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Growing and Protecting New Zealand

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Ministry for Primary Industries
Stock Exclusion Costs Report

Prepared for: Ministry for Primary Industries
Prepared by: The AgriBusiness Group
January 2016

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Contents

1 Executive Summary

This report was commissioned by the Ministry for Primary Industries (MPI) to provide information for a potential policy recommendation regarding stock exclusion from waterways for protection purposes. This research was conducted between July and November 2015.

While there might be similarities in waterways and their management from different regions of New Zealand. Fencing and riparian management requirements are not consistent within or across regions, in part reflecting the uniqueness of individual waterways and their surroundings. However, there are some common key considerations to take into account when designing waterway protection through riparian planting and fencing:

- Understand where the risk of degradation to that particular waterway comes from.
- Design a suitable buffer strip in the context of the surrounding environment.
- Design suitable fencing that is fit for purpose.
- Choose plant species which suit the riparian conditions.
- Manage weeds in fenced riparian areas.

Eight of the 15 Regional Councils had some form of fence and riparian cost calculations. They ranged from a web based public tool (Waikato Regional Council) to spreadsheets available on request (Environment Southland, Bay of Plenty Regional Council), to budgeted figures which are able to be discussed with Regional Council staff. Industry bodies are currently working on several additions to the suite of calculators that are publicly available.

Fencing labour costs were collected through telephone and email surveys of 52 members of the New Zealand Fencing Association (FCANZ) from all regions across New Zealand. Additional telephone conversations (or emails) were conducted with 12 of the 15 Regional Councils, members of the Department of Conservation (DOC), Landcare Research, AgResearch, Waihora Ellesmere Trust (WET), QE11, and Landcare Trust.

Labour costs, from the survey, varied across fencing contractors of different regions and tended to be cheaper in the South Island compared with the North Island. Fencing material costs were gained from fencing merchants nationally as well as the Lincoln University Financial Budget Manual (LUFBM).

Wooden fencing material (Strainer posts, Stay posts, Posts and Battens) costs also differed between the two Islands with these materials cheaper in the North Island. All other fencing materials were the same price within companies across New Zealand and the only price differences were found between companies.

Table 1 describes the maximum, average and minimum total per metre fence costs (labour plus materials) from aggregated data collected from the 15 regions of New Zealand.

The cost of riparian planting was calculated on a base rate of $5.50 per plant (plants, ground preparation and labour), using native flax and sedges, at 4,500 plants per ha, which was the most commonly adopted cost estimate and plant density in the survey. This equates to approximately $3.67 per linear metre of planting (plants are at 1.5 metre spacing).

Table 1 Maximum, average and minimum total per metre fence costs (NZD) for five different fence types over flat, rolling and steep topography

Stock type	Fence type	Topography	Max (NZD)	Ave (NZD)	Min (NZD)
Sheep/Cattle	Non-electric 8 wire	Flat	16.36	13.02	9.90
		Rolling	17.88	13.66	10.38
		Steep	24.88	16.64	12.06
	Non-electric netting	Flat	15.81	11.99	8.82
		Rolling	18.83	12.63	8.82
		Steep	26.81	16.01	10.32
Deer	Non-electric netting boundary fence	Flat	28.90	18.90	13.70
		Rolling	28.90	19.68	14.20
		Steep	32.55	22.71	15.70
Sheep/Cattle	Electric 4 wire	Flat	11.21	6.56	4.40
		Rolling	12.21	6.88	4.40
		Steep	13.21	8.25	4.90
Cattle	Electric 2 wire	Flat	8.58	4.67	2.91
		Rolling	10.58	4.89	3.21
		Steep	11.58	5.94	3.66

Fencing and riparian planting for stock exclusion can have both adverse and positive impacts on the farm system. Positive impacts provide motivation for landowners to create and care for riparian buffer zones. Adverse impacts can end up with an increased degradation of waterways. In some cases alternatives to fencing may result in the required outcome. This highlights the importance of good planning and design tailored for individual riparian zone projects.

Farm system positive impacts of fencing for stock exclusion

Stock exclusion of waterways (through fencing) can improve the impacts on the environment as well as improving the farm productivity and management of the system (Section 6.5 Advantages for farmers in fencing waterways. This report). Key positive impacts identified in this study include.

- Improved stock health
- Improved safety for people and stock
- Improved pasture quality
- More efficient stock movements

Farm system adverse impacts of fencing for stock exclusion

Fencing to exclude stock from waterways can also have adverse impacts on the farm system, its management and the surrounding environment, therefore careful design and siting is needed in flood prone areas. Consideration of the following impacts is discussed in this report. (Section 6.2 Possible adverse impacts of fencing on the surrounding catchment)

- Can aid prolific weed growth causing seed transfer and fire risk
- May add to farm infrastructure costs – realigning existing fence lines, adding culverts and installing a water reticulation system

Integrated fencing and additional stock exclusion options

Low volume/flow waterways can become raging torrents during high rainfall events depending on the size of the catchment and their location in it. Careful fence and landscape design may be required for these areas to reduce the risk of physical damage to waterways as a result of debris trapped in fence-lines. In these situations, it may be more beneficial to use higher density planting, sediment traps, wetlands, buried drains or a combination of these and stock management strategies to enhance waterway health in the lower catchments

2 Background

This report identifies the costs of fencing and riparian planting in the context of excluding stock from waterways across New Zealand, so that it limits the quantity of nutrients and pathogens entering a flowing waterway. It is part of a larger project assessing the value of enhancing freshwater quality and identifying potential policies for stock exclusion alongside the National Policy Statement for Freshwater Management (NPS-FM).

Fencing of waterways is one component of a suite of options available to enhance freshwater quality. Fencing can have impacts, both positive and adverse, on land management systems and the environment surrounding these systems. This report discusses the issues surrounding these impacts and alternatives to fencing for stock exclusion from waterways.

3 Methodology

3.1 Fencing and riparian planting

The types and costs of fencing used to exclude stock in different regions of New Zealand were identified and categorised through discussions with MPI and informal consultation of regional council staff.

Discussions and data gathering with regional council staff also included riparian planting information and budgeted costs of fencing and riparian planting, where this was part of regional council policy and current practice.

Further discussions with the following key organisations assisted the understanding of riparian fencing, design, and planting:

- Matt Highway (DairyNZ),
- Mark Sutton (QE11 Trust, Waiau Fisheries & Wildlife Habitat & Enhancement Trust),
- Rebecca Martin (Partnerships, Department of Conservation),
- Phil Keene (Regional coordinator, Landcare Trust),
- Robyn Simcock (Ecologist/Soil Scientist, Landcare Research),
- Adrienne Lomax (General Manager, Waihora Ellesmere Trust)
- Ross Monaghan (Senior Scientist, AgResearch)

3.2 Riparian planting description and costs

The riparian planting information and costings gathered from across New Zealand was combined to produce a riparian planting description, which was subsequently used in the cost modelling. Riparian planting is modelled with plants at 1.5 metre spacing and a planting density of 4500 plants per hectare. Plant and planting costs combined are assumed at $3.67 per linear metre for native flax and sedge/grass type plants.

3.3 Fence description

All fence types modelled are hypothetical descriptions, to provide consistency for the fence contractors that estimated costs. They represent commonly used fences across the majority of New Zealand landscapes. The fence lines are described as; 1 kilometre long, with 9 angle assemblies, and 1 gateway assembly (at one end of the fence). A post driver is able to be

used on flat and rolling terrain, but not steep. Speed and ease of erecting a fence is related to cost. The ability to use a post driver speeds up the fence building process compared with hand digging posts, therefore the labour cost of building a fence on steep country is more expensive. Steep country is defined (by the fencing contractors) as country that a fencing contractor could not get a post driver to. Rolling country is defined as greater than a 7 degree slope to being too steep for a post driver (approximately 35 degrees). Fencing estimates do not allow for rocky, swampy or extremely heavy clay conditions. This means cost estimates may increase in situations of rocky, swampy or extremely heavy clay conditions.

