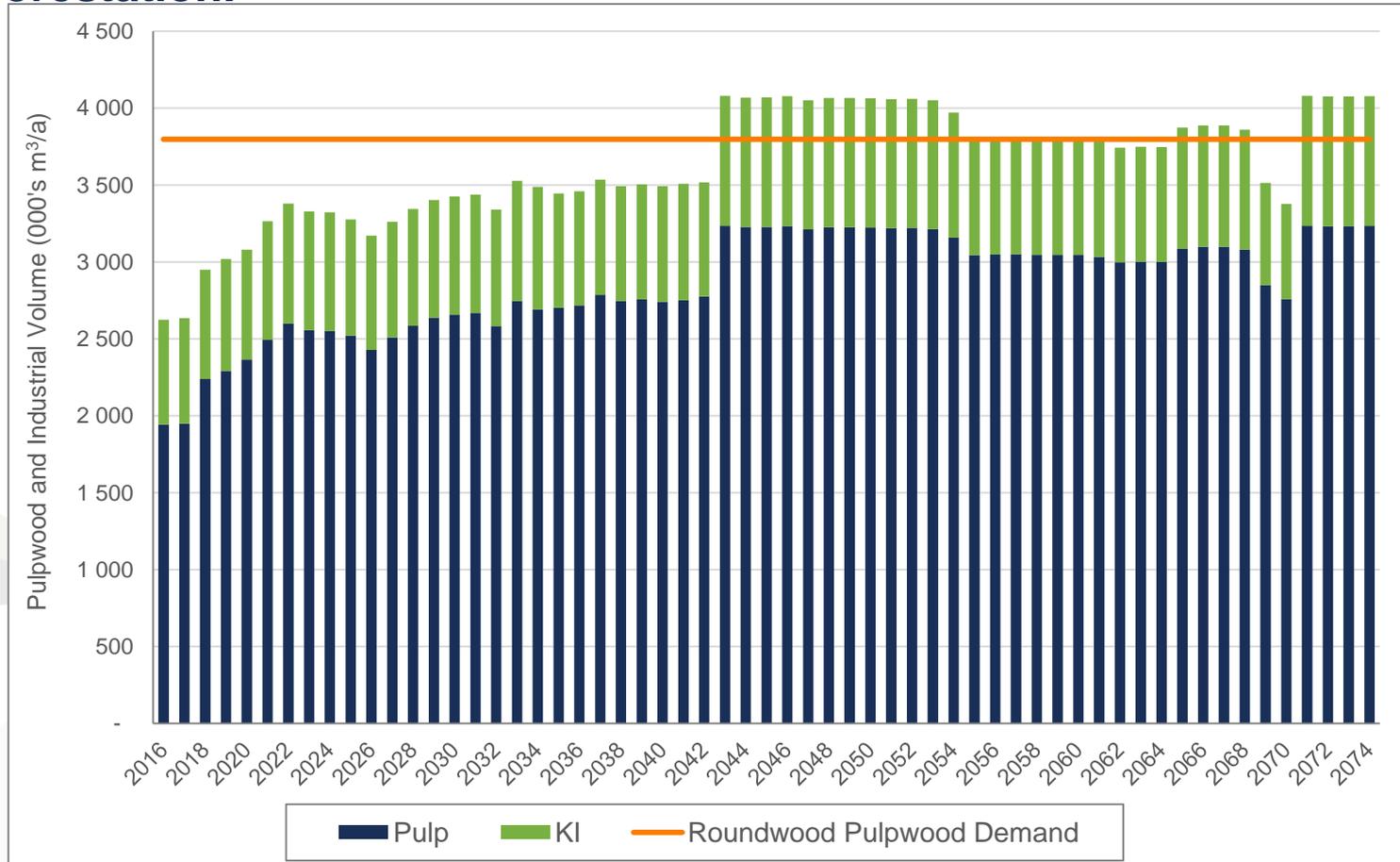
MPI has conducted survey's of forest owner's deforestation intentions since 2005. The CNI has and is expected to have the highest rate of deforestation in the country

Period	Year the deforestation survey was carried out									
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
2005	12	12	12	12	12	12	12	12	12	12
2006	12	13	13	13	13	13	13	13	13	13
2007	12	12	19	20	19	19	19	19	19	19
2008	10	10	8	3	3.5	3	3	3	3	3
2009	10	10	8	3	3.5	3	3	3	3	3
2010	9	10	7	3	3	3	2	2	2	2
2011	9	10	7	2	2	4	3	3	3	3
2012	9	10	7	2	2	3	2	8	7	7
2013	5	7	5	2	2	2	2	7	6	6
2014	5	7	5	2	2	2	2	7	5	8
2015	9	6	7	2	3	2	2	7	6	6
2016	8	6	7	2	2	2	2	7	5	6
2017	8	5	6	2	2	2	2	7	5	6
2018	6	5	5	2	2	2	2	7	5	6
2019	5	5	5	2	2	2	2	7	5	5
2020	5	5	5	2	2	1	2	6	5	5
Deforested 2005 - 2020	122	121	114	62	63	63	61	106	92	98
CNI deforested ha[1]		65	49	35	32	30	29	72	60	66
Land Use Change[2]										
Dairy		55%	63%	63%	63%	65%	78%	86%	86%	91%
Beef/Sheep		31%	29%	29%	29%	8%	8%	9%	10%	6%
Lifestyle		14%	7%	8%	8%	14%	14%	4%	4%	3%
Other			1%			13%		1%		

