Preliminary Estimate of the Cost of the Essential Freshwater Proposals on Māori Land Use Potential

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Economics put simply

Authorship

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1. Introduction

This paper follows on from *Options for Estimating Effects of Proposed Freshwater Policies on Māori Land Use Potential* (March 2020). As outlined in that paper the objective is to estimate the change in potential financial returns to Māori land caused by the proposed Essential Fresh Water (EFW) standards.

The main findings of that paper are that:

- About 10% of Māori land is under-utilised in the sense that it could be used more profitably for something else.
- Significant types of under-utilisation occur where land is currently covered in pre-1990 planted forest on Class 4 land.
- If the general effect of the proposed clean water reforms is to render dairying and sheep & beef farming less profitable than currently, it seems likely that the current opportunity cost of under-utilisation would be lower.

To meet the above objective of estimating the change in potential financial returns to Māori land caused by the proposed EFW standards, we take a two-stage approach:

1. Estimate the potential loss of profit from under-utilisation; that is land not being allocated to its theoretically most profitable use.
2. Estimate how that result changes if the EFW package is introduced.

The cost of the EFW package on Māori owned land is estimated to be about $21m pa. This cost is small relative to the opportunity cost of over $500m pa calculated from Māori land allocated to its most profitable use. The main reason for the small effect of the EFW package is that a large proportion of Māori land is used for forestry, which is less affected by the package.

All estimates are subject to a wide margin of error, but it would be reasonable to infer that the cost of the EFW package to Māori land owners is probably an order of magnitude smaller than the current opportunity cost of land being under-utilised.

2. Estimation

Current loss of income

We have two sets of data:

1. A table of Māori land disaggregated by LUC and LUCAS[1].
2. Perrin (2016) estimated a table of lease rentals for eight land use categories cross-tabulated against LUC classes 2-3, 6 and 7. Their data is re-assembled in Table 1. (The original is shown in Appendix A). We have extrapolated it to include LUC class 1, interpolated it to include class 5, and also added likely compatible LUCAS classifications to the descriptive land use categories.

Table 1

Land rents by LUC and LUCAS ($/ha)

		LUC class						
	LUCAS	1	2	3	4	5	6	7
Native forest pre 1990	71	270	245	227	173	153	133	42
Leased forestry	72	270	245	227	173	153	133	42
Leased forestry	73	270	245	227	173	153	133	42
Grassland-grazed trees	74	120	104	88	72	56	40	0
High producing-dairy	75	1100	1000	900	800	700	600	0
Low producing-sheep and beef	76	750	650	550	450	350	250	200
Leased crop	77	1000	900	800	700	0	0	0
Leased cut and carry	78	800	700	600	500	0	0	0
Vegetated wetland (Manuka)	80	100	100	100	100	100	100	100

We combine these two datasets to produce an estimate of theoretical income from land rent under current use. This is labelled theoretical as not all land is actually leased.

We then allocate all land to it most profitable use, which is dairying, assumed to be LUCAS class 75. However, the Perrin data relates only to the Lake Rotorua catchment, so we conduct a sensitivity test in which LUCAS 77, cropping , is assumed to be the most

[1] LUC is Land Use Capability; a broad assessment of the land's capability for use in different types of agricultural production given its physical limitations. LUCAS is Land Use and Carbon Analysis System. For the rest of this paper the term 'Māori land' means land as defined by the Māori Land Court and that secured under Treaty of Waitangi settlements.

profitable use, unless the land is already in dairying. Further, given the high error margin in this methodology, we test a number of other scenarios. Our scenario list is as follows:

- Scenario 1: Base case with LUCAS 75 as the theoretically most profitable use.
- Scenario 2: LUCAS 7 as the most profitable use.
- Scenario 3: All LUC 1 values raised by 50% and LUC 2 values by 25%. This is to simulate a greater gradation for the better quality land that could apply outside Lake Rotorua catchment.
- Scenario 4: All values for LUCAS 71-73 are raised by 25% in order to simulate higher returns from forestry, which is a common use of Māori land.
- Scenario 5: Maximum values for LUC-1, LUCAS 75 raised from $1100 to $1600 for Waikato and Bay of Plenty, and to $2200 for Canterbury.

The results are summarised in Table 2. The theoretical loss from sub-optimal land use is over $500m in each scenario. Increasing the gradation (Scenario 3) raises both the potential and current rental income, but hardly affects the difference between the two. This probably reflects the predominance of Māori land being in LUC classes 3 and 4.

Scenarios 2 and 4 lower the difference by about $26m. In Scenario 2 the potential is lowered and in Scenario 4 the estimated current rental is higher – again due to the dominance of Māori land in LUC classes 3 and 4.

