Land-use change from pastoral farming to large-scale forestry Update

August 2022

Orme & Associates Limited

Client Report

Update of land-use change from pastoral farming to large-scale forestry for 1/1/2020 – June 2022

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Figures, Tables and Maps

Executive Summary

Orme & Associates has been commissioned by Beef + Lamb New Zealand to:

REVIEW AND UPDATE the Land Use change on Pastoral Farms report to June 2022.

This report covers the period **1/1/2020 to 30/6/2022** and also includes an updated assessment of properties not recorded in previous reports, due to potential timing issues with settlement dates, and probable effect of COVID-19 restrictions during the latter part of 2020 affecting conditional clauses.

814 rural properties classified as Pastoral or Forestry were identified as transferring to a different owner during the period 1/1/2020 to 30/6/2022. Of these 137 (16%) met the criteria for inclusion in the report as potentially being converted from pastoral to afforestation, compared to 14% recorded in the previous report.

Whole farms identified as purchased for potential afforestation

The period 1/1/2017 to 30/6/2022 results are tabled below:

Whole of Farm Purchase	Year				2021	Q1 & Q2 2022	Grand Total (Hectares)	% by Conversion
	2017	2018	2019	2020				
Honey (Mānuka)	3,039	7,340	1,678	3,313	2,292	-	**17,662**	**10.1%**
Forestry	2,510	11,245	26,198	6,069	11,306	3,895	**61,223**	**34.9%**
Carbon Forestry				13,635	19,717	3,010	**36,362**	**20.7%**
Forestry OIO	1,455	8,982	10,626	15,261	19,136	4,600	**60,060**	**34.3%**
Total Whole of Farm	**7,004**	**27,567**	**38,502**	**38,278**	**52,451**	**11,505**	**175,308**	**100.0%**
Previous Report	**7,004**	**27,567**	**38,502**	**28,159**	**14,246**	**-**	**115,478**	

The results of our review estimate:

1. The gross land area of whole farms purchased in the 1/1/2020 to 30/6/2022 for planting is estimated at **102,234 ha**.
2. Approximately 5,606 ha gross land area is identified for Honey operations, a significant drop on previous % basis.
3. Approximately 36,362 ha gross land area is identified as purchased by a likely (Long Rotation) Carbon Entity.
4. Approximately 38,997 ha gross land area is identified through the OIO process.
5. The balance of 21,270 ha gross land area is assumed to be from domestic purchasers interested in both production forestry and carbon options.
6. The data was based on sales that could be verified during the stated period.

NB. Total gross land area is 102,234 ha or 102,235 ha, due to rounding variances with different data/tables.

Emerging trends

LUCAS 2016-layer summary

Analysis of the 2016 LUCAS layers of the properties identified since the last report suggest:

LUCAS 2016 Layer	Cropland - Annual	Grassland - High producing	Grassland - Low producing	Grassland - With woody biomass	Natural Forest	Planted Forest - Pre 1990	Post-1989 Forest	Wetland - Open water	Wetland - Vegetated non forest	Grand Total (Hectares)
North Auckland		4,312	95	153	1,143	82	84	5	11	**5,884**
South Auckland		5,422	2,915	228	1,665	46	39	2		**10,318**
Hawkes Bay	0	6,833	4,921	522	258	210	343	14	7	**13,113**
Gisborne		1,211	2,784	325	275	200	1,154	4	1	**5,955**
Taranaki		1,253	2,997	113	1,622	327	120	1		**6,434**
Wellington		5,327	12,950	1,970	3,673	914	2,404	21		**27,259**
Marlborough		37	1,208	311	435	10	545	0		**2,546**
Nelson		367	374	28	238	21	118	1		**1,146**
Canterbury		666	2,426	474	203	43	547	1		**4,360**
Otago	0	5,219	8,584	3,167	1,682	691	522	2	94	**19,960**
Southland		1,726	2,535	321	643	13	14	4	3	**5,261**
Grand Total	**0**	**32,373**	**41,788**	**7,613**	**11,837**	**2,557**	**5,890**	**54**	**117**	**102,235**
% 2020-2022	0.0%	31.7%	40.9%	7.4%	11.6%	2.5%	5.8%	0.1%	0.1%	**100%**
% 2017-2020	0.0%	24.2%	41.2%	6.7%	16.1%	2.5%	8.9%	0.1%	0.0%	**100%**

72.6% (vs 65.4% in the 2017-20 period) of the whole farms sold into forestry, were in clear pasture,

7.4% (6.7%) in potentially reverting country, and

19.9% (27.5%) in either exotic or indigenous forest species.

This would appear to indicate a shift in the overall characteristics of the land changing hands from the initial reporting period (2017-2020).

LUC classification summary

Further analysis of properties in this sample found that:

Region	Land Use Classification (LUC) Band								Grand Total (Hectares)
	2	3	4	5	6	7	8	Other	
North Auckland	0	36	428		4,830	589			**5,884**
South Auckland	32	533	512	18	7,729	1,476	18		**10,318**
Hawkes Bay	60	469	326		9,702	2,473	82		**13,113**
Gisborne	27	77	67		1,975	3,695	112	3	**5,955**
Taranaki		60	663	93	3,180	2,318	120		**6,434**
Wellington	36	574	455	230	14,747	11,039	174	4	**27,259**
Marlborough		0	36		2,240	244	25	1	**2,546**
Nelson			25		462	510	149		**1,146**
Canterbury		368	381		2,745	833	7	26	**4,360**
Otago	6	1,454	5,075	2,512	10,279	630		4	**19,960**
Southland	46	361	942		3,912				**5,261**
Grand Total	**207**	**3,931**	**8,910**	**2,853**	**61,801**	**23,807**	**687**	**38**	**102,234**
% 2020-2022	0.2%	3.8%	8.7%	2.8%	60.5%	23.3%	0.7%	0.0%	**100%**
% 2017-2020	0.1%	3.1%	5.4%	0.9%	52.0%	36.7%	1.7%	0.1%	**100%**

84.5% (90.4%) in our assessment of land being identified for conversion, since the initial report, is land of LUC 6 and above,

60.5% (52.0%) of the area is in LUC 6,

23.3% (36.7%) in LUC 7 and 0.7% (1.7%) in LUC 8,

Classes 2-5 have increased from 9.5% to 15.5%.

Although a small shift in LUC from 7 to 6, when combined with the changes in the both the ESC and LUCAS classifications, it appears to signal more productive land in the market being purchased for afforestation purposes.

Erosion Susceptibility Classification summary

Region	Erosion Susceptability Class (ESC)					Grand Total (Hectares)
	Low	Moderate	High	Very High	Other	
North Auckland	1,148	4,068	609	59		**5,884**
South Auckland	3,074	6,687	547	9		**10,318**
Hawkes Bay	2,272	6,825	3,126	889		**13,113**
Gisborne	261	1,885	1,054	2,752	3	**5,955**
Taranaki	919	3,077	1,401	1,037		**6,434**
Wellington	5,237	11,982	8,418	1,619	3	**27,259**
Marlborough	2,276	244	25		1	**2,546**
Nelson	487	389	270			**1,146**
Canterbury	2,845	1,481	7		24	**4,360**
Otago	15,592	4,364			4	**19,960**
Southland	5,243	18				**5,261**
Grand Total	**39,354**	**41,019**	**15,458**	**6,365**	**29**	**102,234**
% 2020-2022	38.5%	40.1%	15.1%	6.2%	0.0%	**100%**
% 2017-2020	28.2%	35.8%	26.0%	9.9%	0.0%	**100%**

1. Introduction

Orme & Associates was originally commissioned by Beef + Lamb New Zealand to:

"Update and track the amount of land that has been or will be planted into exotic plantation species in the near future that is likely to take land out of pastoral production".

A refresh has been requested and specifically concerning a full 2021 year and any up-to-date 2022 data.

A review back to the beginning of 2020 was also conducted to ensure all sales were identified where settlement was potentially deferred for a variety of reasons, including COVID 19 issues, this resulted in an additional 10,119 hectares being identified as being "sold" in 2020.

The project initially involved a comprehensive review of available land-use-change data, to provide up-to-date statistics on the areas of land being from converted from pastoral farming into forestry under different ownership models, grant programmes and owner objectives for the period 1/1/2017 to 31/12/2020. This was tabled as the *"Land-use change from pastoral farming to large-scale forestry"* prepared through BakerAg.

To provide a benchmark for 'whole of farm' purchase we analysed all sales of 250 ha or more to be consistent with the process of the original report.

Plantable area (effective forest land) was calculated using the LUCAS layer classifications to identify pastoral land available to change on each property, again consistent with the initial report methodology.

Land Use Capability (LUC) Classification was obtained by intersecting the property titles identified with the NES layer.

When combined with the updated sales information from this current report, the table including original data from 2017 to 2019 and updated data from 1/1/2020 to 30/6/2022 is represented as below:

Whole of Farm Purchase	Year				2021	Q1 & Q2 2022	Grand Total (Hectares)	% by Conversion
	2017	2018	2019	2020				
Honey (Mānuka)	3,039	7,340	1,678	3,313	2,292	-	**17,662**	**10.1%**
Forestry	2,510	11,245	26,198	6,069	11,306	3,895	**61,223**	**34.9%**
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Forestry OIO	1,455	8,982	10,626	15,261	19,136	4,600	**60,060**	**34.3%**
Total Whole of Farm	**7,004**	**27,567**	**38,502**	**38,278**	**52,451**	**11,505**	**175,308**	**100.0%**
Previous Report	**7,004**	**27,567**	**38,502**	**28,159**	**14,246**	**-**	**115,478**	

Table 1: Updated data for whole farms and partial farm new planting areas

Below is the summary table from the previous report which also included 1BT and Crown Forestry JV figures.

Whole of Farm Purchase	Year				Q1 & Q2 2021	Grand Total (Hectares)	Percentage by Conversion
	2017	2018	2019	2020			
Honey (Mānuka)	3039	7340	1678	3295	2641	17993	15.6%
NZ Sales	2510	11245	26198	19104	7496	66553	57.6%
OIO	1455	8982	10626	5760	4109	30932	26.8%
Total Whole of Farm	7004	27567	38502	28159	14246	115478	100.0%
Partial farm plantings by Landowner through 1BT/JV							
1BT Landowner Grant		12,124 Indigenous + 13,434 Exotic			0	25560	66.8%
Crown Forestry JV		21,822 original - 9,144 cutover			0	12678	33.2%
Total Partial farm funded	47382					38238	100.0%
Totals						153716	

2. Methodology

Once again, a review of land sales recorded through real-estate records was undertaken for the period 1/1/2020 to 30/6/2022. This was then compared to properties previously recorded and also the OIO website to cross reference and identify any omissions or time delays and actual sales dates recorded, where available.