Source MPI & Margules Groome

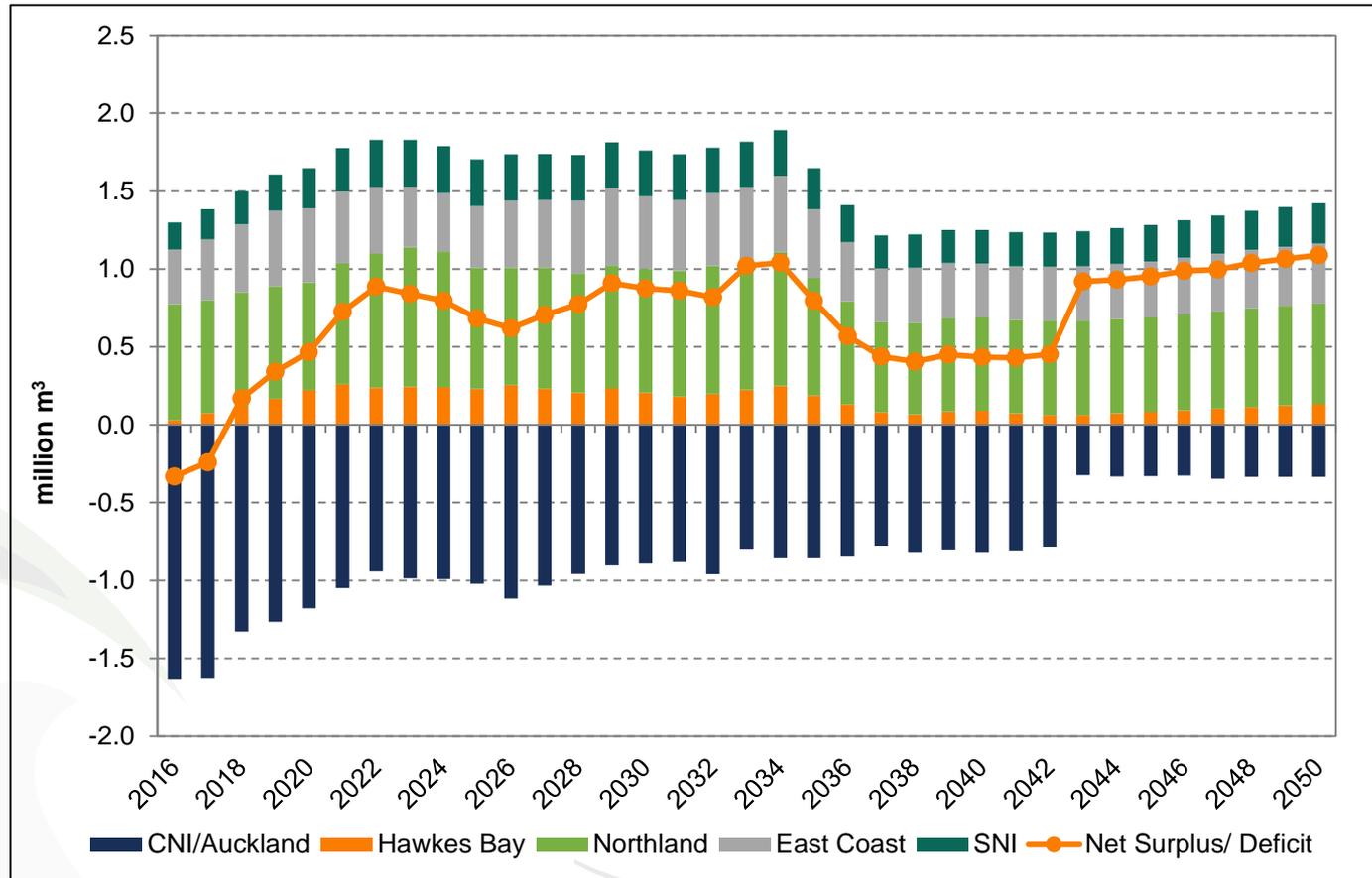
CNI PULPWOOD AVAILABILITY

A deficit in pulpwood availability already exists in the CNI before the impacts of deforestation are taken into account. This makes the CNI industry and Kinleith especially sensitive to any reductions caused by deforestation.