Where possible, posts are spaced at 4 metres for non-electric and 10 metres for electric fences. Cost estimates are for flat, rolling and steep terrain with the following fence types:

- Sheep/cattle non-electric wire fence
- Sheep/cattle non-electric netting fence
- Deer non-electric netting boundary fence
- Sheep/cattle electric fence (4 wire)
- Cattle electric fence (2 wire)

Waterways, depending on topography, can be an 'escape' area for deer; therefore boundary fencing specifications were used for deer fencing.

3.4 Fencing labour costs

The cost of labour to erect fences was collected through telephone and email surveys of 52 members of the New Zealand Fencing Association (FCANZ) from all regions across New Zealand (a copy of the phone interview contact list is in Appendix 2). Additional telephone conversations (or emails) were conducted with 12 of the 15 Regional Councils, members of the Department of Conservation (DOC), Landcare Research, AgResearch and Waihora Ellesmere Trust (WET), QE11, and Landcare Trusts.

3.5 Fencing material costs

Costs for fence materials were gained from fencing merchants nationally (Gold pine, Great Southern, NZ Farm Source, PGG Wrightsons and Farmlands) as well as the Lincoln University Financial Budget Manual (LUFBM). All costs are estimates only, as topography, location and soil conditions can affect labour and material costs.

All information has been collated in Microsoft Excel spreadsheets and analysed to inform the results in this report. The information has also been used in the development of an interactive model for MPI staff.

4 Literature Review

4.1 Introduction

Fencing and riparian planting type is not prescriptive within or across the regions of New Zealand due to the uniqueness of individual waterways and their surroundings. There may be similarities in waterways and their management from different regions, and there may be waterways within regions that require quite different riparian management. However, there are some key considerations to take into account when designing waterway protection through riparian planting and fencing as described in the Clean Streams booklet (Waikato Regional Council, 2004):

- Understand where the risk of degradation to that particular waterway comes from. Is it sediment (soil), pathogens (animal effluent) or nitrogen (leaching)?
- Most suitable buffer strip will be dependent on soil type, land slope and required plantings.
- Suitable fencing. This may be a 2 wire electric for dairy farms, but a non-electric full fence for sheep and deer. Flood prone areas may require a different style of fence.
- Will access be required for cleaning waterways
- Management of weeds in fenced areas
- Plant species must suit riparian conditions.

4.2 Regional Council Regulatory Context

The importance of freshwater quality to New Zealand's economic, environmental, cultural and social well-being has been discussed in a range of documents including; National Policy Statement for Freshwater Management 2014 (NPS-FM) (Ministry for the Environment, 2014) and Managing Water Quality: Examining the 2014 National Policy Statement (Parliamentary Commissioner for the Environment, 2015). These reports give an overarching view of the issues and desired outcomes with suggested options that may be available for Regional Councils and land managers to improve freshwater quality.

The NPS-FM includes a National Objectives Framework (NOF) that guides Regional Councils in their objective setting at a local level. This involves:

- identifying all the values held by tāngata whenua and the community on freshwater management units (FMU),
- identifying attributes (the measurable characteristics) that need to be managed to provide for those values and
- formulating freshwater objectives (based on those attributes) which describe the outcome your regional council wants to achieve" (Ministry for the Environment, 2014).

This process enables Regional Councils to understand their environment through baseline recording, setting freshwater objectives, a pathway to reach the objectives and a strategy to maintain those objectives.

Regional Councils, nationally, are at varying stages of meeting the NPS-FM timelines with target dates ranging from 2015 to 2030. A summary of different Regional Councils' expectations to implement the objectives of the NPS-FM is presented in Appendix 1 - The Status of Regional Plans and anticipated implementation of NPS-FM.[1]

[1] Scan of Environmental Strategies and Initiatives in the Context of the National Science Challenge 'Our Land Our Water', The AgriBusiness Group, Internal report, June 2015

Regional Councils offer a range of resources and funding opportunities for land managers to enhance their unique environment. Part of this process, at a council level, is to assist land managers to exclude stock from waterways. Central Government is also involved in implementation, through the Ministry for the Environment that manages the Fresh Start for Freshwater Clean-up Fund. This provides Regional Councils and their project partners with financial assistance to remediate water bodies of national significance. From 2011 to 2014 the fund allocated $14.5 million to seven lake projects.

4.3 Review of Regional Council Literature and Activity

A review of the Regional Councils activity found that they individually tailor stock exclusion and waterway care to their specific regions requirements. The following are examples of fencing and riparian planting resources that are available to the public through Regional Councils and are not intended to be a comprehensive list of all resources available.

Southland

The Southland Regional Council, Environment Southland (ES) is currently reviewing the Regional Water Plan for Southland and the Effluent Land Application Plan with the goal of updating these to form the new Water and Land Plan. The aim of the new plan will be to prevent any further decline in water quality and help the community to achieve their goals for water.

They have produced booklets/brochures covering riparian plant species and planting, clean stream management, tracks and waterway crossings and intensive winter grazing (Southland Regional Council, 2015).

The Southland Environmental Enhancement Fund (EEF, 2015) is available to assist individual landowners and community groups to protect and enhance indigenous biodiversity on private and community-owned land in Southland through planting and fencing. ES has an in-house cost calculator (Emma Moran, pers. Com, Sep 2015) that is used for calculating the total (materials and labour) per metre costs of Dairy ($4.14), Sheep/Beef ($10.00) and Deer ($16.80) fencing as well the per metre cost of riparian planting of grasses ($1), poplars ($2) and natives ($3).

Otago

Environmental Considerations for Clean Streams Otago Regional Council (2005) was produced by the Otago Regional Council (ORC) and is a comprehensive guide on the management of waterways to improve water quality, freshwater life and bank stability. This booklet also provides a summary of ORC rules that may apply to waterway management, which is intended as a guideline only. The appendices include useful contacts and native plant lists for Otago.

West Coast

Promotion of stock exclusion is outlined in the operative Land and Water Plan (West Coast Regional Council, 2014), which encourages:

- The establishment, maintenance and enhancement of vegetated riparian buffers;
- Land and riparian management to be undertaken in accordance with industry best practice;
- Fencing of waterways to prevent stock access; and

- Construction of bridges or culverts over regular stock crossing points.

Intensively farmed areas are targeted where stock access are more likely to cause adverse effects.

Council is receiving funding from the Ministry for the Environment (MfE) as part of the Fresh Start for Freshwater Clean-up Fund. This includes an undertaking to fence and plant on farm properties around Lake Brunner. One of the conditions of the funding was that all works undertaken with the funding are included in a Farm Plan. The farmers undertake to build the fence and complete the planting, whilst MfE funds the material costs (Alyce Melrose, pers. Com., Sep 2015). Fencing type was mainly 2 wire electric with posts every 10 metres, which has a total (material and labour) cost of $3.98 per metre. Every additional wire would add $0.20.

For riparian planting the average cost per metre for native plants, fertiliser tablets, and labour to put the plants in the ground is $3.15.

Canterbury

Environment Canterbury (ECan) Living Streams handbook covers all aspects of management that enhances waterways; weed removal, bank shaping, riparian planting, stock crossing and fencing. This can be viewed on their website as well as downloaded as three separate PDF files. There is also a Waterway Health: Visual Assessment Kit that covers waterway health from lowland intensively stocked to hill country extensively stocked farms (Environment Canterbury, n.d.). The hill country information extends to discuss waterway care when it is not practical to fence waterways.

Funding opportunities such as the Environment Enhancement Fund and the Honda Tree Fund can be found on the ECan website, http://ecan.govt.nz/get-involved/local-projects-community-groups/living-streams/handbook/Pages/appendix-funding.aspx

Marlborough

The Marlborough District Council (MDC) provides support for farmers through farm plans. The Dairy Environment Farm Plan Programme provides the farmer with the assistance of a consultant to help establish goals and a pathway to them. The Guidelines for Sustainable Management of Native Vegetation on Farms (Marlborough District Council n.d.) has been developed to help farmers balance the protection of natural values and areas of native vegetation on the farm, without compromising productivity and is available on line for farmers to go through on a step by step basis.