To note - In the November 2021 report, groupings were - Honey (Manuka), NZ Sales, OIO and based on sales by year. For this report we have expanded the groupings to – Honey, Carbon Forestry, Forestry, Forestry OIO and broken-down sales by quarter.

OIO areas have been further refined to reflect the areas of pastoral land potentially converted rather than the gross areas referred to in the OIO decisions.

There appears to have been a significant lift in property transactions intended for afforestation, based on the interpretation of the data, with a revised jump in settled transactions in 2020 from previously reported 28,159 hectares to 38,278 hectares. Quarterly figures also appear to indicate a trend for sales being recorded in the 4th quarter in both 2020 and 2021.

Entity	2020				2021				2022		Grand Total (Hectares)	% by Conversion	
	Qtr1	Qtr2	Qtr3	Qtr4	Qtr1	Qtr2	Qtr3	Qtr4	Qtr1	Qtr2		2020-2022	2017-2020
Carbon	2,309	1,286	1,608	8,432	3,802	305	3,340	12,269	3,010		**36,362**	**36%**	**58%**
Forestry	2,387	1,639	638	1,404	1,862	3,741	3,076	2,627	3,550	345	**21,270**	**21%**	
Honey				3,313	2,292						**5,606**	**5%**	**16%**
OIO		4,044	1,890	9,327	4,768	1,682	2,702	9,984		4,600	**38,997**	**38%**	**27%**
Total	**4,696**	**6,970**	**4,137**	**22,476**	**12,724**	**5,729**	**9,118**	**24,880**	**6,560**	**4,944**	**102,234**	**100%**	**100%**
Grand Total	**38,278**				**52,451**				**11,505**		**102,234**	**100%**	

Table 2: Land sale data from 01/01/20 to 30/06/22

Sales that showed up as having been completed within the 2020 year but were not included in the initial November report, have been included in this analysis, as have updated numbers for the full 2021 year, which indicates a leap to 52,451 hectares. This confirms previous expectations that there was a delay in the finalising of sales affecting a more correct representation of the sales transactions.

Area of farms converted for harvest forest by region

The table below records the updated sales for the 2020-2022 sales period and compares against the % of sales by district recorded for the period 2017-2020 in the previous report.

Region	Sales by District (hectares and %) 2020-2022		2017-2020	% Change of area sold
North Auckland	5,884	6%	4%	**+8%**
South Auckland	10,318	10%	4%	
Hawkes Bay	13,113	13%	10%	**+5%**
Gisborne	5,955	6%	4%	
Taranaki	6,434	6%	4%	**-17%**
Wellington	27,259	27%	46%	
Marlborough	2,546	2%	6%	**-5%**
Nelson	1,146	1%	2%	
Canterbury	4,360	4%	4%	
Otago	19,960	20%	16%	**+8%**
Southland	5,261	5%	1%	
Grand Total	**102,234**	**100%**	**100%**	

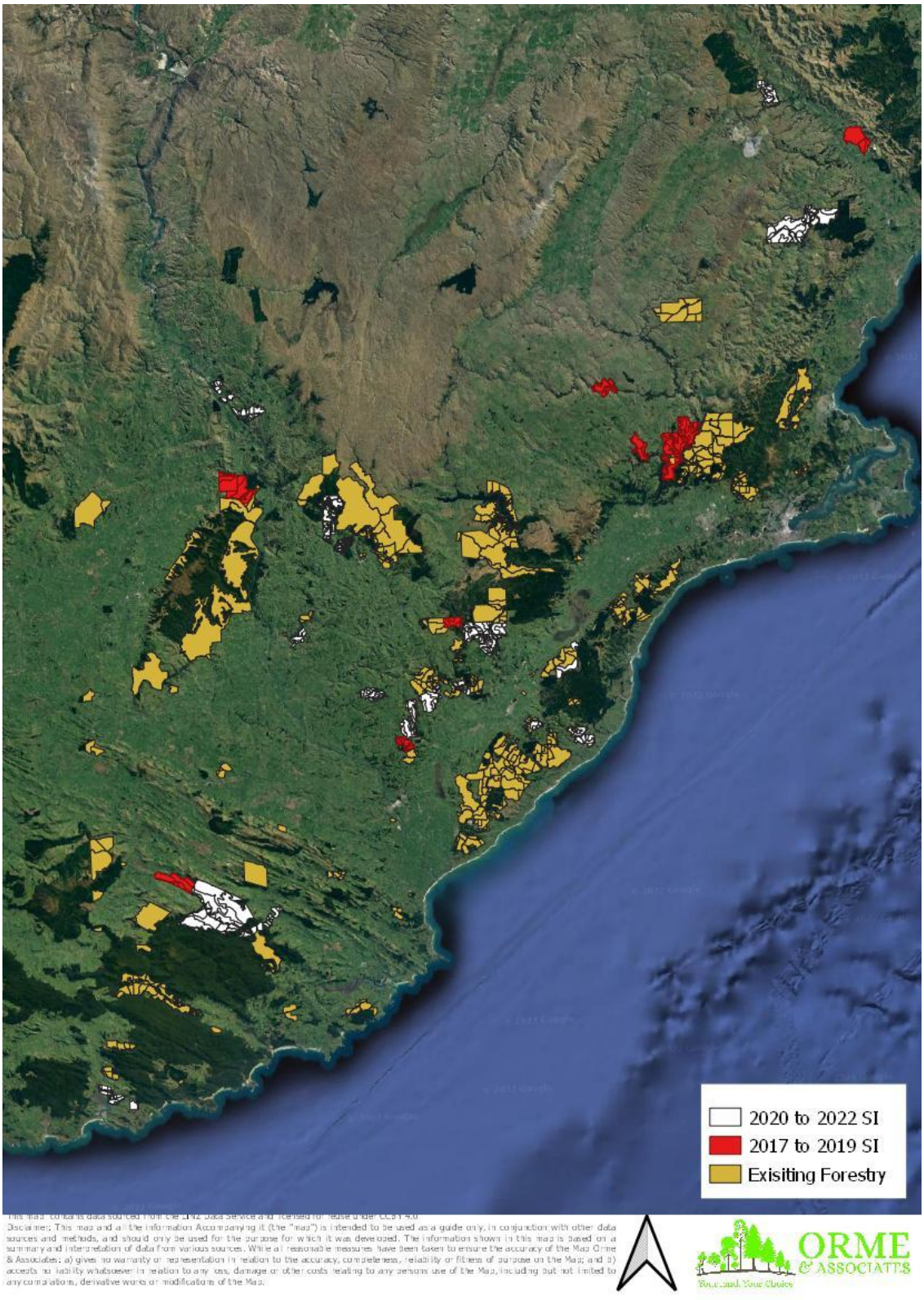
Table 3: Land sale by district data from 01/01/20 to 30/06/22

As can be seen there appears to be a shift away from the lower North Island/Wairarapa area on a percentage basis, with opportunities being developed in Northland and the southern South Island.