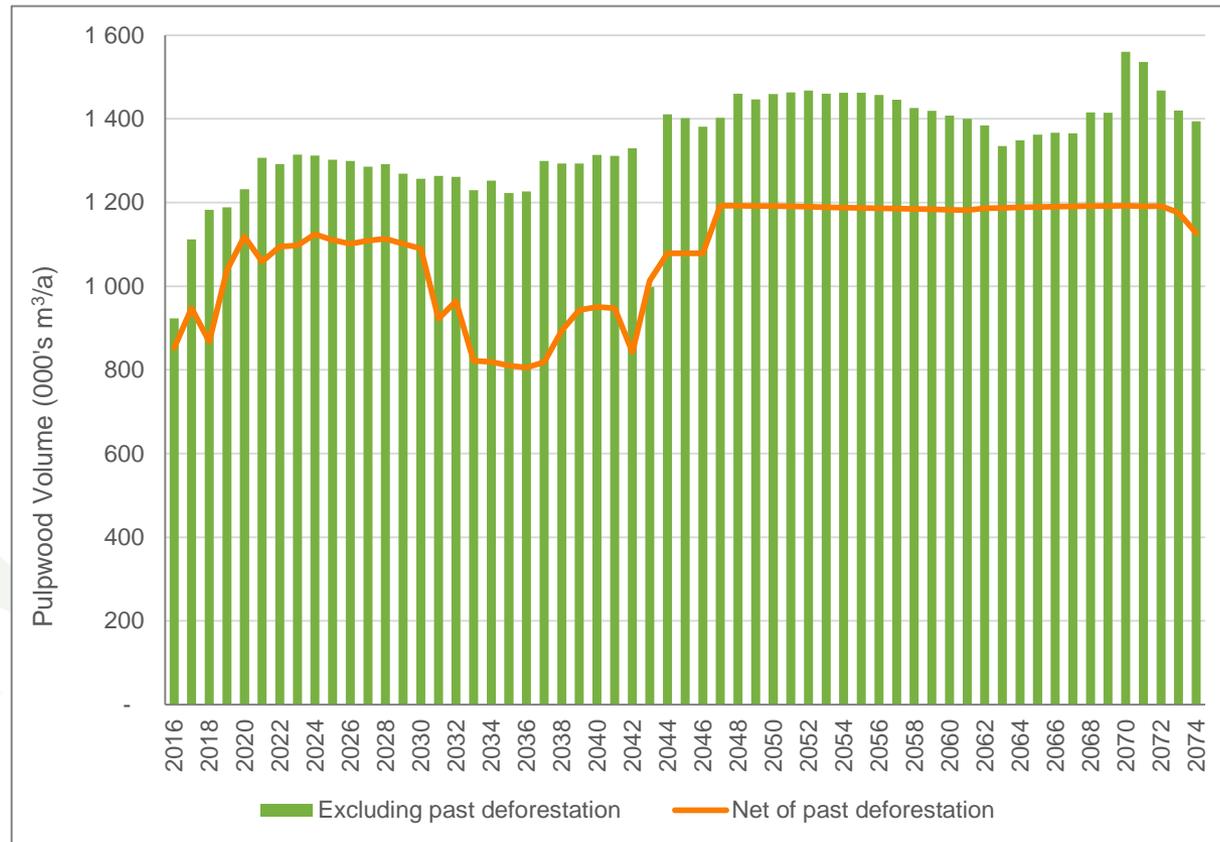
REGIONAL PULPWOOD AVAILABILITY

The hypothetical pulpwood supply surplus/deficit by region shows the major problem that already exists in the CNI even when the Auckland region is included. The deficit can only be satisfied by including distant high cost resources from Hawkes Bay, Northland and the East Coast.