Nicky Eade, Environment Science and Monitoring Group, (MDC) estimated total material and labour fencing costs where cattle are being fenced from waterways to be: waratah or post and 2 wire electric $2-$4 per metre; standard post and 7 wire stock proof fence in fairly accessible locations to be $10-$18 per metre; in remote and difficult to access areas the cost can be up to $25 per metre.

Nelson/Tasman

Community projects are encouraged through the collaboration with stream care and coast care groups as well as the NZ Landcare Trust. There is a Rivers and Stream Management Fund (Tasman District Council, n.d.) that looks at ways to improve water quality by managing stock access and maintaining vegetation buffers. A cash or work contribution up to 50 per cent of the total cost of the work is required from the landowner or occupier and the

landowner or occupier is responsible for maintaining the works to a required standard. The Tasman District Council budgets fence per metre costs (material and labour) as; 7 wire non-electric ($14.75), 3 wire electric ($6.20) and 2 wire electric ($6.00). Deer fencing is not budgeted for. Riparian plants and planting is budgeted at $25,000 per hectare (Al Check, DoC, *pers.com.* Sep 2015).

Greater Wellington

Section 32 of the Greater Wellington Regional Council's Regional Plan Review (GWRC, Aug 2015) outlines the impacts of stock on waterways, discusses the estimated length and cost of fencing waterways of different categories and the benefits. The report states that total fencing costs can range between the following:

- $1.65 per metre for a single strand electric fence which may be sufficient for dairy cows;
- $6.20 per metre for a five-wire fence, which may be suitable for beef cattle, and
- $16.00 per metre for an eight-wire post and batten, suitable for sheep and cattle.

Horizons

Sustainable Land Use Initiatives and Whole Farm Plans (Sustainable land use, n.d.) are used by Horizons to guide land managers through sustainable land management.
Whilst non-electric fencing (materials and labour) is budgeted up to $18 per metre depending on contour, electric is budgeted at $5 per metre. Riparian plants and planting has 7 categories from wetland species to poplar poles on steeper hill country.

Taranaki

The Taranaki Regional Council (TRC) works alongside hill country landowners to promote sustainable land management practices. Key tools include Comprehensive Farm Plans and Agroforestry Plans in addition to information on riparian plants and planting, and stream fencing. TRC also focuses on sustainable land management in its work with dairy farmers, and hosts a manual on their website that provides guidelines to dairy farmers and their advisors for the practical, effective, and safe management of farm practices that may affect the environment (Taranaki Regional Council, 2006).

Fencing costs were budgeted at around $10 per metre for 3 wire electric and $15 for non-electric. This increased to approximately $20 per metre for non-electric fencing on steep hill country.
The cost budgeted for riparian plants included planting (depending on plant type) is approximately $5 per plant (TBC staff, pers. Com., Sep. 2015)

Hawkes Bay

The Hawkes Bay Regional Council has a brochure on riparian management, as well as wetlands (Hawkes Bay Regional Council, n.d.), and a Land Management Team that work closely with landholders, community groups, industry and government agencies to promote the use of appropriate land management practices.

Fencing costs are estimated at $16 per metre (materials and labour) for non-electric fences and $1 per wire per metre for electric fencing. Riparian plants are estimated at $2 to $3 per plant and no cost for labour (Warwick Hesketh, pers. com,. Sep 2015).

Gisborne

Erosion is a key issue with land within the Gisborne district and there is an emphasis on mitigation strategies, such as tree planting, reversion to scrub and poplar planting (Gisborne Regional Council, May 2014).

Bay of Plenty

Bay of Plenty Regional Council (BOPRC) is very proactive in the area of waterway enhancement and has a vast array of publications including Land Management fact sheets from contaminated land, stream care, fencing to guides on the regional plan. BOPRC use a land management calculator to estimate the cost of land care as opposed to a per metre calculator for riparian planting and fencing (Darryl Hall, *pers. com., Sep 2015)*. This calculator incorporates timeline and maintenance costs.

Waikato

Waikato Regional Council, Environment Waikato (EW) has an online calculator, developed in-house, for interested parties to estimate the cost of fencing and riparian planting projects (Waikato Regional Council, n.d.). One-wire electric fences are estimated at $1.65 per metre (material and labour) with an increase of $0.30 per metre for every additional wire. Non-electric 8 wire battened fences are $16 per metre and $10 per metre without battens. Riparian plant per metre prices are $3.50, $6.00 and $1.40 for natives, ornamental exotics and poplars respectively.

An additional resource for land managers is the Clean Streams (Waikato Regional Council, 2004) booklet collated as a collaborative effort by EW and industry sector groups. This comprehensive guide explains how farming can affect waterways. It offers practical suggestions about what farmers can do, and what works best and where, together with illustrations and photographs of Waikato examples.

Auckland

The Auckland Council hosts the Waterway Protection Fund (Auckland Council, 2015) to support community initiatives improving water quality in priority catchments. Funding is primarily targeted towards projects that involve fencing off waterways, and enabling alternative water supplies for livestock that is needed as a consequence of the fencing. Funding is also available for environmental weed control and restoration planting within fenced-off areas.

The estimated cost for 7 or 8 wire post and battened fences is $15 to $20 per metre (materials and labour) depending on the number of fence angles and the slope of the ground. A riparian buffer strip of 3-5 metres is required and preference is given to projects with wider buffer strips.

Northland

Northland Regional Council's Environment Fund (2015) has five different funding streams, with most projects funded at up to 50% of their total costs. Applicants must be able to provide the remainder of the cost by way of voluntary labour, cash, other funding or in-kind contributions such as donated materials.

Funding is provided for:

- Fencing streams, rivers, wetlands, lakes or estuaries

- Planting riparian margins to achieve water quality benefits
- Fencing eroding areas and planting with soil conservation species, or
- Coastal restoration and protection projects for estuaries, dunes and salt marshes.

4.4 Regional Council Summary

Eight of the 15 Regional Councils had some form of fence and riparian cost calculations. They ranged from a web based public tool (Waikato Regional Council) to spreadsheets available on request for this report (Environment Southland and Bay of Plenty Regional Council), to budgeted figures discussed with Regional Council staff. Table 2 describes the range of prices for fencing in dollars per metre (includes labour and materials, but excludes fence line preparation). The Bay of Plenty Regional Council's figures are not in Table 2, as their calculations are based per area enhanced and hours to enhance areas. The Table 2 data aligns with Mark Sutton's (Waiau Fisheries and Wildlife Habitat and Enhancement Trust) budgeted figures (Pers. Com. Sep 2015) and the Lincoln University Financial Budget Manual (2014). Only three of the councils provided estimates for fencing steeper country and deer fencing. This is because the majority of waterway fencing has been on flat to rolling country.

Table 2 Total fencing costs ($ per metre) on flat, rolling and steep topography across New Zealand

	Sheep/cattle			Deer		Sheep/cattle		Cattle	
	Non-electric 8 wire fence			Netting		Electric 4 wire		Electric 2 wire	
	Flat	Rolling	Steep	Flat	Rolling	Flat	Rolling	Flat	Rolling
LUFBM[2]	12.8	13.4	19.7	15.1	15.1	6.7	6.7	4.6	N/A
Tasman	14.8	14.8	N/A	N/A	N/A	6.1	N/A	6.0	N/A
West Coast	N/A	N/A	N/A	N/A	N/A	4.3	4.3	4.0	4.0
Taranaki	15.0	15.0	20.0	N/A	N/A	5.0	5.0	5.0	5.0
Southland	10.0	10.0	N/A	16.8	16.8	0.0	0.0	4.1	4.1
Wellington	16.0	16.0	N/A	N/A	N/A	6.2	6.2	2.0	2.0
Horizons	15.0	15.0	16.5	18.0	18.0	7.5	7.5	4.0	4.0
Hawke's Bay	16.0	16.0	N/A	N/A	N/A	4.0	4.0	2.0	2.0

4.5 Riparian Programmes and Initiatives

There are a broad range and number of programmes and initiatives that promote waterway care that operate independently, or in partnership with, Regional Councils. They provide advice and/or financial assistance for land managers to protect waterways, and range from fencing only to fencing and riparian planting.