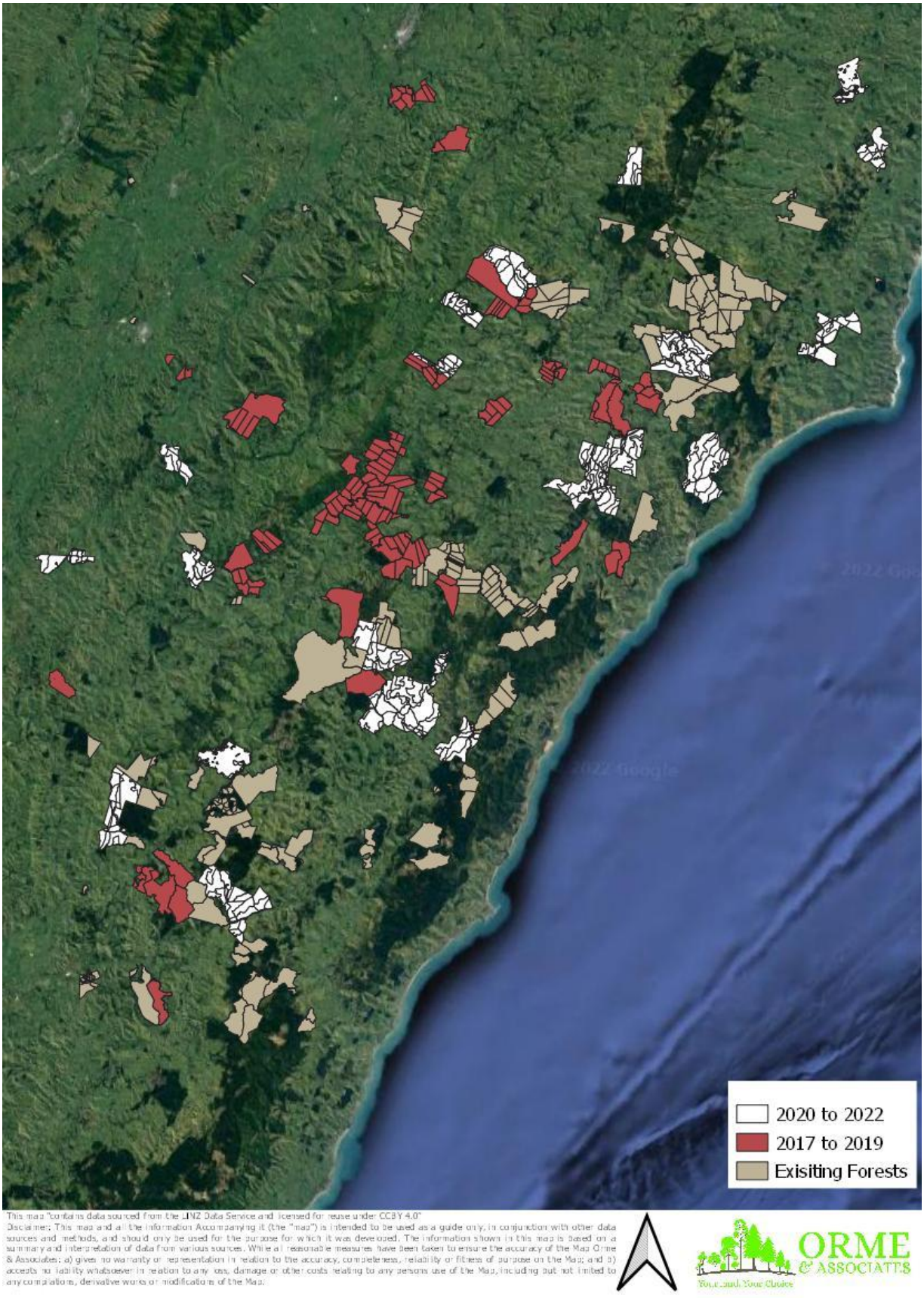
Maps of land acquisitions

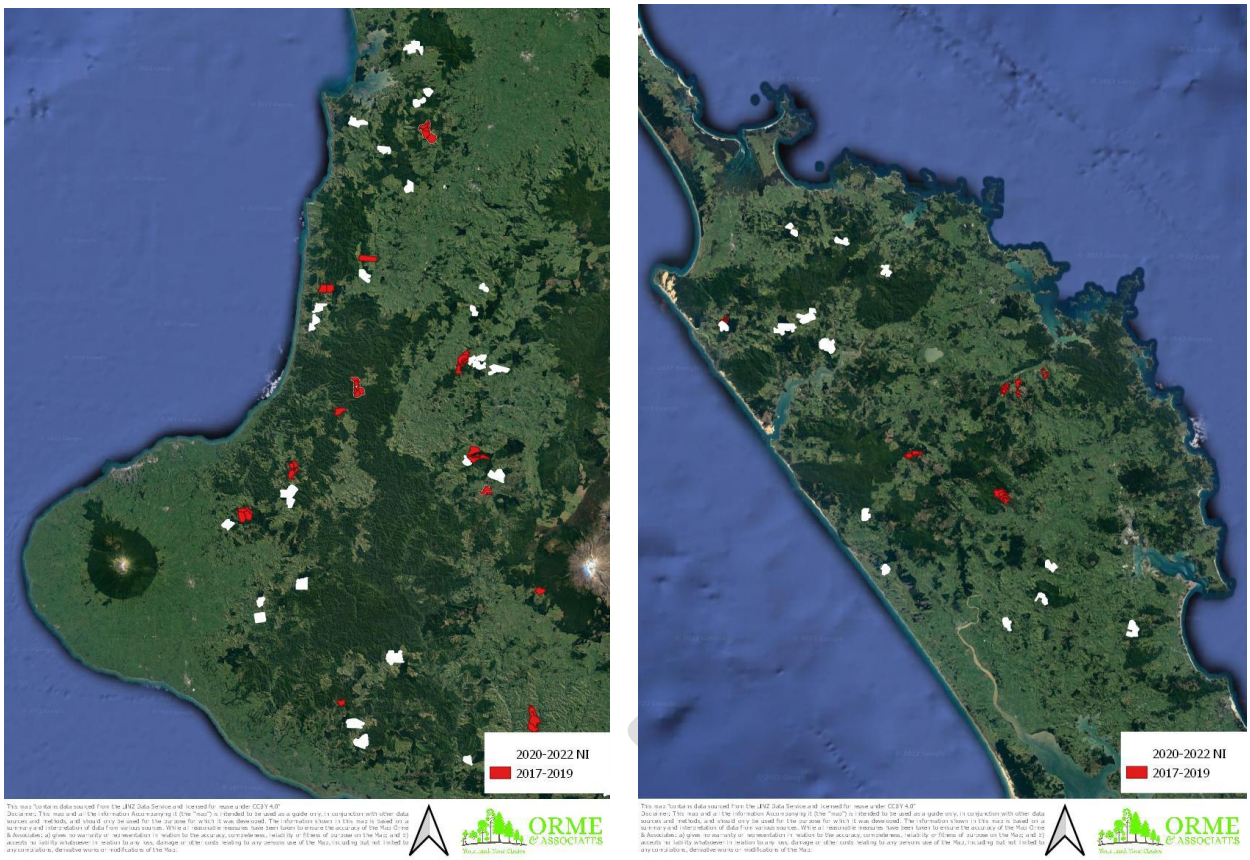
Indicative Regional maps of all properties identified in this review are included in the Appendices.

The maps show that in the South Island, initial land acquisitions identified for forestry were generally widely scattered, however, as additional properties change hands there appear to be clusters and natural groupings starting to emerge in the Otago region. Additional sales earlier reported in the OIO summaries that were expected to add to this pattern, have become apparent.



In contrast, the North Island map, which had showed some major clusters of properties in the initial report (especially around existing afforestation areas) that were likely to be converted from sheep and beef farming to forestry, has seen a spreading of the sales pattern into other regions notably Northland and the greater Taranaki/Waikato Region.





This latest round has seen an increase in areas changing hands in the South Island, potentially due to lower land costs and less competition for the land, on an increase in the total land changing hands for potential afforestation.

Area of farms converted native vs. exotic plantings

Unfortunately, this level of detail is not able to be identified from the sales information. There is additional information and detail included in most OIO decisions, however, on a broader scale, this cannot be identified.

In general, discussions within excess of 100 existing landowners visited during the course of the last year, has indicated that, wherever possible, they would have a preference to establish indigenous species. However, the cost of establishment and pest control in general, makes large scale conversion to natives uneconomic without any additional support since the closing of the One Billion Trees (1BT) fund.

It is critical that if there is a serious desire to encourage the establishment of natives on farm, that some form of assistance must be provided.

3. Land Type Affected

3.1 Areas of land being converted to forestry by LUC Class

We analysed the Land Use Capability (LUC) Classification data for properties identified in several ways, including by owner and by region.

The LUC system is an assessment of the land's capability for use, which '*takes into account its physical limitations and its versatility for sustained production*'.

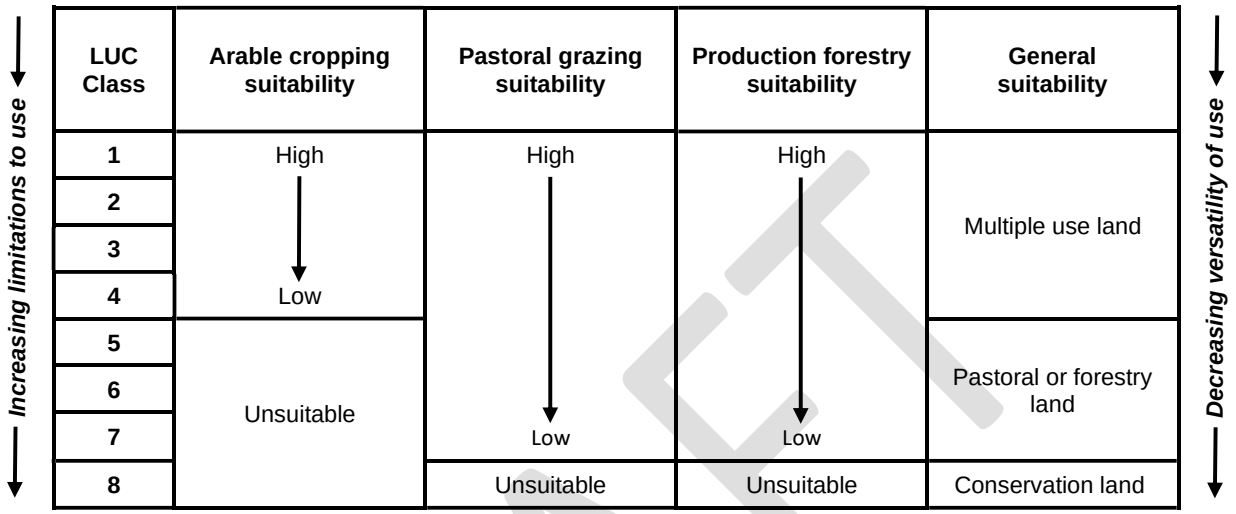


Figure 1: Increasing limitations to use and decreasing versatility of use from LUC Class 1 to LUC Class 8

Land Use Capability (LUC) Classification and **Erosion Susceptibility Classification (ESC)** layers were intersected on top of the property title layers. This again produced a data set with accurate estimates of the areas of land in different LUC and ESC classes on all the properties identified for the period concerned.

Region	Land Use Classification (LUC) Band								Grand Total (Hectares)
	2	3	4	5	6	7	8	Other	
North Auckland	0	36	428		4,830	589			**5,884**
South Auckland	32	533	512	18	7,729	1,476	18		**10,318**
Hawkes Bay	60	469	326		9,702	2,473	82		**13,113**
Gisborne	27	77	67		1,975	3,695	112	3	**5,955**
Taranaki		60	663	93	3,180	2,318	120		**6,434**
Wellington	36	574	455	230	14,747	11,039	174	4	**27,259**
Marlborough		0	36		2,240	244	25	1	**2,546**
Nelson			25		462	510	149		**1,146**
Canterbury		368	381		2,745	833	7	26	**4,360**
Otago	6	1,454	5,075	2,512	10,279	630		4	**19,960**
Southland	46	361	942		3,912				**5,261**
Grand Total	**207**	**3,931**	**8,910**	**2,853**	**61,801**	**23,807**	**687**	**38**	**102,234**
% 2020-2022	0.2%	3.8%	8.7%	2.8%	60.5%	23.3%	0.7%	0.0%	**100%**
% 2017-2020	0.1%	3.1%	5.4%	0.9%	52.0%	36.7%	1.7%	0.1%	**100%**

Table 4: Summary of all LUC areas due for conversion to forestry

When compared to the LUC percentages from the initial report, a subtle change in the classification is starting to emerge with an increase in Class 4 and 5 land showing up on the table, an increase in Class 6, and a subtle reduction in Class 7 land being involved.

It is also interesting to see that the traditional “carbon” and “honey” companies still favour land with less productive classifications. Some subtle changes in OIO purchased properties, and farms traded by non “carbon” entities shows a marked increase in Class 4 land being involved.

More detail about whether the better class of land is being on sold to farming interests has been anecdotally reported but at this stage cannot be quantified.

Entity	LUC Layer								Grand Total (Hectares)
	2	3	4	5	6	7	8	Other	
Carbon	0%	2%	4%	0%	64%	28%	1%	0%	**36,362**
Forestry	0%	6%	17%	0%	61%	15%	1%	0%	**21,270**
Honey	0%	3%	4%	2%	44%	46%	2%	0%	**5,606**
OIO	0%	4%	9%	7%	59%	20%	0%	0%	**38,997**
Grand Total	**207**	**3,931**	**8,910**	**2,853**	**61,801**	**23,807**	**687**	**38**	**102,234**
% of Total	**0%**	**4%**	**9%**	**3%**	**60%**	**23%**	**1%**	**0%**	**100%**

Table 5 shows the areas of land by region under the different ESC categories going into forestry.

Here we see a more even split between land in the three main ESC classes – low, moderate, and high, with only a small percentage of 'very high' (i.e. highly erodible land) being destined for planting (down to 6% from previously reported 10%).