Scenario 5 is virtually indistinguishable from Scenario1, implying that the results are unlikely to be sensitive to the maximum land rents assumed for Canterbury, Bay of Plenty and Waikato.

Table 2

Total value of land rents: estimated potential v current ($m)

	Potential	Current	Difference
1	960	390	570
2	934	390	544
3	973	399	573
4	960	418	543
5	961	390	570

EFW v NPS-2017

The $540m-$570m is an estimate of the potential annual income that could theoretically be earned by Māori land if it was all allocated to its most profitable use, ignoring any other constraints on such conversion. The next step is to estimate how this potential might be affected by the EFW proposals.

The results from Modelling by Resource Economics shows that the incremental cost of the EFW reforms relative to the NPS 2017 regime is about $294m per annum. This estimate is disaggregated by region and four farm types – dairy, sheep & beef, horticulture and other (mostly forestry). Note that the numbers we currently have may not be final.

Our dataset has Māori land use by region, eight types of dairy farm and seven type of sheep and beef farm. Aggregating these to simply dairy and sheep & beef farms means we can apply the costs per hectare for EFW calculated by Resource Economics. The implicit assumption here is that Māori land in a given use in a given region has the same profitability and environmental effects as any other land in that use and that region.

The results of this calculation are shown in Table 3. The total estimated cost is $14.6m per annum, being $25.4m-$10.8m. However, as this is confined only to dairy and sheep & beef farming (although in practice the cost on the latter is zero) we scale up this estimate upward by 3/7 to account for effects on horticulture and forestry, in line with the calculations by Resource Economics for all land. This raises the potential cost to $21m.

Even at $21m the cost is less than 4% of the estimated potential loss in annual income from sub-optimal land use estimated above. Indeed it is within the error margin.

The intuitive logic behind this result is that a large proportion of Māori land (around 61% of MLC land and 88% of Treaty settlement land) is used for forestry which is not significantly affected by the EFW proposals. If Māori land been allocated to more profitable uses (namely dairying) the relative cost of the EFW would be higher.

By far the largest cost occurs in Waikato which is characterised by dairying. Bay of Plenty and Canterbury also see larger than average effects.

Table 3

Estimated costs of NPS-17 and EFW ($m)

	NPS-2017		EFW	
	Dairy	S&B	Dairy	S&B
Auckland	0.134	0.004	0.235	0.004
Bay of Plenty	0.488	0.000	2.073	0.000
Canterbury	2.142	0.000	3.475	0.006
Gisborne	0.000	0.000	0.000	0.000
Hawke's Bay	0.000	0.000	0.000	0.000
Manawatu Wanganui	1.232	0.000	1.805	0.000
Marlborough	0.000	0.000	0.000	0.000
Nelson	0.000	0.000	0.000	0.000
Northland	0.123	0.000	0.150	0.000
Otago	0.058	0.000	0.086	0.000
Southland	0.319	0.000	0.426	0.000
Taranaki	3.427	0.000	3.659	0.000
Tasman	0.004	0.000	0.009	0.000
Waikato	2.789	0.000	13.415	0.000
Wellington	0.032	0.000	0.032	0.000
West Coast	0.003	0.000	0.003	0.000
Total NZ	10.751	0.004	25.369	0.010

Suggested next steps

Refinement of the estimates is possible, using more disaggregated data from the model developed by Resource Economics or using Landcare Research. Another look at Table 1 is probably worthwhile. However, these suggestions need to be carefully considered to see if any represent value for money.

Appendix A

The following table is taken from (Perrin 2016): *Lake Rotorua Underutilised Māori Land Analysis*, Perrin Ag Consultants ltd., in conjunction with Scion, May 2016.

Table 7. Projected lease rentals

	Leased pasture (Dairy)	Leased pasture (Drystock)	Leased pasture (Dairy support)	Leased Cut and Carry	Leased Cropping	Leased Forestry	Native Bush and Scrub	Gorse	Tree crop (Leased Manuka)	Grazed Trees (lease)
LUC2	$ 1,000	$ 650	$ 800	$ 700	$ 900	$ 245	$ -	$ -	$ 100	$ 104
LUC3	$ 900	$ 550	$ 700	$ 600	$ 800	$ 227	$ -	$ -	$ 100	$ 88
LUC4	$ 800	$ 450	$ 600	$ 500	$ 700	$ 173	$ -	$ -	$ 100	$ 72
LUC6	$ 600	$ 250	$ 400	$ -	$ -	$ 133	$ -	$ -	$ 100	$ 40
LUC7	$ -	$ 200	$ 200	$ -	$ -	$ 42	$ -	$ -	$ 100	$ -