Stock exclusion was included in the Clean Streams Accord (2003), and in the subsequent Sustainable Dairying: Water Accord (SDWA, 2013). The SDWA has a number of targets including the 100% exclusion of stock from waterways by 31 May 2017. Matt Highway, Land Management team leader for DairyNZ, is in the early stages of developing a riparian fencing calculator which is part of the Million Metres Stream project.

[2] Lincoln University Financial Budget Manual 2014

The Million Metres Stream project is a non-profit project set up to restore the health of New Zealand waterways, metre by metre, stream by stream. The aim is to reach a million metres of water restoration.

The Dunes Trust is a nationwide organisation that brings together the knowledge and experience of communities, iwi, management authorities, industries and science agencies to save coastal sand dunes. Their website includes a cost calculator to work out the cost of riparian planting projects (Dunes Trust, 2015).

NZ Landcare Trust works with farmers, landowners and community groups nationally, to improve the sustainability of landscapes and waterways. Projects tend to be large-scale operations, sometimes dealing with land-care problems at a 'catchment level'. They often involve the Trust working together with multiple agencies plus landowners, farmers and land-care groups. These projects are funded using four main sources: MPI - Sustainable Farming Fund, MfE - Community Environment Fund, DOC - Biodiversity Advice Fund and the Waikato River Clean-up Trust (Landcare Trust, 2014).

Typically, materials for fencing and riparian planting come from these funds with in-kind funding from interested community groups. Costs are worked out based on local knowledge (Phil Keene, *pers.com.* Sep 2015)

Beef + Lamb New Zealand have produced land and environment guidelines that describe the reasons for stock exclusion of waterways, and outline the management options and benefits of this (Beef + Lamb NZ, 2015). They also run workshops to assist farmers to complete a Land Environment Plan (LEP) tailored to their own property. This plan covers a range of management areas on their farm and helps farmers become aware of farm related environmental impacts.

Landcare Research is a Crown Research Institute (CRI) with a core purpose to drive innovation in the management of terrestrial biodiversity and land resources. Robyn Simcock (Ecologist/Soil Scientist, Landcare Research), believes that it is more important to place value on the outcome rather than the cost of the input. She bases the riparian plants selection in the following order of priority:

- Animal reach - How far can the animal reach through the fence?
- Competition – Is there likely to be smothering from other plants?
- Chemical susceptibility – Will chemicals be used for weed maintenance
- Soil type – Choose the correct plant for the soil type
- Soil moisture – Use plants that are suitable for wet or dry areas
- Flooding – What is the impact of flooding and how often is this likely to happen?
- Attitude – Will the riparian margin be cared for?

Answers to these questions will help select the optimal plants for a given situation and Landcare Research has developed the NZ Nature Services tool to assist interested parties in plant selection.

NZ Nature Services (Landcare Research n.d.) is a web based tool that assists the selection of locally suitable native plant species for specific purposes. It is a one-stop shop of over 1000 plant species that provides regionally, environmentally and purpose appropriate plant

selection for habitat restoration, shelter, landscaping, mitigation, wildlife, cultural uses and other 'ecological services'.

AgResearch, another New Zealand CRI, partners with the pastoral sector to identify and deliver the innovation that is needed to create value for the country. AgResearch recognises the impact of farming on water quality and the assortment of mitigation options available. Dr. Ross Monaghan (Senior scientist with AgResearch) is leading the development of a Toolbox of Good Management Practices that will provide an assessment of the cost and effectiveness of a suite of mitigation options (AgResearch, 2015). The toolbox will include riparian fencing costs, where appropriate. It will also provide an indicative ranking of where expenditure should be prioritised to ensure that maximum benefit is obtained for each dollar invested. The Lincoln University Financial Budget Manual and Regional Councils have supplied fencing costs for this model, which is due to be released in approximately September 2016 (Dr. Ross Monaghan, *pers. com.,* Sep 2015)

5 Results of Fencing and Planting Cost Assessments

5.1 Riparian Calculator – Fencing and Riparian Planting

The fencing and riparian planting calculator is a simple Microsoft Excel tool developed to inform the cost of fencing and riparian planting on flat, rolling and steep topography across different regions of New Zealand. Riparian planting includes plants and planting costs based on $3.67 per metre, using flax and sedge type natives.

Topographical differences (flat, rolling and steep) were defined by the fencing contractors and relate to the ease and speed to erect fences. The ability to use a post driver to drive posts into the ground means that it is faster for fences to be erected on flat and rolling country compared with steep country where posts need to be hand dug.

The calculator identifies labour and material costs separately to enable the user to see how these costs differ regionally across New Zealand. It then combines both to give a total fencing cost on a per metre basis. Also included is the cost of repairs and maintenance[3], which is estimated at one per cent of the original fence material costs.

5.2 Labour Costs

Fencing quotes/estimates for labour may be budgeted per length (chain or metre), per hour or per job. Some contractors will have a base rate and then add costs per strainer, angle and gate assembly. Survey participants for this report typically give length estimates or quotes for easier (flat to rolling) country and a per hour or day quote for steeper country.

Fencing contractors tend to look at a job first before they provide an estimate of the cost. This is in recognition that every job typically has a unique aspect to it. They will assess any variables that may affect the time it would take to complete the work, such as rocky or heavy clay country, the travel time to get from the farm boundary to the site and whether fence-line materials have been laid out.

There were a number of reasons (given by survey participants) contributing towards the variation in labour costs.

- Typical supply and demand forces based on the availability of fencing contractors at the time
- The understanding of the competitive rates in the market by landowners.
- Contractors' overheads.

Many of the contractors commented that margins were tight and they tried to price jobs to equal an hourly rate of $45 to $50.

Labour costs, from the survey, varied across fencing contractors and nationwide with costs cheaper in the South Island compared with the North. Table 3 shows the labour cost of fencing of five different fence lines over three terrains (flat, rolling and steep) in the different regions of New Zealand. Labour costs for fencing rolling country were similar to flat. Steep

[3] Ongoing maintenance costs are not included in the calculator, as it is assumed there would be virtually no maintenance costs once plants are established.

country (where holes were hand dug) averaged 134% of the cost of fencing on the rolling country.

5.3 Fencing Material Costs

Wooden fencing material (Strainer posts, Stay posts, Posts and Battens) costs also differed for the two Islands with these materials cheaper in the North Island. All other fencing materials were the same price within companies across New Zealand and the only price differences found across companies. Table 4 shows the fencing material costs of five fence types in the different regions of New Zealand. These costs were the same irrespective of topography.

Table 5 combines the labour and material fencing costs to show the total cost per metre for five fence types over flat, rolling and steep topography in the different regions of New Zealand. The average cost (labour plus materials) averaged 120% for steep country compared with rolling country. For fence material costs only (excluding labour costs) for steep versus rolling this percentage is reduced due to the similarity of fence material costs across all flat, rolling and steep country.