This represents a slight departure from the previous 4-year profile possibly reflecting a reduction in 'harder' farmland for sale and the increases in price making the next tier of farms to be traded.

Region	Erosion Susceptability Class (ESC)					Grand Total (Hectares)
	Low	Moderate	High	Very High	Other	
North Auckland	1,148	4,068	609	59		**5,884**
South Auckland	3,074	6,687	547	9		**10,318**
Hawkes Bay	2,272	6,825	3,126	889		**13,113**
Gisborne	261	1,885	1,054	2,752	3	**5,955**
Taranaki	919	3,077	1,401	1,037		**6,434**
Wellington	5,237	11,982	8,418	1,619	3	**27,259**
Marlborough	2,276	244	25		1	**2,546**
Nelson	487	389	270			**1,146**
Canterbury	2,845	1,481	7		24	**4,360**
Otago	15,592	4,364			4	**19,960**
Southland	5,243	18				**5,261**
Grand Total	**39,354**	**41,019**	**15,458**	**6,365**	**29**	**102,234**
% 2020-2022	38.5%	40.1%	15.1%	6.2%	0.0%	**100%**
% 2017-2020	28.2%	35.8%	26.0%	9.9%	0.0%	**100%**

Table 5: Areas of land (ha) being converted to plantation forestry by Erosion Susceptibility Classification

Historically, steeper land has been purchased by forestry interests due to its availability/lesser interest from farming and/or for environmental reasons. Carbon forestry (where radiata pine is planted but there is no intention to harvest the trees) and mānuka are two further options which are now attractive on some of this most challenging of ESC classes.

The table below supports the evidence in LUC table (Table 4) that the class of land purchased by non-traditional "carbon" entities is in general better farmland in respect to LUC and ESC criteria.

ESC	Entity				Grand Total
	Carbon	Forestry	Honey	OIO	
Low	25%	55%	19%	44%	**38%**
Moderate	49%	34%	42%	35%	**40%**
High	22%	8%	33%	11%	**15%**
Very High	4%	3%	6%	10%	**6%**
Other	0%	0%	0%	0%	**0%**
Grand Total	**100%**	**100%**	**100%**	**100%**	**100%**

Under the National Environmental Standard for Plantation Forestry (NES-PF), some of this land in Very High (red) zones cannot be planted for production forestry without resource consent

3.2 LUCAS Layer Analysis

As well as the ESC and LUC analysis undertaken, property shapefiles were intersected with the 2016 LUCAS Layer.

LUCAS 2016 Layer	Cropland - Annual	Grassland - High producing	Grassland - Low producing	Grassland - With woody biomass	Natural Forest	Planted Forest - Pre 1990	Post-1989 Forest	Wetland - Open water	Wetland - Vegetated non forest	Grand Total (Hectares)
North Auckland		4,312	95	153	1,143	82	84	5	11	**5,884**
South Auckland		5,422	2,915	228	1,665	46	39	2		**10,318**
Hawkes Bay	0	6,833	4,921	522	258	210	343	14	7	**13,113**
Gisborne		1,211	2,784	325	275	200	1,154	4	1	**5,955**
Taranaki		1,253	2,997	113	1,622	327	120	1		**6,434**
Wellington		5,327	12,950	1,970	3,673	914	2,404	21		**27,259**
Marlborough		37	1,208	311	435	10	545	0		**2,546**
Nelson		367	374	28	238	21	118	1		**1,146**
Canterbury		666	2,426	474	203	43	547	1		**4,360**
Otago	0	5,219	8,584	3,167	1,682	691	522	2	94	**19,960**
Southland		1,726	2,535	321	643	13	14	4	3	**5,261**
Grand Total	**0**	**32,373**	**41,788**	**7,613**	**11,837**	**2,557**	**5,890**	**54**	**117**	**102,235**
% 2020-2022	0.0%	31.7%	40.9%	7.4%	11.6%	2.5%	5.8%	0.1%	0.1%	**100%**
% 2017-2020	0.0%	24.2%	41.2%	6.7%	16.1%	2.5%	8.9%	0.1%	0.0%	**100%**

Table 6: LUCAS 2016 layer

This indicated a 7% increase in the proportion of High producing Grassland being converted to forestry.

Again, interesting to note that this is largely due to private land sales rather than traditional Carbon entities that still seem to be targeting the lower classes of land.

Entity	LUCAS 2016 Layer						
	Cropland - Annual	Grassland - High producing	Grassland - Low producing	Grassland - With woody biomass	Natural Forest	Planted Forest - Pre-1990	Post-1989 Forest
Carbon	0%	31%	45%	5%	13%	1%	5%
Forestry	0%	37%	32%	8%	11%	4%	7%
Honey	0%	27%	34%	5%	31%	0%	4%
OIO	0%	30%	43%	9%	8%	3%	6%
Grand Total	**0%**	**32%**	**41%**	**7%**	**12%**	**3%**	**6%**

3.3 Comment: the value of LUC, ESC and LUCAS information

The LUC and ESC systems are both now well-established as descriptors of topography and erosion susceptibility and are used extensively to regulate and guide land use. They also inevitably influence the perceived and actual value of land on the open market.

Hill country farms in New Zealand are traditionally made up of a large percentage of LUC Classes 5, 6 and 7 land and some of these are very profitable. It is fair to say however, that the steeper the land (i.e. higher LUC and ESC classes), the higher the production costs to generate the same farming output per hectare compared with land in lower LUC/ESC classes. The same can be said of forestry, where, within reason, while land productivity is less sensitive to topography and erosion potential, costs of production are sensitive to these site factors. Some of the country's best forest growth rates are seen on steep to very steep land in areas of moderate to high erodibility in the eastern North Island.

Equally, there are farms on lower LUC land that due to climatic conditions, choice of farming approach and other factors, are not as profitable as might be expected. However, the data suggests that forestry investors understand and remain confident of the potential of land in high LUC/ESC classes in the price range at which the land is currently available.

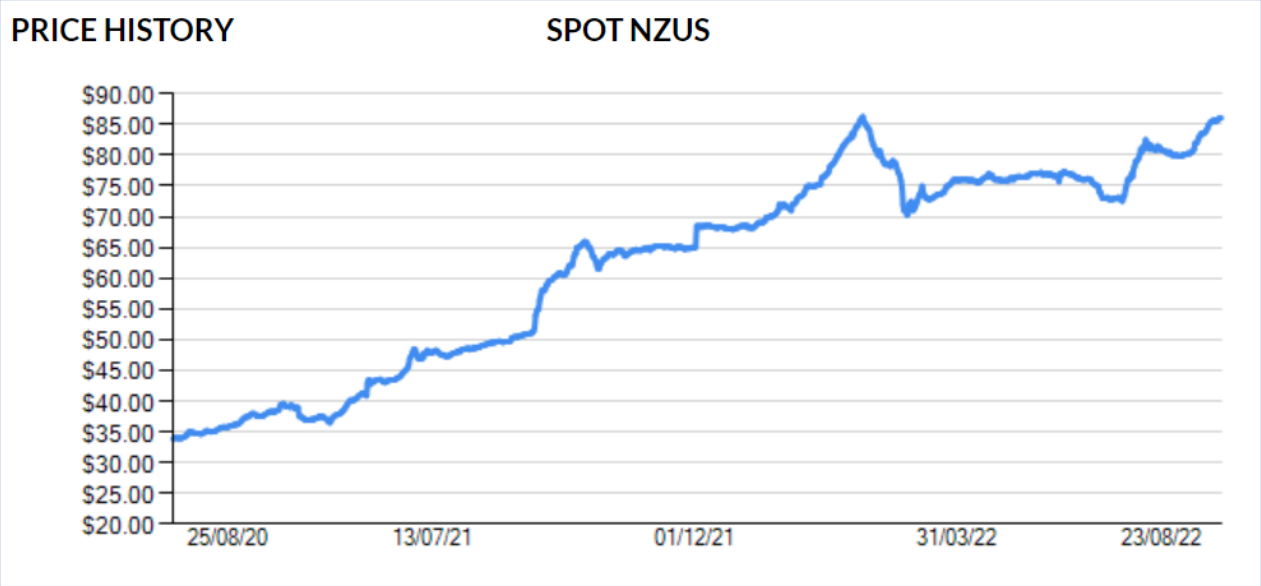
A shortage of properties and a continued rise in the value of carbon is seeing demand and price points trend steadily upwards with requests from Real estate agents looking for land in some districts, starting at $14,000 to $19,000/ha.

3.4 Indication of key drivers of land use change

Carbon Market

It would be fair to suggest that the increase in the price of carbon traded on the secondary market changes the economics of traditional farming methods in favour of full or partial farm conversion to forestry, with the added benefit of the increased carbon available under the new averaging and permanent categories making the economics in most districts more favourable.

The graph below represents the trend in the NZU spot price since early 2020. This clearly demonstrates an increase in the possible returns already identified; however, a large number of landowners are fundamentally opposed to wholesale land use change.



For further details or access to Carbon pricing, please contact Jarden Securities on +64 (9) 521 7802 or carbon@jarden.co.nz

On Farm Cost Increases and compliance

Another key consideration is the increase in on farm costs and in particular the increase in the cost of fertilizers in the last 12 months. There are farming platforms that rely heavily on an economic application and recent price increases have seen some of the properties we have been dealing with tip the balance and begin to consider massive changes in land use.

Combine this with the continual changing regulatory environment and many landowners are beginning to question the business case behind staying a traditional farming operation.

Land-use Change

Land prices in most regions have continued to climb. While this is positive for the landowners concerned, as it also lifts the equity value of other properties in the area, the increased carbon price is likely to see more pressure on land for conversion to forestry.

The analysis tends to suggest that the larger, longer rotation players in the market still actively pursue land that could be defined as less productive farmland on the basis that the comparable ESC and LUC % splits, when compared to what appears to be newer entrants to the market, show a higher % of the better classes of LUC, ESC and LUCAS with the newer entrants.

There has been a clear lift in the prices paid for land throughout all of the country.

The traditional "carbon" hotspots have seen a shift in areas traded. This appears to be a combination of reduced availability and more cost-effective options in other regions that can provide similar carbon returns especially on a long-term basis.

The table (Table 3) below shows a shift in regions across NZ on a % of total sales basis.

Region	Sales by District (hectares and %) 2020-2022		2017-2020	% Change of area sold
North Auckland	5,884	6%	4%	**+8%**
South Auckland	10,318	10%	4%	
Hawkes Bay	13,113	13%	10%	**+5%**
Gisborne	5,955	6%	4%	
Taranaki	6,434	6%	4%	**-17%**
Wellington	27,259	27%	46%	
Marlborough	2,546	2%	6%	**-5%**
Nelson	1,146	1%	2%	
Canterbury	4,360	4%	4%	
Otago	19,960	20%	16%	**+8%**
Southland	5,261	5%	1%	
Grand Total	**102,234**	**100%**	**100%**	

Current Landowners situation

Again, the level of detail available in terms of the sales is inconclusive. It is well known that the average age of farmers in New Zealand is at the upper end of the scale, however, we are starting to see a new generation taking over and transitioning into the business.