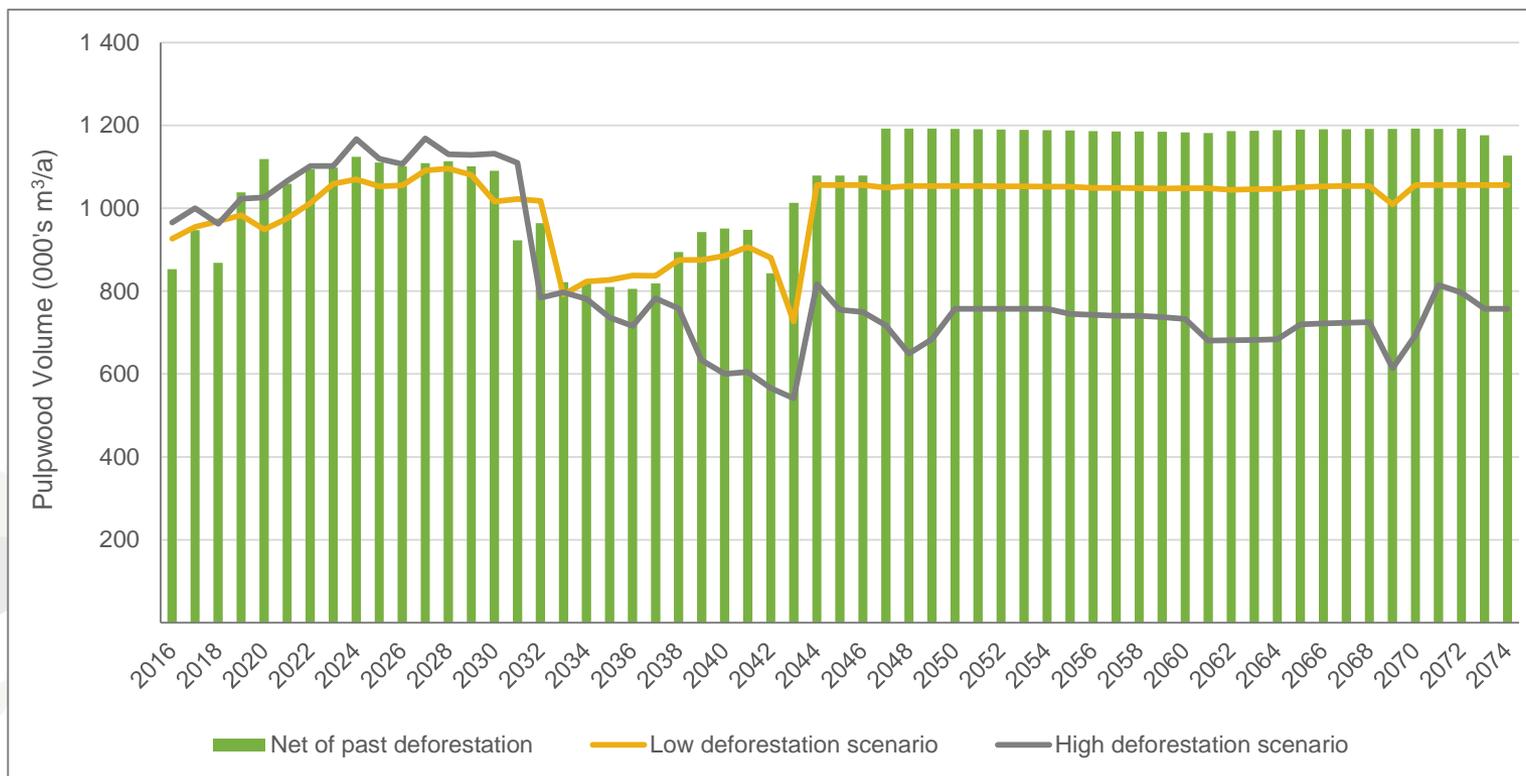
IMPACT OF PAST DEFORESTATION IN THE WRC

The impact of deforestation up to the present on pulpwood availability in the WRC will only begin to manifest from around 2017. From then on, the reduction in availability averages 275 000 m³/annum.



FUTURE DEFORESTATION SCENARIOS IN THE WRC

Future deforestation trends will depend on many factors, therefore two scenarios were examined: Scenario 1 low case where rates of deforestation follow the 2012 to 2015 trend (i.e. around 830 ha/year) and Scenario two higher case where rates similar to the 2008-2012 period occur (3 000 ha/yr).



This corresponds to an average reduction of 98 000 m³ under the low case and 375 000 m³/annum under the high case.

ECONOMIC IMPACT OF PAST DEFORESTATION

As a first step we assumed that the deficit in fibre could be met from the wider CNI and areas peripheral to the WRC. Cost of supply was the compared to the prevailing market price for pulpwood in the CNI (published by AgriHQ).

Area	Delivered Cost \$/m ³	Increase in Cost \$/m ³	% increase in Delivered Cost
Upper Waipa Catchment	60	7	13%
Western Otorohanga	70	17	32%
Western Waikato	65	12	23%
Waitomo	70	17	32%
Stratford	90	37	70%

Assuming supply is available from these areas, the cost of past deforestation to Kinleith is estimated at \$165 million between now and 2050.

ECONOMIC COST OF PAST & FUTURE DEFORESTATION

Realistically, only limited or no incremental volumes of pulpwood could be sourced from within the wider CNI/WRC. Therefore the deficit would need to be met from more distant regions.

Costs of Supply from Wood Surplus Regions

Supply Region	Landed Cost (\$/m3)	Weighting Based on Availability
East Coast	132	30%
Northland	126	50%
Western SNI	99	10%
Average Cost	112	
Average Extra Cost	59	

Supplying volume from areas outside the CNI increases the cost of past deforestation to **\$560 million** and the cost of future deforestation to **\$84 million** for the low deforestation scenario 1 and **\$275 million** for the high deforestation scenario 2.

The combined total impacts then become **\$644 million** and **\$836 million** respectively.

Identifying economic and environmental complementarities between the dairy and forestry industries in the CNI