Table 3 Regional labour costs for five fence types over flat, rolling and steep terrain in New Zealand

Labour costs for one metre of fencing (NZD)	Sheep/Cattle						Deer			Sheep/Cattle			Cattle		
	Non-electric 8 wire			Non-electric netting			Non-electric netting			Electric 4 wire			Electric 2 wire		
	Flat	Rolling	Steep	Flat	Rolling	Steep	Flat	Rolling	Steep	Flat	Rolling	Steep	Flat	Rolling	Steep
Northland	7.2	7.3	10.7	7.2	7.3	10.3	8.5	9.0	12.7	4.5	4.5	5.8	3.3	3.3	4.7
Auckland	9.7	10.0	16.2	9.3	9.7	18.0	12.2	12.8	19.5	5.3	5.7	8.0	3.5	3.5	5.7
Waikato	8.0	8.9	9.8	6.9	7.8	9.0	10.5	11.1	12.5	3.9	4.5	5.1	2.8	9.9	3.7
Bay of Plenty	6.8	7.2	9.5	6.6	6.9	9.3	8.2	8.2	10.5	3.4	3.4	4.3	2.2	2.2	2.8
Gisborne	8.8	8.8	11.0	8.7	8.7	11.0	12.5	12.5	15.0	5.5	5.7	6.7	3.5	3.5	4.3
Hawke's Bay	8.2	9.2	13.0	7.7	8.0	11.4	10.5	10.8	15.1	5.1	5.4	8.7	3.3	3.3	5.4
Taranaki	7.5	8.3	10.3	6.8	7.7	9.9	11.0	13.5	17.0	3.7	3.8	5.7	2.7	2.8	4.0
Horizons	6.8	8.0	11.0	6.7	7.8	10.8	7.3	8.3	10.7	3.6	4.0	5.2	2.8	3.2	4.2
Greater Wellington	8.2	9.3	13.5	8.4	9.7	13.6	10.3	12.0	16.9	6.3	6.8	8.2	4.7	5.5	6.6
Marlborough	7.2	7.6	10.3	6.4	7.0	10.0	7.3	8.8	10.5	3.8	4.0	5.2	2.5	2.5	3.3
West Coast	9.0	9.5	12.7	9.0	9.5	12.7	9.0	9.5	12.7	2.9	3.5	5.5	3.5	3.5	4.7
Canterbury	4.5	5.1	7.4	4.8	5.8	9.1	5.0	6.0	9.5	2.9	3.5	5.5	1.5	1.7	2.3
Otago	7.2	7.6	10.7	6.0	6.7	10.5	10.0	10.9	14.8	3.7	4.5	6.4	2.4	3.4	4.9
Southland	4.3	4.5	6.0	3.9	4.0	6.0	5.8	5.9	9.2	2.3	2.3	3.6	1.8	1.8	2.8

Table 4 Regional material costs for five fence types over flat, rolling and steep terrain in New Zealand

Total material costs for one metre of fencing (NZD)	Northland	Auckland	Waikato	Bay of Plenty	Gisborne	Hawke's Bay	Taranaki	Horizons	Greater Wellington	Marlborough	West Coast	Canterbury	Otago	Southland
Sheep/cattle non-electric wire	5.2	5.4	5.6	5.6	5.6	5.4	5.4	5.4	5.4	6.1	6.1	6.6	5.7	5.9
Sheep/cattle non-electric netting	4.9	4.8	5.1	5.0	5.0	4.8	4.8	4.8	4.8	5.4	5.4	5.8	5.1	5.3
Deer netting	9.1	9.2	9.2	9.2	9.2	8.9	8.9	8.9	8.9	10.4	10.4	10.5	9.8	9.7
Sheep/cattle 4 wire electric	2.2	2.2	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.5	2.5	2.6	2.3	2.4
Cattle Electric 2 wire	1.6	1.6	1.7	1.7	1.7	1.6	1.6	1.6	1.6	1.8	1.8	1.9	1.7	1.8

Table 5 Regional material costs for five fence types over flat, rolling and steep terrain in New Zealand

Total costs for one metre of fencing (NZD)	Sheep/Cattle						Deer			Sheep/Cattle			Cattle		
	Non-electric 8 wire			Non-electric netting			Non-electric netting			Electric 4 wire			Electric 2 wire		
	Flat	Rolling	Steep	Flat	Rolling	Steep	Flat	Rolling	Steep	Flat	Rolling	Steep	Flat	Rolling	Steep
Northland	12.3	12.5	15.8	12.0	12.2	15.2	17.6	18.1	21.7	6.7	6.7	8.1	4.9	4.9	6.3
Auckland	15.0	15.4	21.5	14.1	14.5	22.8	21.3	22.0	28.6	7.5	7.9	10.2	5.1	5.1	7.3
Waikato	13.6	14.5	15.4	12.0	12.8	14.1	19.7	20.4	21.8	6.2	6.8	7.4	4.4	11.5	5.3
Bay of Plenty	12.4	12.8	15.1	11.6	12.0	14.3	17.4	17.4	19.7	5.7	5.7	6.5	3.8	3.8	4.5
Gisborne	14.4	14.4	16.6	13.7	13.7	16.0	21.7	21.7	24.2	7.8	8.0	9.0	5.2	5.2	6.0
Hawke's Bay	13.5	14.5	18.4	12.5	12.8	16.2	19.4	19.8	24.0	7.3	7.6	10.9	4.9	4.9	7.0
Taranaki	12.9	13.7	15.7	11.7	12.5	14.8	19.9	22.4	25.9	5.9	6.0	7.9	4.2	4.4	5.6
Horizons	12.2	13.4	16.4	11.5	12.7	15.7	16.3	17.3	19.6	5.8	6.2	7.4	4.4	4.7	5.7
Greater Wellington	13.5	14.7	19.0	13.2	14.5	18.5	19.3	20.9	26.0	8.5	9.0	10.5	6.2	7.1	8.2
Marlborough	13.3	13.7	16.5	11.8	12.4	15.4	17.6	19.1	20.9	6.3	6.5	7.6	4.3	4.3	5.1
West Coast	15.1	15.6	18.9	14.4	14.9	18.2	19.4	19.9	23.1	5.4	6.0	7.9	5.3	5.3	6.5
Canterbury	11.1	11.7	14.0	10.5	11.5	15.0	15.5	16.5	19.9	5.5	6.1	8.0	3.4	3.6	4.2
Otago	12.8	13.2	16.3	11.1	11.7	15.6	19.8	20.7	24.6	6.0	6.8	8.7	4.1	5.0	6.6
Southland	10.2	10.4	11.9	9.2	9.3	11.3	15.5	15.6	18.9	4.7	4.7	6.0	3.6	3.6	4.6

5.4 Riparian planting and costs

When considering and planning riparian planting there are a number of factors to consider in a design. A wide range of resources and programmes are available to offer support. (Sections 4.2 Review of Regional Council Literature and Activity and 4.3 Riparian Programmes and Initiatives, this report). Because of the range and cost of suitable plants it is difficult to give a general cost that will fit most circumstances.

In addition to this difficulty there is also the requirement of working out the true cost of riparian planting to 100% survival of plants in a riparian strip. Steve Brailsford, presenting to the Waihora Ellesmere Trust in March, 2012, described how the true cost of planting is dependent on the number of live plants 12 months past the planting date. In his presentation he showed that even though initial planting costs were expensive, due to using protective sleeves and fertiliser tablets, the per plant cost decreases if you consider the cost per 'live' plant after 1 year (WET, 2012). His comparison was between plantings with survival percentages of 95%, 68% and 16% costing $7.89, $9.55 and $37.50 per live plant respectively. He said that most plants 'do well' at 1.5m x 1.5m spacings and this equates to an average of 4500 pants per hectare.

Plants included in Steve Brailsford's presentation contained a mix of large trees (15%), small trees/large shrubs (45%), and understory shrubs/grasses (40%). This combination plus planting costs averaged $6.54 per plant, which included logistics, supervision & coordination planning, and setting up. Ongoing maintenance costs were dependent on site characteristics, but estimated at $1.50 to $2.50 per seedling per year, for at least 2 years.

The plant density (4500 plants per hectare) aligns with the Horizon Regional Council estimate of 4444 plants per hectare and a cost of $5.50 per plant. Riparian costs reported here were calculated on the assumption that each row of plants would cost $3.67 per linear metre of stream bank, including the cost of the plant, site preparation and planting. This is calculated by dividing the cost per plant by the 1.5-metre spacing.

For riparian planting, the assumptions and costs[4] are summarised below in Table 6.