These younger farmers appear to be prepared to look objectively at the total farming operation and analysing down to a paddock-by-paddock level the best use of land to support their chosen farm model.

This detailed analysis is now required across many platforms as rising costs associated with fuel, fertilizer, additional feed, and other on-farm costs all add up.

Couple this with a shortage of staff in some regions and the industry appears to be in a very delicate state.

Most farmers see the potential benefit of an integrated approach incorporating trees in certain places on their farms less suited to food production.

ETS Awareness

A recent program, covering 70 farm visits in the Hurunui district in Canterbury, to explain the ETS and possible current and future opportunities with trees on farms, noted the following (start of extract):

"The overriding initial position of landowners was one of general confusion around the ETS, and how it related to their individual property and circumstances - what qualified, what didn't, how and what to claim? How can something that doesn't leave the farm be "sold"?

Most of the landowners were initially nervous and slightly confused, having heard different, often conflicting, versions about the ETS at various locations. However, once they understood the basic concept, then the opportunities started being presented by the landowners themselves.

From the visits we identified an initial starting position as noted below:

Starting Property Position				
Pre-1990 FAP on title	**Existing ETS**	**Post 89 Exotic**	**Post 89 Indigenous**	**ETS Intention**
36	**17**	**42**	**27**	**31**
51%	**24%**	**60%**	**39%**	**44%**

- **51%** of properties had Pre-1990 Forest Allocation Plan (FAP) compensation attached. Some of these properties had had the units transferred to them when purchasing the property (not compulsory to do so).
- **24%** had existing ETS registrations to some degree, some with Crown Joint Ventures (JV) and Forestry Rights (FR).
- **60%** had qualifying Post-1989 Exotics NOT registered.
- **39%** had Post-1989 Indigenous NOT registered.
- **44%** had qualifying trees that they planned to register, time permitting.

After the visits and discussions, landowners indicated the following adjustments to their original plans:

Planned Future Intention				
Plant Radiata	**Plant Poles**	**Indigenous Plant & Reversion**	**Plant Other Species**	**Register in ETS**
22	**40**	**34**	**23**	**57**
31%	**57%**	**49%**	**33%**	**81%**

- **31%** were looking at planting small areas of radiata for production if access allowed, for permanent carbon, or contribution to the farming model for either ETS or He Waka Eke Noa (HWEN) benefits.
- **57%** were VERY interested in planting poles for soil conservation purposes, with the added benefit of carbon helping with the cost involved.
- **49%** planned some form of indigenous establishment. However, without exception all were concerned about the cost and pest control from other properties in the district.
- **33%** were looking to plant something other than radiata. Redwoods and high density Euc's being amongst the most talked about.
- **81%** after the visits with existing and/or proposed plantings, planned to register in the ETS.

General observations from meeting with farmers

- Without exception every property visited was trying to do the best by their land and looking at ways to spread risk and increase income streams.
- Each farm was slightly different in respect to land and stock management.
- Huge amount of time spent on compliance and reporting.
- Limited support/subsidy on a national scale since One Billion Trees Fund (1BT) was cut off.
- Preference to plant natives but cost and survival rates of concern.

- No carbon recognition for fencing, protecting and promoting existing indigenous land to regenerate (additionality).
- Lack of coordinated pest control in the region/nationally, especially with the increased numbers of pests being seen on properties.
- Unaware that mixed species could qualify.
- Unaware that stock could still graze if needed and measurement is to the dripline not fence line.
- Worry of TB spreading back into the area.
- Need for permanent Exotics in hard-to-reach areas to help survival of farm.
- Confusion around PRE-1990 forest obligations and general understanding with some potential pre-1990 deforestation issues identified.
- Confusion on 'safe' (aka 'low risk') carbon understanding.
- Lack of understanding by their accountants and lawyers around ETS transactions i.e., land sales, changes to unincorporated bodies which can constitute a transfer of participation (i.e., transmission of interest).
- Recent concern that talks of removing exotics from the Permanent Forest category to prevent Whole Farm conversions, will make planting uneconomic in terms of carbon income, in the 20-100 hectares of the property that are poor performing in respect to grazing, inaccessible and almost impossible to get a road to within the current rules to harvest.
- Shift in focus from solely ETS to ETS vs HWEN - what the differences are and what is the best option for them. General frustration around the rules, proposed changes and uncertainty around which is the best way forward." (end of extract)

Barriers currently seen to further conversion

It has been suggested that lack of seedling supply has restricted the level of conversion in New Zealand in recent times. In reality, this is not the case if forward planning and order placement confirmation with nurseries is done in a timely manner.

Additional capacity for both exotic and indigenous seedling production is starting to appear in the industry.

Labour has also been a cause for concern. Planting costs per tree have risen from around $0.40/tree to $0.80-$0.90/tree as the availability of "trained" planters is constrained by the effects of border closers and lingering COVID 19 restrictions in play.

Many opportunistic contractors have appeared in the industry to fill the gap. However, there is no substitute for experience. Examples of poor planting techniques resulting in poor survival, poor timing or absence of release spraying and follow up blanking operations are becoming apparent.

Proper establishment also involves on going pest control and release spraying operations.

Chemical supply has been interrupted by COVID-19 restrictions internationally and placed even more importance on proper forward planning and quality control.

The real barrier is certainty around the rules going forward and the ability to carefully plan 12-months in advance and be confident to set up contractual arrangements for the supply of trees and labour.

3.5 Distance to the nearest port

Historically, beyond a certain distance and depending on a range of variable factors including the log price, harvesting costs, transport costs, domestic mill locations, and shipping costs, it becomes less economic to transport logs to the mill for processing or the port for export. Although referred to as distance to Port, in reality it is the DISTANCE TO MARKET.

This influences the value of traditional forestry land, however, with the increasing price of carbon, the economics of the entire cycle has greatly improved the returns from the first crop and provided increased confidence in pricing decisions.

In the initial report, properties were identified between 150 km and 200 km from the nearest port. Forests closer than 150 km to a port are those expected to be most likely managed for both timber and carbon revenues (based on current industry log revenues and costs), unless purchased by entities that have a carbon-only focus from the outset.

With the rise in the price of carbon since 31/12/2020 and the introduction of auctioning, to a large degree, the distance to market has impacted the decisions less, as there is more potential income from carbon than harvesting the trees, and the distance to the Carbon market is ZERO km.

Having only one band for averaging of 16 years for Pinus radiata has changed the focus. If additional bands recognised the increase in volumes of a longer 40–50-year framing rotation and the ability to offset higher harvesting costs with higher per hectare recoverable volumes, then economically longer rotations would become more viable than registering in the "permanent" category which is currently the only other viable option for marginal operations and resulting in carbon only management regimes, which will potentially affect log supply going forward, so is an issue for the traditional production forest and timber industry in New Zealand.

Areas registered as permanent forestry within the post-1989 Emissions Trading Scheme (ETS), with a progressive production thinning regime, while maintaining the 'forest land' definition of a minimum 30% canopy cover, are expected to become attractive options.

NB. The detailed rules for averaging accounting and other changes to the ETS are still being finalised and may be subject to change. The rules will be set out in the new regulations for forestry in the ETS. These regulations will be finalised and published by 1 October 2022. They come into practice on 1 January 2023.

In addition, this year the Government sought feedback on a proposal to exclude exotic forests from being registered in the new permanent post-1989 category in the ETS. The consultation on the proposal closed on 22 April 2022. Submissions are being considered. A decision is expected to be made on this later in the year.

4. Discussion

4.1 Why is farmland continuing to be sold?

With projected returns on forestry investments increasing due to the addition of carbon revenues, 'forestry' is now able and prepared to pay more for the land than 'traditional farming'. As forestry buyers have arrived on the scene, some landowners have chosen to take the opportunity to benefit, with the time being right to move on to the next farm or next stage in life.

The evidence would, on the surface, suggest that the price of carbon has certainly had an increased effect on not only the land values, but also the type of land that is able to be traded, as the demand remains to purchase and properties with less effective areas are taken up.

While this is making it attractive for some existing landowners to exit the industry or move onto better land, the potential for increased afforestation of pastoral land is real, and the areas concerned appear to be increasing with the sales information showing combined sales of 102,234 hectares for the period, a significant increase on that previously reported.

If we look at the timing of sales, we see the beginning of a trend for confirmation of S&P agreements in the last quarter of the year.

It is interesting to note that confirmed contracts show a low level in the first two quarters of 2022, perhaps reflecting the mixed messages coming from both Ministers Nash and Shaw around the future of exotics in the ETS permanent category.

Entity	2020				2021				2022		Grand Total (Hectares)	% by Conversion	
	Qtr1	Qtr2	Qtr3	Qtr4	Qtr1	Qtr2	Qtr3	Qtr4	Qtr1	Qtr2		2020-2022	2017-2020
Carbon	2,309	1,286	1,608	8,432	3,802	305	3,340	12,269	3,010		**36,362**	**36%**	**58%**
Forestry	2,387	1,639	638	1,404	1,862	3,741	3,076	2,627	3,550	345	**21,270**	**21%**	
Honey				3,313	2,292						**5,606**	**5%**	**16%**
OIO		4,044	1,890	9,327	4,768	1,682	2,702	9,984		4,600	**38,997**	**38%**	**27%**
Total	**4,696**	**6,970**	**4,137**	**22,476**	**12,724**	**5,729**	**9,118**	**24,880**	**6,560**	**4,944**	**102,234**	**100%**	**100%**
Grand Total	**38,278**				**52,451**				**11,505**		**102,234**	**100%**	

If we look further into the detail surrounding the type of land being purchased by the various entities, we see that the traditional large scale and OIO players, continue to focus on a “lower” class of land across the three measures used in this report:

1. LUC
2. ESC
3. LUCAS

Entity	LUC Layer								Grand Total (Hectares)
	2	3	4	5	6	7	8	Other	
Carbon	0%	2%	4%	0%	64%	28%	1%	0%	36,362
Forestry	0%	6%	17%	0%	61%	15%	1%	0%	21,270
Honey	0%	3%	4%	2%	44%	46%	2%	0%	5,606
OIO	0%	4%	9%	7%	59%	20%	0%	0%	38,997
Grand Total	207	3,931	8,910	2,853	61,801	23,807	687	38	102,234
% of Total	0%	4%	9%	3%	60%	23%	1%	0%	100%

ESC	Entity				Grand Total
	Carbon	Forestry	Honey	OIO	
Low	25%	55%	19%	44%	38%
Moderate	49%	34%	42%	35%	40%
High	22%	8%	33%	11%	15%
Very High	4%	3%	6%	10%	6%
Other	0%	0%	0%	0%	0%
Grand Total	100%	100%	100%	100%	100%

Entity	LUCAS 2016 Layer						
	Cropland - Annual	Grassland - High producing	Grassland - Low producing	Grassland - With woody biomass	Natural Forest	Planted Forest - Pre-1990	Post-1989 Forest
Carbon	0%	31%	45%	5%	13%	1%	5%
Forestry	0%	37%	32%	8%	11%	4%	7%
Honey	0%	27%	34%	5%	31%	0%	4%
OIO	0%	30%	43%	9%	8%	3%	6%
Grand Total	0%	32%	41%	7%	12%	3%	6%

The independent entities (referred to as Forestry) buying land for afforestation seem to be purchasing land with significantly better classes of grassland and better ESC and LUC profiles. This potentially represents a FOMO (Fear Of Missing Out) approach rather than a carefully considered economic evaluation.