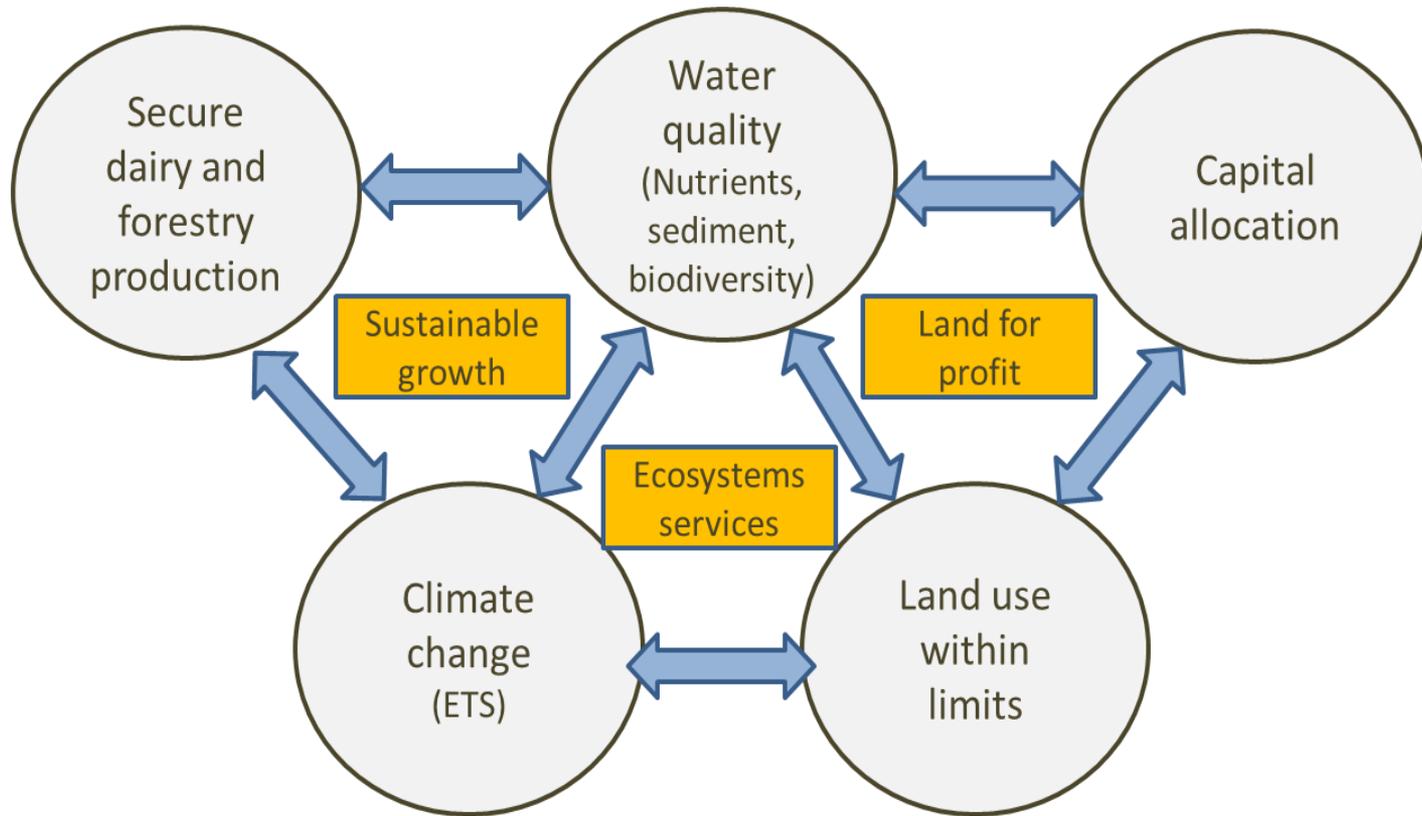
Warren Parker & Juan Monge



'Back of the envelope' insights - 2014

	Forest		Dairy	
Hectares	28,000		26600	grazable
Stocking	550	trees/ha	2.5	cows/ha
Yield/unit	650	m3/ha	380	kg MS/cow
Rotation	28	years	1	seasonal
Total yield	650,000	m3/yr	25,270,000	kg MS/yr
Ave price	90	\$ m3	5.55	\$ payout
Total income	58,500,000	\$ to forest owner	140,248,500	\$ to farmer
Net	35,100,000	\$ stumpsage	39,168,500	\$ EFS
Product	64,760	t pulp	24,268,625	kg whole milk powder
	263,900	green timber m3		
Export price	875	Pulp \$US/t	7.80	\$NZ kg MS
	310	timber \$/m3		
Export \$	172,929,436		189,295,273	
Land value	10,000	\$/ha	36,100	\$/ha
Employment	>300	Kinleith	242	on farm
Nitrogen	140	tonnes/yr	1835	tonnes/yr
Phosphate	?		1290	tonnes/yr
Carbon (GHG)	1003	t stored/ha	6	t GHG/ha/yr emitted

The bigger picture – find ways to exploit sector complementarity to achieve land use within limits and regional growth