Table 6: Riparian Planting Assumptions and Approximate Costs

Plant Species	Flax and sedges
Plant Density	4,500 plants/ha
Cost per planting (plants, ground preparation and labour)	$5.50
Plant Spacing	1.5 metres apart
Cost per metre (cost per planting / plant spacing) $5.50 / 1.5	$3.67

Many riparian zones will benefit from having multiple rows of plants and in some circumstances both sides of the waterway may be planted. Table 7 gives a range of the costs that would be encountered from planting 1 to 4 rows and both sides of a waterway.

Table 7: A range of costs of riparian planting ($ per metre).

Cost per metre	Planted One Side	Planted Both Sides
1 Row	$3.67	$7.34
2 Rows	$7.34	$14.8
3 Rows	$11.01	$22.02
4 Rows	$14.68	$29.36

[4] Ongoing maintenance costs are not included in the calculator, as it is assumed there would be virtually no maintenance costs once plants are established

6 Discussion on other Relevant Issues

6.1 Reasons for riparian fencing and potential benefits

The wide range of waterways and riparian areas across New Zealand is comprehensively described in 'Managing Riparian Zones: A contribution to protecting New Zealand's rivers and streams' (Collier, K.J., Cooper, A.B., Davies-Colley, R.J., Rutherford, J.C., Smith, C.M., Williamson R.B., 1995) . It outlines the influence of watercourse size, riparian vegetation temperature and artificial development (tile drains, farming) on marine and terrestrial life. Collier et al. also provide insights into possible management solutions to enhance these landscapes, such as using a vegetative buffer strip to reduce sediment flows to water and planting to shade and decrease water temperature. Shading can improve the habitat for invertebrates, whilst cooling may improve the habitat for fish.

Importantly Collier et al. links this to the Resource Management Act 1991 (RMA), which has a

> *"…purpose to promote the sustainable management of natural and physical resources".*

Collier et al., also cites section 17 of the RMA

> *"Section 17 deals with adverse effects and obliges managers to avoid, remedy, or mitigate any adverse effect on the environment arising from an activity they undertake or are responsible for".*

6.2 Possible adverse impacts of fencing on the surrounding catchment.

It is important to recognise that fencing of waterways may also have negative impacts on the environment. For example, fencing waterways can encourage additional weed growth both instream and on banks, which may 'choke' the waterway. Weed growth can be washed away and for blockages downstream, increasing flooding potential in times of high water flow. Seeds can drop into the water from weeds growing along stream banks, and be transported downstream. Larger woody weed species can shelter and shade waterway banks, which can in turn denude the undergrowth and create a sediment runoff risk.

Low volume/flow waterways can become raging torrents during high rainfall events depending on the size of the catchment and their location in it. Careful design is required for these areas to reduce the risk of physical damage to waterways from debris trapped in fence-lines. In these situations, it may be more beneficial to use higher density planting, sediment traps, wetlands, buried drains or a combination of these and stock management strategies to enhance waterway health in the lower catchments (Robyn Simcock, Ecologist/Soil Scientist, Landcare Research, *pers. com.).*

6.3 Physical farm system design

Fencing of waterways to exclude stock will in many cases change paddock design. This can affect the efficient management of the farm, as well as animal behaviour. For instance, animals will tend to be more unsettled in long narrow paddocks compared with more square shaped paddocks. The cost of fencing waterways may increase due to the requirement for other additional infrastructure costs to accompany the stock exclusion fencing. These may include culverts, water reticulation schemes and re-fencing paddocks. Maintenance costs for this extra infrastructure is an additional annual cost and is estimated at 1% per annum of

capital cost for fencing and up to 5% of the capital cost per annum for reticulated water depending on water system type (Lincoln University, page B-137, 2014).

Waterways have traditionally been used for stock drinking water, especially in more extensive farming areas. Alternative water supplies (or water reticulation) would be required to replace these waterways. In some areas, it may mean having to install water storage costs (tanks or dams), windmills or ram pumps. Table 8 shows the cost of water troughs, culverts, pipe, water tanks, windmills and pumps. These are material only costs and do not include site preparation and labour costs.

Table 8 Key component costs used in water reticulation for stock[5]

	Size	Cost (NZD)
Concrete trough	750 litres	442.50
Alkathene pipe	200m 25mm	312.56
Culvert	5m, 400mm	603.30
Ram pump	20,500 litres/day	6,500.00
Ferguson Windmill	2,300 litres/day	2,778.26
Water tank	25,000 litres	2,695.65

To help put Table 8 into context, Table 9 quantifies the potential infrastructure costs of adding reticulated stock drinking water due to the exclusion of stock from a natural waterway. This is an example of likely costs, as actual costs would depend on existing resources, such as existing reticulated schemes to plug into, number of culverts that may be required to cross waterways that have been fenced, length of pipe required, or gravity water supply opportunities.

Table 9 Likely costs to supply 10 and 50 hectares of land with reticulated stock drinking water

For 10 hectares	Size	Number	Cost (NZD)	Subtotal cost (NZD)
Concrete trough	750 litres	1	442.50	442.50
Alkathene pipe	200m 25mm	1	312.56	312.56
Culvert	5m, 400mm		603.30	603.30
Ram pump	20,500 litres/day	1	6,500.00	0.00
Ferguson Windmill	2,300 litres/day	1	2,778.26	2,778.26
Water tank	25,000 litres	1	2,695.65	2,695.65
Total cost				6,832.27
For 50 hectares	Size	Number	Cost	Subtotal cost
Concrete trough	750 litres	5	442.50	2212.50
Alkathene pipe	200m 25mm	5	312.56	1562.80
Culvert	5m, 400mm	1	603.30	603.30
Ram pump	20,500 litres/day	1	6,500.00	6500.00
Ferguson Windmill	2,300 litres/day	0	2,778.26	0.00
Water tank	25,000 litres	1	2,695.65	2,695.65
Total cost				13,574.25

[5] Financial Budget Manual, Lincoln University 2014, pages B168-B177

6.4 Additional costs associated with electric fences

Electric fences have been used in New Zealand agriculture for over 50 years and have, in many cases, been a more affordable option, in regards to capital costs, than the non-electric fencing alternatives. It is relatively easy for farmers to better utilise pasture through temporary fencing (also called break or strip fencing), however these fence types are often not stock proof if power is reduced due to earthing of the live wire. Stock grazing tends to keep vegetation from earthing the live wires when these are used as internal fences (stock can graze both sides), but regular checking and occasional chemical spraying is required when these fence types are used for shelter belts and waterways, hence raising the maintenance cost for this type of fencing.

6.5 Advantages for farmers in fencing waterways

Stock management

There are a number of stock management advantages for farmers fencing off waterways. One is to help improve animal health. It reduces the risk of liver fluke in stock. Liver fluke (*Fasciola hepatica*) is an intestinal parasite that affects productivity in livestock which is picked up from wet areas / waterways. Farmers are more easily able to keep an eye on stock when they are not 'hiding' around stream banks or scrub.

Stock losses can be reduced in stock excluded waterways by reducing the likelihood of stock being stuck in waterways and young stock drowning.

Fencing waterways also enables farmers to shift stock more efficiently, and to utilise pasture more easily, often through use of temporary electric fencing.

Human safety

Mud, crumbling or steep banks, slippery stream banks and slimy beds may also make waterways hazardous for people, especially when using motorbikes and 4-wheelers. Keeping stock out of these areas also reduces the need for people to be there and will help make for a safer work place, which can result in fewer work days lost. Bridges or culverts adds to the safety and makes it faster for people and stock to move round the farm. (Beef + Lamb NZ, 2015).

Pasture management

If waterways have been fenced off, and water troughs are provided for stock drinking water, then the strategic positioning of troughs in a water-reticulated system may improve pasture utilisation as well as animal health. Stock graze within a certain area from a water source depending on topography, animal type, paddock size and climate. Strategic placement of water troughs can encourage more even grazing and improve productivity through improved pasture quality.