When compared to the total sales of all properties over 250 hectares for the period 2020-2022 (including properties staying in traditional farming Operations), the following LUC differences were observed between land identified as potential afforestation and land assumed to be under the farming business as usual model.

In both islands there appears to be a lower LUC class of land transitioning into forestry.

South Island Sales		
LUC	**Afforestation**	**Farming**
1	0%	0%
2	0%	2%
3	5%	12%
4	15%	15%
5	5%	2%
6	62%	46%
7	12%	19%
8	0%	5%

North Island Sales		
LUC	**Afforestation**	**Farming**
1	0%	1%
2	0%	3%
3	3%	7%
4	3%	8%
5	0%	1%
6	58%	54%
7	35%	25%
8	1%	1%

4.2 Analysis of potential land expectation value (LEV) comparing traditional production forestry to a Permanent (non Clear-fell) model

The increasing effect of the carbon price on the potential purchase price for land is often discussed.

Traditional Production Forestry has always been a viable option in most areas subject to the traditional effect of distance to market. This has also been heavily influenced in recent years, on market volatility, logistical freight volatility and the effect of demurrage (slow loading/unloading of vessels).

A comparison of a property near Masterton was conducted to illustrate the potential influence of carbon on the returns for various forestry models, including carbon only, for an additional 100 hectares of Pinus radiata being established.

Framing Regime	Cashflow: Years 0 -10	Cashflow: Years 11 - 20	Cashflow: Years 21 - 29 (incl. log revenue and replanting)	Cashflow: Years 30 - 50	IRR	NPV (8.5%)	Total Cost	Total Revenue	Surplus
Forestry - no carbon	-$426,300	-$70,000	$2,128,465		6.3%	-$137,639	$801,600	$2,433,765	$1,632,165
Sale of first 16 years carbon	$1,116,180	$1,629,480	$2,108,265		31.8%	$1,199,116	$867,600	$5,721,525	$4,853,925
28 Yrs Carbon Only	$1,350,920	$2,538,540	$2,284,480		32.4%	$1,527,099	$618,300	$6,792,240	$6,173,940
50 Yrs Carbon Only	$1,350,920	$2,538,540	$2,544,560	$4,271,100	32.4%	$1,733,033	$838,300	$11,543,420	$10,705,120

Forestry - no carbon

As can be seen the returns for traditional forestry without registering in the ETS represent a reasonable internal rate of return (IRR) (6.3%) although the net present value (NPV) is negative.

Sale of first 16 years carbon ($70/NZU)

By registering the same forest into the ETS under averaging (16 years carbon allocated) the resultant potential income in the early years dramatically increases the returns (IRR 31.8%).

NPV has increased dramatically as a result of the sale of the carbon allocated.

(NB. These numbers include the cost of replanting after harvest to avoid the need to surrender the carbon allocated).

28 years carbon only (No Clear-fell)

The calculations appear to indicate that at $70/NZU, if traded, that the return from not harvesting under the carbon accounting model results in a greater return than carbon and stumpage, without the concerns of market volatility, and potential environmental, fencing and roading issues sometimes related to harvesting activities.

Permanent Forest (50 years carbon)

The effect of a Permanent Forest registration for 50 years indicates possible returns if the carbon is traded at $70/NZU. Please note this places an obligation against the land. Should the 'forest land' definition not be maintained a unit surrender would be required, and penalties may apply.

Most B+LNZ platforms have areas on farm, that are suited to Permanent Exotic Afforestation, where the weed species, productivity and access require a different thought process to be productive. It is important that this option is maintained to help ensure the survival of many "traditional" farming operations.

5. Summary

Throughout the project it was evident that the data was continually changing as land was purchased, on-sold, approved, or declined by the OIO office, and simply in relation to the timing of available information, when contracts settled, and information could be released.

Our original objective was to:

"Independently validate the amount of land that has been or will be planted into exotic plantation species in the near future that is likely to take land out of pastoral production".

The results of our current review estimate:

Whole of Farm Purchase	Year				2021	Q1 & Q2 2022	Grand Total (Hectares)	% by Conversion
	2017	2018	2019	2020				
Honey (Mānuka)	3,039	7,340	1,678	3,313	2,292	-	**17,662**	**10.1%**
Forestry	2,510	11,245	26,198	6,069	11,306	3,895	**61,223**	**34.9%**
Carbon Forestry				13,635	19,717	3,010	**36,362**	**20.7%**
Forestry OIO	1,455	8,982	10,626	15,261	19,136	4,600	**60,060**	**34.3%**
Total Whole of Farm	**7,004**	**27,567**	**38,502**	**38,278**	**52,451**	**11,505**	**175,308**	**100.0%**
Previous Report	**7,004**	**27,567**	**38,502**	**28,159**	**14,246**	**-**	**115,478**	

The data was based on sales that could be verified during the stated period.

The areas identified includes sales dated 2020 that emerged confirmed as a result of timing issues around the OIO approvals process and apparent conditional domestic sales in November/December 2020 that have since settled.

This caused a jump of over 10,000 hectares in the 2020 numbers and a dramatic (though not unexpected) rise in the area purchased in 2021 for conversion.

The amount of land that has been and continues to be purchased for mānuka operations has dropped.

Given the increase in the carbon price, and the state of the mānuka honey industry, it may become increasingly difficult for honey producers to compete in the current market to purchase land.

The perceived economics of forestry with the updated carbon cashflows, continues to be attractive and the demand for potential forestry land from investors remains strong.

There is unsatisfied demand amongst prospective purchasers. However, limitations with seedling, labour and chemical supply going forward will, to a certain extent, delay the speed of transition.

There is also an increasingly strong interest/commitment from farmers and landowners considering within-farm plantings, to diversify their income options and Greenhouse Gas (GHG) obligations.

The strong uptake of the One Billion Trees (1BT) planting grant by existing landowners, provided evidence that many farmers were assessing the long-term benefits associated with putting part of their farm in trees, planting 'the right trees in the right place' - where the right place is one which increases overall farm profitability, reduces total farm emissions, and may also confer other sustainable environmental and social benefits.

Since the fund was stopped, so has landowner commitment/ability to plant non-radiata species.

Demand is increasing for a funding model to help landowners establish indigenous vegetation and other exotic species such as Redwoods with their soil conservation and longevity values, as well as Eucalyptus, Oaks and other NON-radiata species.

The danger is, if some form of funding does not eventuate soon, exotics, and radiata in particular, will become the ‘go to’ species due to the economics involved.

There is a real benefit for existing BLNZ members to benefit from within farm plantings, as the lack of labour in some areas, cost of fertilizer, fuel and additional feed in response to more dramatic climate events, cause many landowners to question how and why they are in the business of farming.

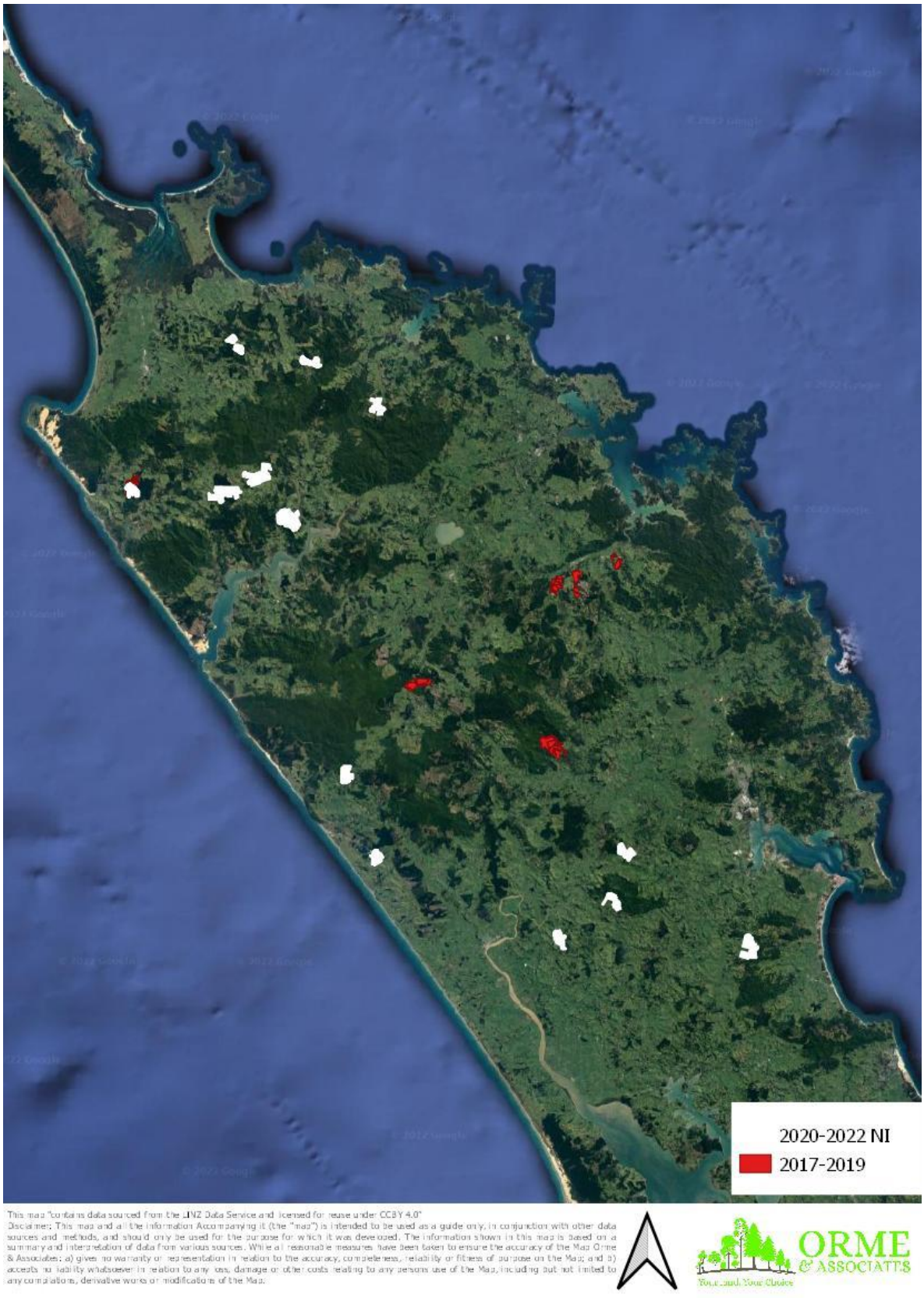
The traditional “carbon” entries are changing the rhetoric around the discussion, referring to longer 50-year plus rotations and ultimately the transition to indigenous forest.