Externalities and ecosystem services values

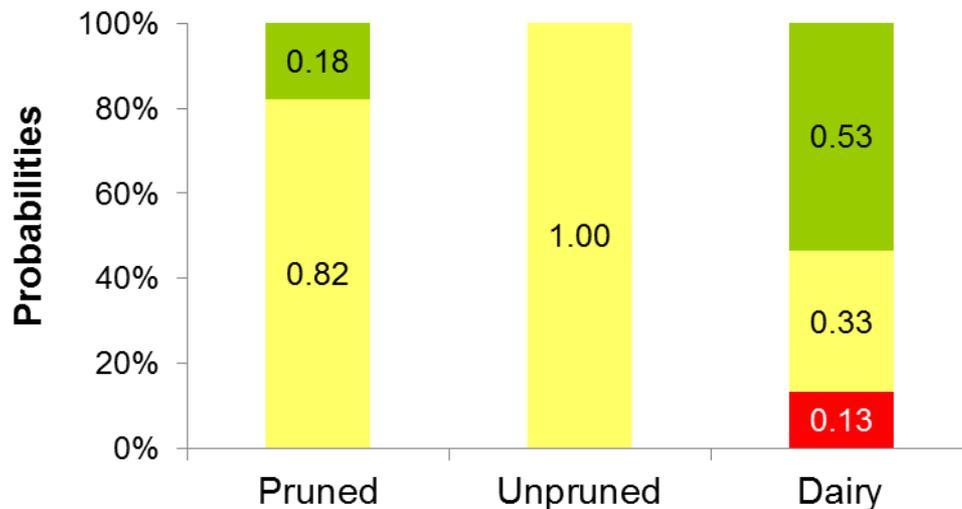
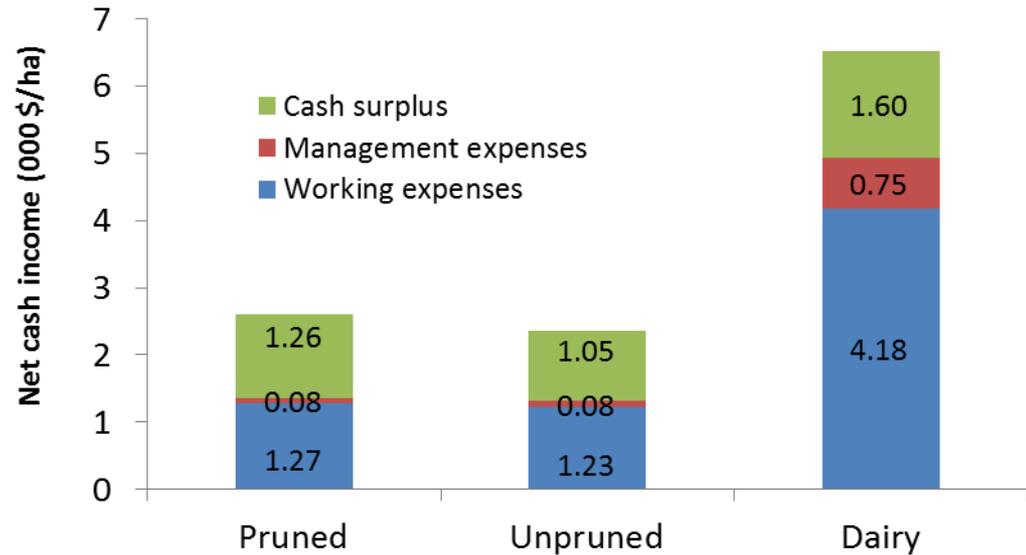
Externalities/Services	Units	Land uses	
		Dairy	Forestry
Quantities			
Nitrogen leaching	kg/ha/yr	15 – 115	3 – 28
Phosphorus leaching	kg/ha/yr	0.30 – 1.70	0.01 – 0.10
GHG emissions	t CO ₂ e/ha/yr	8 – 14	
GHG sequestration	t CO ₂ e/ha/yr		35 – 55
Values			
Carbon	\$/t CO ₂ e		3 - 9
Nitrogen	\$/kg		350 - 650
Flood mitigation	\$/year		1 - 41 million
Biodiversity*	\$/person		69
Recreation*	\$/visit		4 - 92
Land stabilisation* (1% incr)	\$/ha/yr		1
Water sediments*	\$/ha/yr		105
Algae in water*	\$/ha/yr		111
Level of water flow*	\$/ha/yr		12

* Non-market values

Representative profitability and risk (noting dairy is mostly on much better quality land)

Representative:

- steady-state forest in CNI
- dairy farm in Waikato



- Green: surplus > \$1,500
- Yellow: \$0 < surplus < \$1,500
- Red: loss

Complementarity between studies

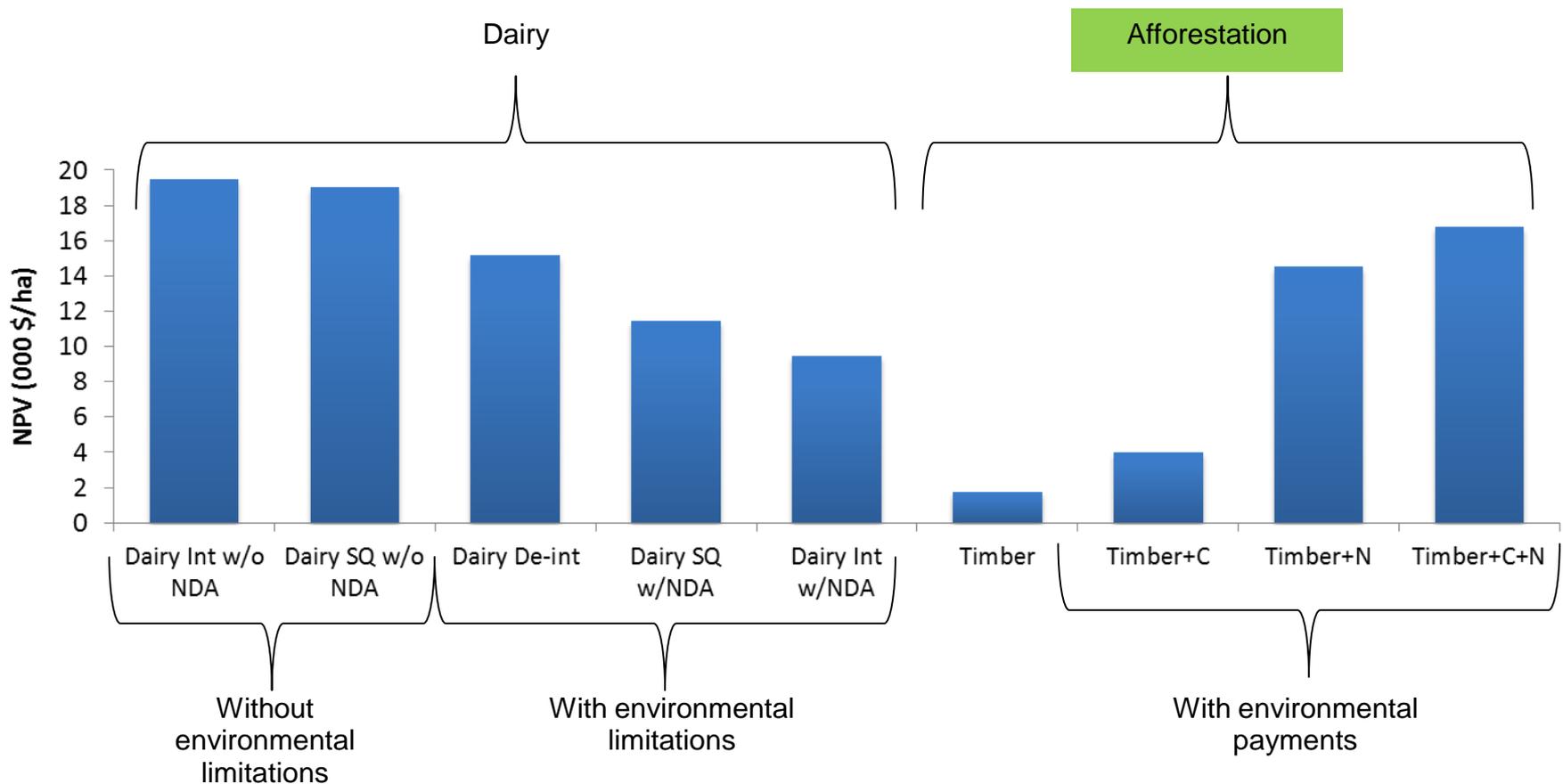
LAM study

- Catchment and farm-level impacts
- Assessment of allowance allocation schemes
- Land-use patterns that comply with limits at least cost
- Based on average product prices

Scion study

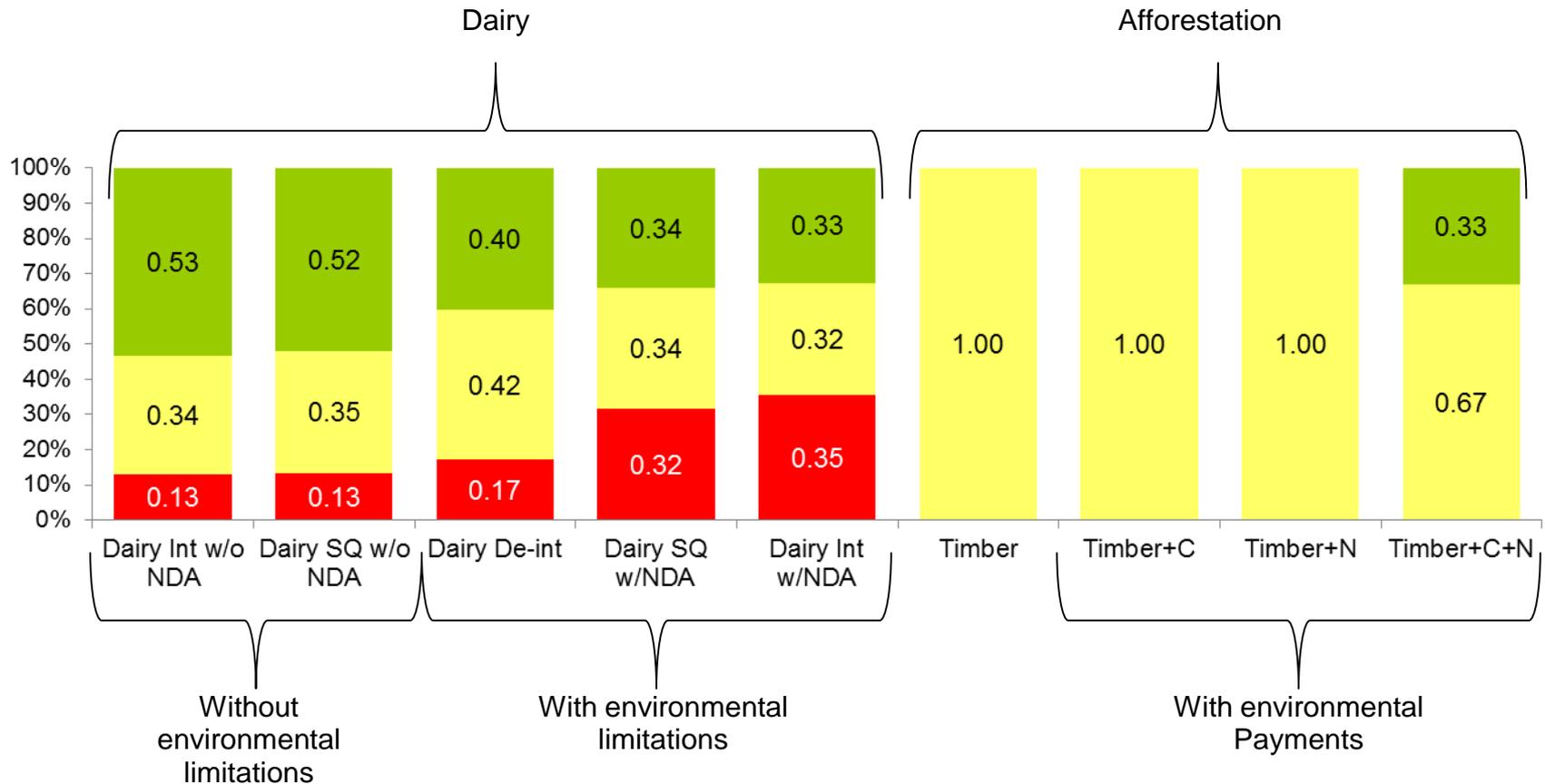
- Dairy and forestry land-use and value chain for CNI deforested land
- Applies proposed limits for dairy and forestry – Rotorua example
- Highlights ecosystem services
- Risk profiles of different land uses; price variability in the last 10 years
- Provided insights to LAM model to strengthen coefficients for forestry and wood processing