6.6 Fence types

This report describes a range of fencing costs for a range of types of fences, netting, wire (non-electric), battened and electric. Fence types across New Zealand are not limited to these, but can also include a combination of those described in the report. For example, there are fences with a mix of electric and non-electric wires; some have more wires and fewer battens, and some have no battens. There are different configurations of netting, posts and the use of waratahs (or 'Y') posts intermingled with wooden posts.

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Appendix 1 - Status of Regional Plans and anticipated implementation of NPS-FM6

Council	Plan Status	Collaborative process	Anticipated NPSFM implementation
Northland	Developing new Land and Water Plan 2015	Stakeholder workshops Waiora catchment groups	Progressive plan changes based on priority catchments with final plan changes for remaining catchments - complete by 2023
Auckland	PAUP process underway. Variations water management zones needed to give effects to NPS	Rural Advisory Panel	Progressive plan changes complete by 2021
Waikato	Variation 6 Water Quantity established initial limits	Healthy Rivers Community Stakeholder Group process. Intent is that the group will develop an agreed plan change.	Progressive plan changes based on catchments - complete by 2023
Bay of Plenty	Land and Water plan being reviewed Lake Rotorua Plan changes	Regional Water Advisory Panel Establishment of community groups in water management areas	Progressive plan changes complete by 2030 Generic plan change followed by priority catchments
Taranaki	Draft Water and Land Plan for consultation	Not available	Implemented through Water and Land Plan by 2015
Gisborne	Draft Freshwater Plan With chapters for specific catchments	Freshwater Advisory Group	Progressive plan changes based on catchments - complete by 2021
Hawkes Bay	RPS amended Tukituki catchment plan	Greater Heretaunga and Ahuriri TANK group	Other catchment plans required
Horizons	One Plan	Not available	Implement by 2015
Wellington	Draft Regional Plan in development followed by catchment plan changes	Whaitua catchment processes	Progressive plan changes by 2025 based on catchments
Nelson	Nelson RMP being reviewed	Not available	Complete by 2017
Tasman	TRMP – needs to be amended	Freshwater and Land Advisory Groups (FLAG) for each catchment	Thru plan changes after FLAG process
Marlborough	Regional Plan in development	Not available	Plan Changes by 2026
West Coast	Land and Water Plan operative	Not available	Other plan changes by 2030
Canterbury	Land and Water Plan – sub regional specific chapter variations	Zone Committees for catchments	Thru sub regional chapters by 2022
Otago	PC 6A Water Quality sets limits for water quality PC 4B Groundwater	Not available	Implemented by 2015
Southland	Plan Change 13 New dairy conversions Regional Water and Land Plan (Draft to be notified July 2015)	Not available	Progressive plan changes to be complete by 2025

[6] Scan of Environmental Strategies and Initiatives in the Context of the National Science Challenge 'Our Land Our Water', The AgriBusiness Group, Internal report, June 2015

Appendix 2 - Phone interview contact list (*not for further distribution*)

Fencing contractors			
Company	**Location**	**email**	**Ph number**
Steve Locke Fencing Ltd	Blenhiem	steve@stevelockefencing.co.nz	03 5781927
Renner Contracting Ltd	Seddon	rennerfencing@hotmail.com	03 575 7080
Bint Contracting Ltd	Nelson		03 522 4265
Blackmore Fencing	Blenheim	blackmorefencing@gmail.com	021 984 299
Buschl Fencing	Nelson	buschlfencing@gmail.com	03 544 6445
Golden Bay Fencing	Takaka	fourjake@xtra.co.nz	03 525 8426
Graeme Coleman Ltd	Seddon	GC.LTD@xtra.co.nz	03 575 7595
Prendergast Contracting Ltd	Blackball	prendergasts@xtra.co.nz	03 732 3689
RTL Trading Ltd	Upper Moutere	trrlawrence@gmail.com	03 543 2285
Steve Williamson Fencing	Timaru	shwilliamson@actrix.co.nz	03 686 4779
Ben Haugh Fencing	Geraldine	benhaughfencing@farmside.co.nz	03 693 8088
Hayman Fencing Ltd	Ashburton	lindsayjane@clear.net.nz	03 308 7394
Ewing Fencing Contractors	Oamaru	mark@ewingfencing.co.nz	03 431 3864
H & L Gill	Otautau	hamish.lyndal@woosh.co.nz	03 225 5488
Leithen Contracting Ltd	Tapanui		03 204 8778
Robertson Fencing Ltd	Fairlie	robertsonfencingltd@xtra.co.nz	03 6858 494
Stephen Mee Contracting Ltd	Winton	stephenjmee@gmail.com	03 236 0255
Topline Fencing	Cromwell	topline.fencing@xtra.co.nz	03 445 4351
Western Fencing Ltd	Otautau	bevan.tash@xtra.co.nz	03 225 5268
Boydie Rangihuna	Wellington	boydrangihuna@gmail.com	04 236 6513
Bruce Pankhurst	Masterton	b.pankhurst@nettel.net.nz	06 377 2348
Gary Graham Fencing	Masterton		06 372 5917
QEII Farms	Raumati South	qe2farms@xtra.co.nz	027 495 5693
Country Construction Ltd	Manawatu	ross@countryconstruction.co.nz	06 329 0991
Paul Corry Fencing	Bulls	corryclan@paradise.net.nz	06 322 0212
Craig Sergeant Fencing	Waipukurau	sargey@xtra.co.nz	06 858 9759
Quality Fencing	Gisborne	bayly12@clear.net.nz	06 862 5771
Ben Holden Fencing Contractors	Gisborne	marie.ben@xtra.co.nz	06 868 5564
J & N Fencing & Construction	Waipukurau	jk.nes@xtra.co.nz	06 858 7535
Roger Hyde Contracting Ltd	Gisborne	roger.hyde@xtra.co.nz	06 868 4960
Shane Bouskill	Waipawa	shane.smedleystn@gmail.com	06 856 5723
Warwick Garth	Matawhero	wildboar2@xtra.co.nz	06 863 3038
A B Contracting & Fencing Ltd	Whakatane	abcontracting@xtra.co.nz	07 304 8833
Tight Wire Fencing Ltd	Taupo	tightwirefencing@xtra.co.nz	07 378 5572
B Hodson Contractor	Kaukapakapa	traceyandbrian@yahoo.co.nz	09 420 5337
Blackwell Contract Fencing	Dargaville	peterblackwell@live.com	09 439 4814
Focus Fencing Company Ltd	Wellsford	stevies.fencing@xtra.co.nz	09 423 7310
Richard Broughton	Whangarei	puruadeer@xtra.co.nz	09 433 5702
Bruce Grant	Tauranga	brucendebz@eol.co.nz	07 543 4360
David George Contracting Ltd	Te Awamutu	thegeorges@ihug.co.nz	07 872 1888
General Fencing Ltd	Te Awamutu	mail@fencingwaikato.co.nz	07 8714 779
Paul Hunt	Cambridge	np@xtra.co.nz	07 823 9335
Robertson	Taupo	robertson.nd@xtra.co.nz	0274 746335
Blackhills Fencing	Taupo	thallmond@ruralinzone.net	07 378 8085

Robbie Stewart Fencing Contractor	Owhango	robbiestewart@xtra.co.nz	07 895 4532
Tight Wire Fencing Ltd	Taupo	tightwirefencing@xtra.co.nz	07 378 5572
C & M Stokoe Ltd.	Inglewood	caromarkstokoe@live.com	06 756 5584
Progressive Fencing	Stratford		06 764 5393
Wolland Farm Services Ltd	Stratford		06 764 8054
Aaron Hill	Pukekohe	aaron_megan@xtra.co.nz	09 238 6606
Nick Liefting Contractors Ltd	Pukekohe	nickliefting@xtra.co.nz	09 236 0570
Sutton Brothers	Drury	suttonbrothers@xtra.co.nz	021 538 439