The challenge for the traditional farming operation is to embrace the opportunities for forestry and carbon within their current farming models.

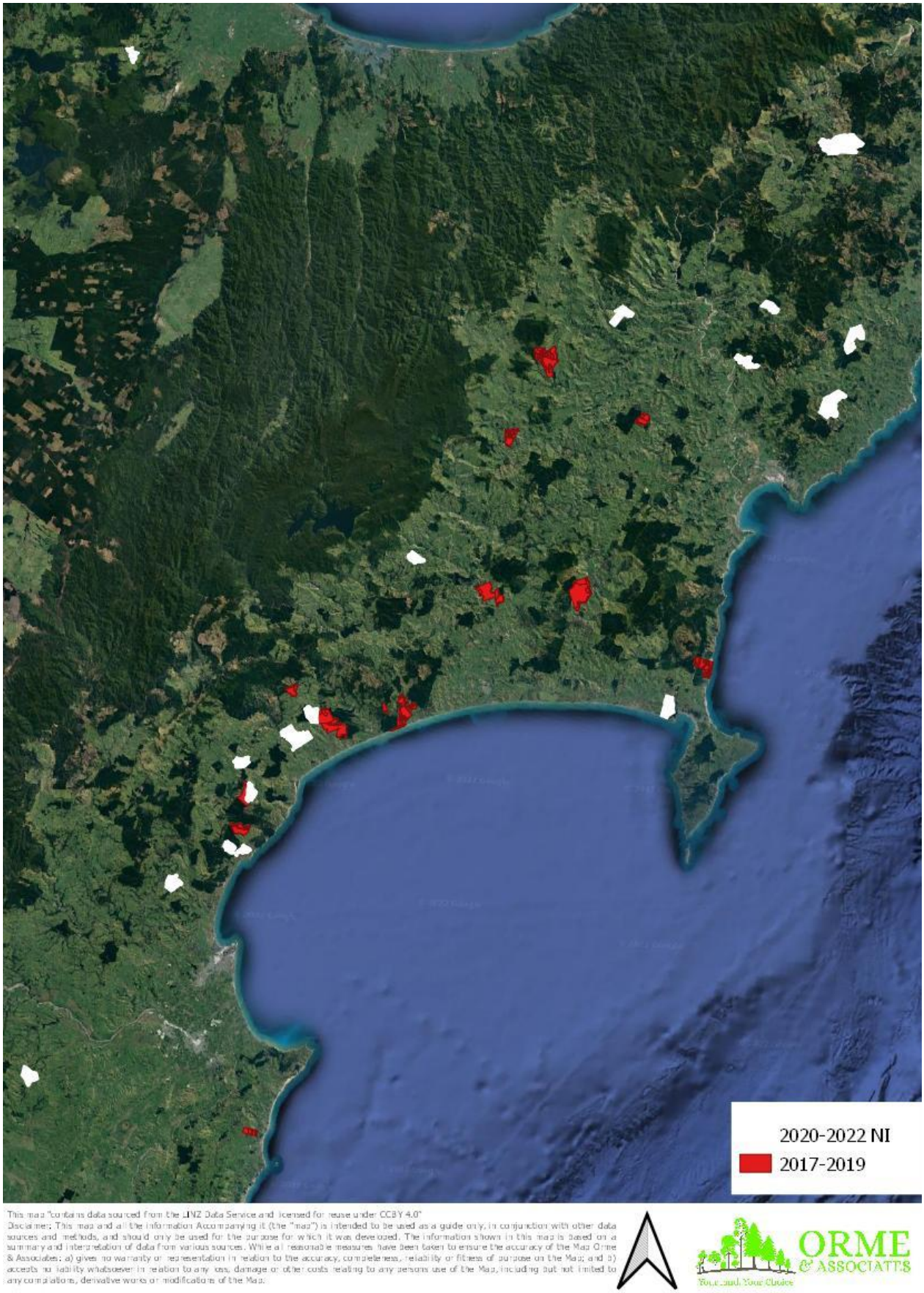
There is a real danger that, if while trying to influence the government of the day to combat the large-scale full farm conversions of food producing land, for potential changes to the regulations, that this will also negatively impact on those farmers that need an element of forestry, to enable them to meet their financial, environmental and GHG offsetting requirements and stay in business.

6. Appendices

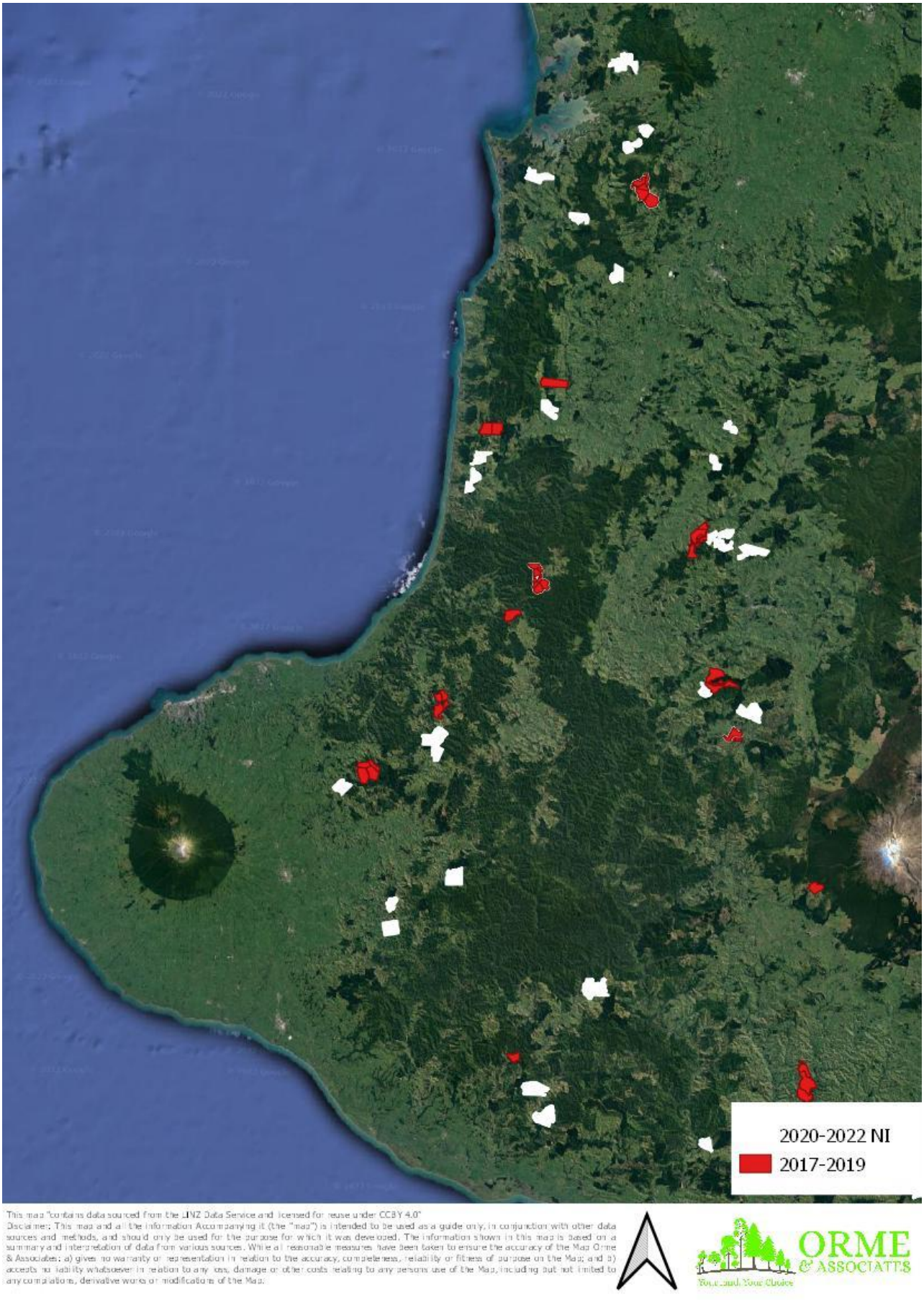
6.1 Appendix A: Regional distribution of land acquisitions identified as likely for forestry conversion