Relative profitability under environmental policies (discounted NPV per hectare - 28 years, 8% DR)



Enterprise resilience: effect of 'product price volatility' under different environmental policies

(probability of a surplus $> \$17,000/\text{ha}$; $< \$0/\text{ha}$ or in between)



Internalising externalities (N, GHG) to reflect 'truer' cost of production per hectare changes relative earnings to the regional economy

Nitrogen Price (\$/kg)	Forestry				Dairy w/NDA		
	Carbon Price (\$/NZU)				Intensive	Status Quo	De-intense
	0	6.8	15	25			
0	1,749	3,985	6,681	9,969	19,500	19,065	15,216
25	2,549	4,785	7,481	10,769	18,875	18,590	15,216
50	3,349	5,585	8,281	11,569	18,250	18,115	15,216
100	4,949	7,185	9,881	13,169	17,000	17,165	15,216
200	8,149	10,385	13,081	16,369	14,500	15,265	15,216
300	11,349	13,585	16,281	19,569	12,000	13,365	15,216
400	14,549	16,785	19,481	22,769	9,500	11,465	15,216

'Back of the envelope' updated for C, N, prices

	Forest		Dairy	
Hectares	28,000		26600	grazable
Stocking	550	trees/ha	2.5	cows/ha
Yield/unit	650	m3/ha	380	kg MS/cow
Rotation	28	years	1	seasonal
Total yield	650,000	m3/yr	25,270,000	kg MS/yr
Ave price	90	\$ m3	5.20	\$ payout
Total income	58,500,000	\$ to forest owner	131,404,000	\$ to farmer
Net	35,100,000	\$ stumpage	292,600.00	\$ EFS
Product	64,760	t pulp	24,268,625	kg whole milk powder
	263,900	green timber m3		
Export price(NZ:US0.65)	875	Pulp \$US/t	?	7.80 \$NZ kg MS
	310	timber \$/m3		
Export \$	187,458,923		189,295,273	
Land value	10,000	\$/ha	36,100	\$/ha
Employment	>300	Kinleith	242	on farm
Nitrogen	140	tonnes/yr	1835	tonnes/yr
Phosphate	?		1290	tonnes/yr
Carbon (GHG)	1,003	t stored/ha	6	t GHG/ha/yr emitted
Carbon revenue/payment	244	\$/ha/yr	41	\$/ha/yr
Nitrogen payment			1,088	\$/ha/yr
C+N internalised			1.19	kgMS/yr

Take homes

‘Back of envelope’ was right! Forestry is a profitable (& relatively stable) land use for CNI; more so if full costs of production are accounted for

Export earnings are similar (reflecting CNIs comparative advantage in forest production and considerable forestry and wood products processing infrastructure)

Clear opportunity to exploit sector complementarity to achieve sustainable land use, improved water quality & address climate change

Sector complementarity also occurs in supply chains and associated services sectors (packaging, engineering & machinery) and this provides regional economic & community resilience

Could build on this study to assess capital allocation and ‘N-C trading’ to support development of under-utilised Maori land



Wrap Up

Wrap Up

Study implications from CHHPP's perspective

- 'Costs' are occurring now
- Water limits do not necessarily threaten the economy
- Optimum land-use will give a win-win for water and economy

Proposed next steps

- Detailed reports finalised mid Sept.
- Public release of studies (joint WRC release)