Organisation		
Regional Councils		
Environment Southland	Emma Moran	Emma.Moran@es.govt.nz
West Coast Regional council	Alyce Melrose	alycem@wcrc.govt.nz
Environment Canterbury	referred to WET	
Marlborough Regional council	Nicky Eade	Nicky.Eade@marlborough.govt.nz
Tasman District council	Andrew burton	
Greater Wellington Regional council	Emily Greenberg	
Horizons Regional council	Grant Cooper - Lucy Ferguson	grant.cooper@horizons.govt.nz
Taranaki Regional council		
Hawkes Bay Regional council	Warwick Hesketh	Warwick@hbrc.govt.nz
Gisborne Regional council	Lois easton	Lois.Easton@gdc.govt.nz
Bay of Plenty Regional council	Daryll Hall	Daryll.Hall@boprc.govt.nz
Waikato Regional council		
Other		
DOC	Rebecca Martin	rmartin@doc.govt.nz
Waiau Fisheries and Wildlife Habitat and Enhancement Trust	Mark Sutton	
Phil Greene	Landcare Trust	
Waihora Ellesmere Trust (WET)	Adrienne Lomax	manager@wet.org.nz
Landcare Research	Robyn Simcock	
AgResearch	Ross Monaghan	
DairyNZ	Matt Highway	
Merchants		
CRT Farmlands	Grant Smith	help@farmlands.co.nz
NZ Farm source	Individual stores	
Gold Pine	Stephen Mulholland	admin@goldpine.co.nz
Great Southern	Mark Robertson	

Appendix 3 – Fencing labour cost parameter matrix

Labour costs to erect one kilometre of fence (NZD)	Sheep/Cattle						Deer			Sheep/Cattle			Cattle		
	Non-electric 8 wire			Non-electric netting			Non-electric netting			Electric 4 wire			Electric 2 wire		
	Flat	Rolling	Steep	Flat	Rolling	Steep	Flat	Rolling	Steep	Flat	Rolling	Steep	Flat	Rolling	Steep
LUFBM	6400	6400	11200	5060	5060	7001	6200	6200	8578	3470	3470	4801	3200	3200	4427
Northland	6500	6500	11000	6500	6500	11000	8500	8500	13000	5000	5000	7000	4000	4000	6000
Northland	7500	8000	12000	7500	8000	12000	8000	9000	15000	4000	4000	5500	3000	3000	4500
Northland	7500	7500	9000	7500	7500	8000	9000	9500	10000	4500	4500	5000	3000	3000	3500
Auckland	11000	12000	16602	11000	12000	22000	15000	17000	23520	4000	5000	6918	3000	3000	4151
Auckland	9000	9000	14000	8000	8000	14000	11500	11500	16000	5000	5000	7000	4000	4000	6000
Auckland	9000	9000	18000	9000	9000	18000	10000	10000	19000	7000	7000	10000	3500	3500	7000
Waikato	9600	10800	12000	8500	9400	10800	8500	9400	10800	4000	4700	5500	2850	3250	4000
Waikato	8250	8250	9250	6250	6250	7250	9000	9000	9750	4250	4250	4750	2750	2750	3000
Waikato	7000	8000	8500	8000	9000	10500	14000	15000	17000	4000	4500	5500	2500	3000	4000
Waikato	7000	8500	9500	5000	6500	7500	N/A	N/A	N/A	3500	4500	4750	3000	3500	3750
Bay of Plenty	6000	7000	9000	5800	6800	8800	8000	8000	10000	3000	3000	3500	2000	2000	3000
Bay of Plenty	6500	6500	6500	6000	6000	6000	6500	6500	6500	N/A	N/A	N/A	2000	2000	2000
Bay of Plenty	8000	8000	13000	8000	8000	13000	10000	10000	15000	3750	3750	5000	2500	2500	3500
Gisborne	10000	10000	11000	10000	10000	11000	18000	18000	18000	6500	7000	7000	2500	2500	3000
Gisborne	8000	8000	10000	8000	8000	10000	10000	10000	12000	5000	5000	7000	4000	4000	6000
Gisborne	8500	8500	12000	8000	8000	12000	9500	9500	15000	5000	5000	6000	4000	4000	4000
Hawke's Bay	9000	12000	16602	7500	8500	11760	7500	8500	11760	6000	7000	9685	3000	3000	4151
Hawke's Bay	8000	8000	12500	8000	8000	12500	16000	16000	22500	4500	4500	10000	4000	4000	7000
Hawke's Bay	7500	7500	10000	7500	7500	10000	8000	8000	11000	4750	4750	6500	3000	3000	5000
Taranaki	8000	8000	10000	7000	7000	9000	N/A	N/A	N/A	3000	3000	5000	2500	2500	3000
Taranaki	6500	9000	11000	5500	8000	10000	11000	16000	20000	3500	4000	6000	3000	3500	5500
Taranaki	8000	8000	10000	8000	8000	11068	11000	11000	14000	4500	4500	6000	2500	2500	3500
Horizons	7500	9500	14500	7500	9500	14500	8000	10000	13000	4000	4500	6000	2500	3000	4500

Horizons	6000	7000	10000	6000	7000	10000	6000	7000	10000	3750	4000	5000	3000	3000	4000
	Sheep/Cattle						Deer			Sheep/Cattle			Cattle		
	Non-electric 8 wire			Non-electric netting			Non-electric netting			Electric 4 wire			Non-electric 8 wire		
	Flat	Rolling	Steep	Flat	Rolling	Steep	Flat	Rolling	Steep	Flat	Rolling	Steep	Flat	Rolling	Steep
Horizons	7000	7500	8500	6500	7000	8000	8000	8000	9000	3000	3500	4500	3000	3500	4000
Greater Wellington	9000	12500	19500	9000	14000	20000	9000	14000	20000	9000	10000	11000	7000	9000	10000
Greater Wellington	8000	8000	11000	8700	7000	10000	9500	9500	14000	4000	4500	5500	2500	3000	3750
Greater Wellington	7500	7500	10376	7500	8000	11068	12500	12500	17294	6000	6000	8301	4500	4500	6226
Tasman	N/A	N/A	N/A	8000	8000	16000	18500	18500	N/A	8000	8000	N/A	6500	6500	N/A
Tasman	9000	9000	12452	6000	6000	8301	10000	10000	13000	3000	3000	4151	2500	2500	3459
Tasman	6000	6500	7000	5000	5500	7000	6500	7000	8000	4000	4000	5000	2750	2750	3500
Marlborough	7500	7750	9000	6750	7500	9000	6500	7500	8500	3500	3500	4500	2500	2500	3000
Marlborough	7000	7000	12500	7000	7000	12500	N/A	N/A	N/A	4000	4000	5534	2000	2000	2767
Marlborough	7000	8000	9500	5500	6500	8500	8000	10000	12500	4000	4500	5500	3000	3000	4151
West Coast	9000	9500	13143	9000	9500	13143	9000	9500	13143	2917	3500	5511	3500	3500	4842
Canterbury	5000	6000	9000	5000	5500	10000	5000	6000	12000	3250	3500	6000	2000	2000	3500
Canterbury	N/A	N/A	N/A	4500	6000	8301	5500	7000	9500	2000	3000	5000	1500	1750	1750
Canterbury	4000	4200	5811	N/A	N/A	N/A	4500	5000	6918	3500	4000	5534	1000	1300	1799
Otago	9500	10000	14000	7500	8500	14000	10000	11500	17000	4500	5500	8000	2250	3250	5750
Otago	6500	7200	9000	5500	6500	8500	8500	9800	12000	4000	5600	6200	3000	4800	5500
Otago	5500	5500	9000	5000	5000	9000	11500	11500	15500	2500	2500	5000	2000	2000	3500
Southland	4000	4500	8000	4000	4500	8000	4000	4500	8000	3000	3000	5000	2500	2500	5000
Southland	4272	4472	6187	4272	4472	6187	5472	5672	7847	2472	2472	3420	2172	2172	3005
Southland	N/A	N/A	N/A	4000	4000	5000	5000	5000	6000	2000	2000	2500	1500	1500	2000
Southland	N/A	N/A	N/A	3500	3500	7000	7000	7000	14000	2500	2500	5000	1800	1800	3600