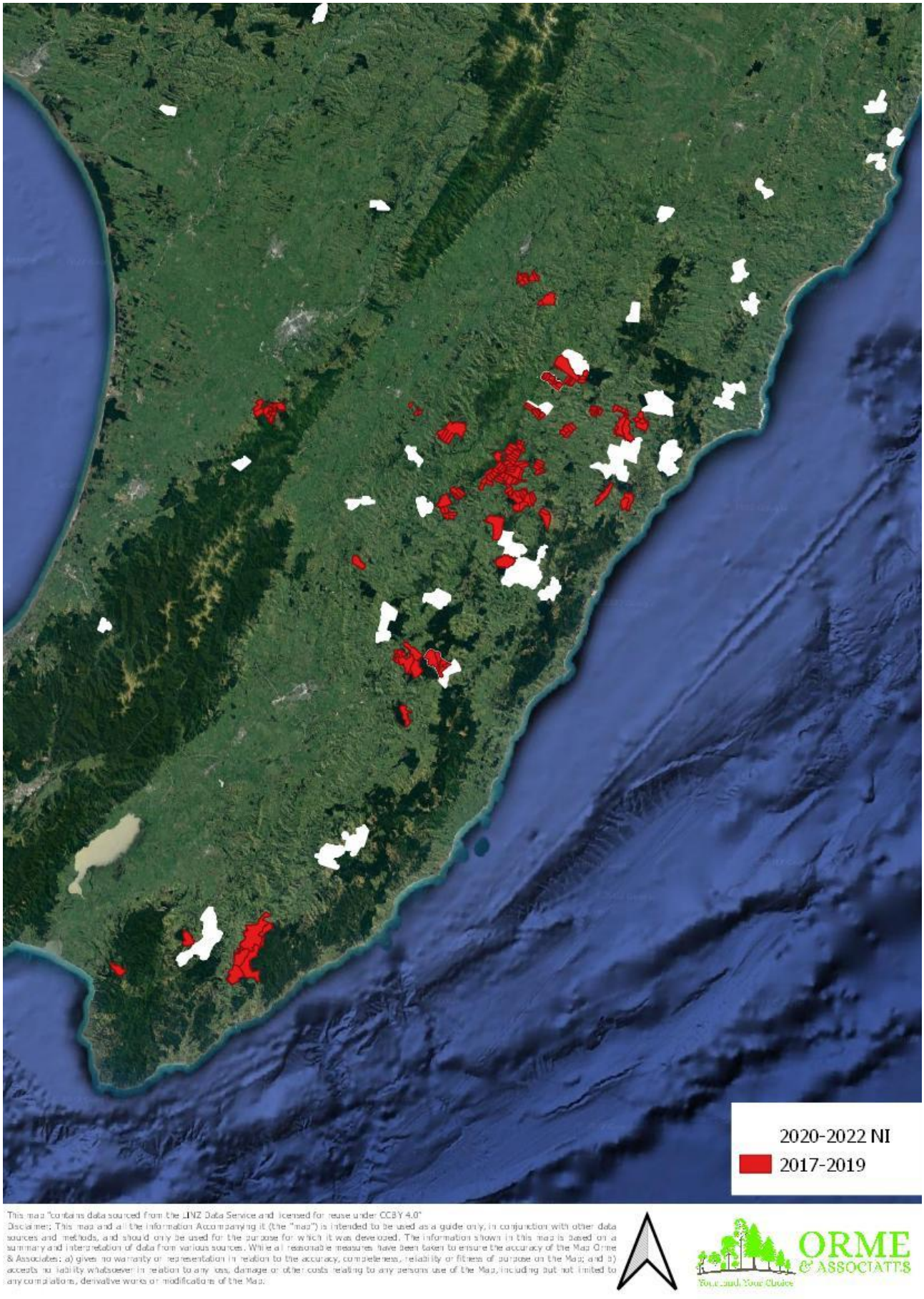
Map 1: Northland zoned land acquisitions for forestry



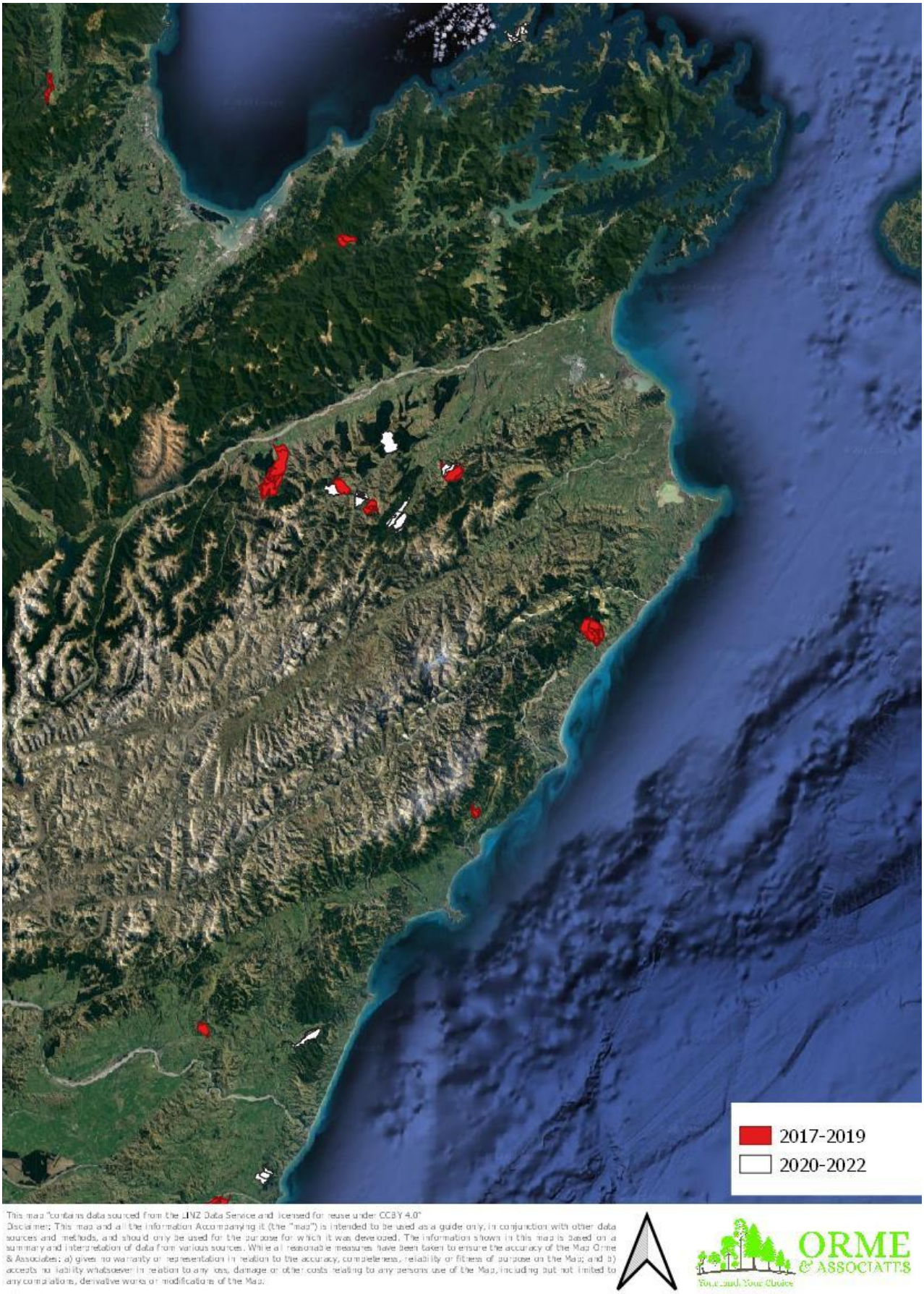
Map 2: Gisborne / Hawke's Bay zoned land acquisitions for forestry



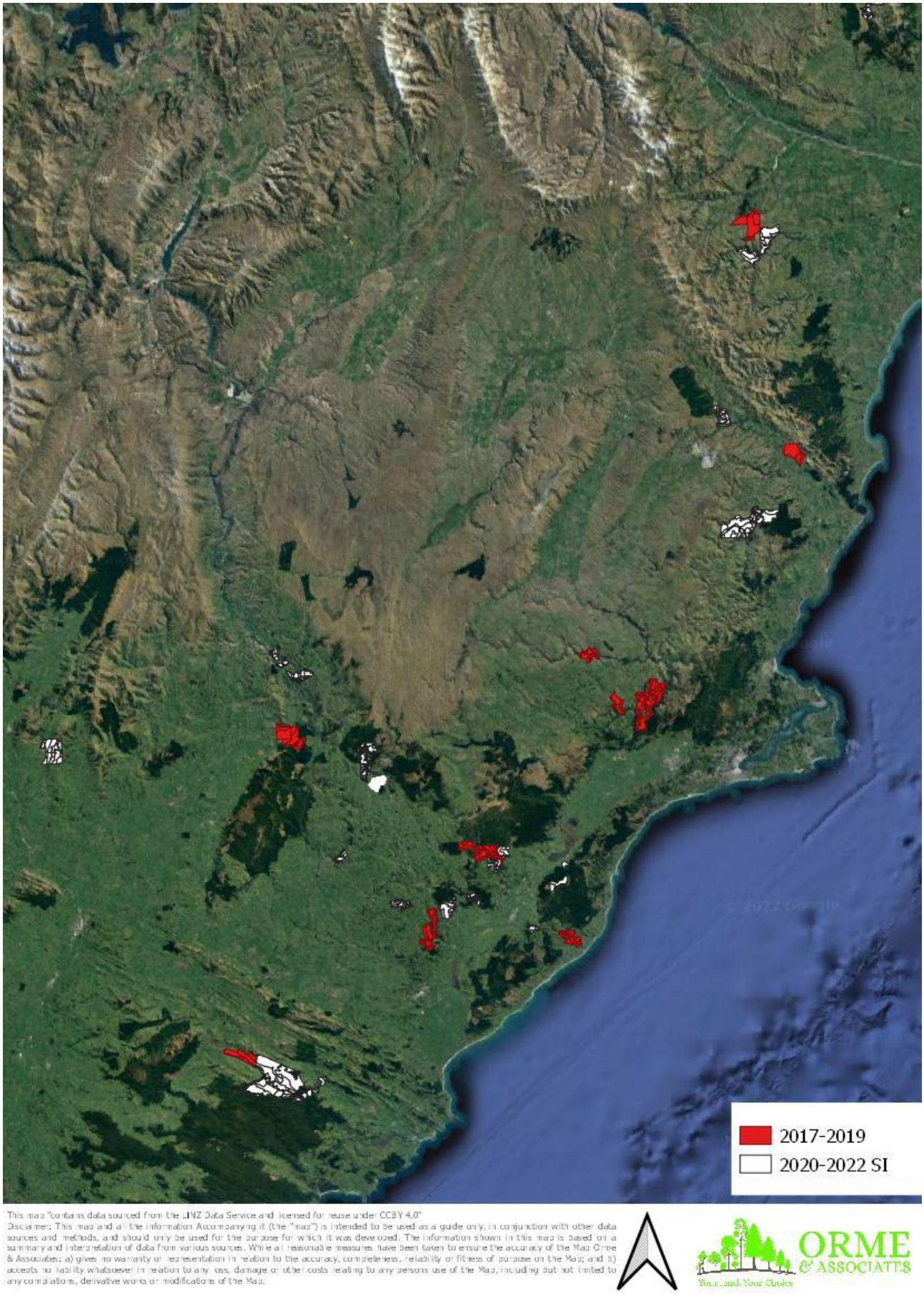
Map 3: Taranaki zoned land acquisitions for forestry



Map 4: Lower North Island zoned land acquisitions for forestry



Map 5: Top of the South Island zoned land acquisitions for forestry



Map 6: Otago / South Canterbury zoned land acquisitions for forestry