Environment Southland
A Report from the Farm Debt Working Group

Farm Debt, Farm Viability and Freshwater Management in Pastoral Southland

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EM | CONSULTING

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Cover photo: Otamita Stream and farmland in the Hokonui Hills, Southland
Source: Emma Moran

Executive Summary

Introduction

Since the deregulation of New Zealand's economy in the 1980s, investment in pastoral farming, largely funded by debt, has increased in many regions and been largely directed towards intensification. In Southland pastoral farming has long been the mainstay of the regional economy and an outcome of this investment has been increased pressure on the environment, which underpins the economy.

The tension between the stewardship of fresh water and the financial position of farms, particularly in relation to farm debt and land values, is of particular concern for local communities across Southland. While farm debt is important in the context of freshwater management, the topic is complex and expansive, and our joint knowledge is limited. Environment Southland set up a research project in 2021 to develop an understanding of the topic that can be used to inform its implementation of the National Policy Statement for Freshwater Management 2020 in Southland.

This report follows the progression of an expert panel from July 2021 to 2022, known as the Farm Debt Working Group, as they explored the topic of farm debt and freshwater management in this region. The Farm Debt Working Group was comprised of seven professionals from agri-finance, agri-business, accountancy, land valuation, and rural support services. Collectively, the members held just over 200 years' experience in their respective industries, almost all of which has been living and/or working in the south. In essence, this is their report and it is designed to let their voices come through strongly.

Over the course of four workshops, the Farm Debt Working Group were supported by a technical team, had access (in general terms) to the environmental science and policy direction for Southland, and made use of tools from The Southland Economic Project[1]. In these workshops the Group tested and developed their understanding of the topic via three mechanisms: 1. an in-depth roundtable discussion, 2. hypothetical 'what if' scenarios to reduce (in turn) nitrogen and sediment, and 3. a systems mapping exercise to show the relationships between the important factors and possible pathways. They also drew some final observations and identified possible areas for future work.

The approach recognised that there is a lack of publicly available data, especially at a regional-scale. Much of what is known about farm debt (other than farmers' individual experiences) sits within the agricultural services sector, as well as reflecting the importance of industry knowledge, and a detailed understanding of freshwater management. This report is the main output of a Farm Debt Research Project and follows a background paper supplied by the Technical Support Team for Workshop 1.

Although the Farm Debt Working Group was given a broad scope for this research, the background paper posed two specific research questions for their consideration:

1. *How might the many factors that determine farm debt (e.g. cashflow, farm size, production system, a farmer's ability and skills, productive efficiency[2], profitability, and land values) influence the socio-economic impacts of environmental policy; and*
2. *How might the socio-economic impacts of environmental policy influence the uses of farm debt as a business management tool in the future?*

[1] https://www.es.govt.nz/environment/economy

[2] Efficiency is one of those terms where usage is so commonplace that few people may ever stop to think about what it actually means. Economic efficiency has four main components: technical, productive, allocative and dynamic efficiency (Australian Productivity Commission, 2013). Productive efficiency relates to the use of different resources (e.g. labour, land, water) in the production of goods and services, including externalities such as contaminants. It is not the same as cost-effectiveness, which is simply a cost per unit of output.

Key Findings

Over the four workshops described above the Farm Debt Working Group covered a lot of territory, but it started with the famer and ended with local communities. The following key findings are drawn together from this process, summarising the many extremely valid points made in the main body of the report, the range of which highlights the complexity and diversity of the topic.

The Farmer

1. **Skills**: In all aspects of farming there are 'curves' (i.e. ranges, continuums, or distributions), including those that measure the skills and capabilities of the farmer. The reality is that for freshwater management the businesses that survive will be those that are most resilient, with resilience being determined primarily by the farmer and how they farm. More skilled farmers will be in a better position to cope with change, and some will do so by increasing in scale using farm debt. Other farmers may struggle and for some the right decision may be to exit from an industry, but if this is necessary then it needs to be allowed to occur with dignity.
2. **Risk grades**: As a bank customer, a farmer's capital allocation and interest rates are now based on their individual risk and security profile (rather than on the book value of a business). This profile is all about the farmer, and increasingly considers their level of environmental compliance. A high level of scrutiny is put on debt and income risk (and so the farmer) because these risks determine a bank's cost of capital for that client.
3. **Decision-making**: Freshwater management creates different pathways for pastoral farmers depending on their skillset and situation. It will pose challenges for some and provide opportunities for others. Some farms will continue to increase in scale, smaller farms may be more vulnerable (depending on their profitability), and farm succession may become even more of a turning point for families. A farmer's choice of pathway will depend in large part on past and present decisions (as well as their appetite for risk), particularly in relation to debt and the environment. Decision-making under stress and uncertainty can put 'a fog' over it all.

The Farming Business

4. **Business first**: The increasing shift to build more financial management on to a farmer's practical skills is influencing farm viability. Farmers must now develop their own farm budgets (rather than their bank) and many farmers do so, with some also using their budgets on a regular basis. Farmers need to contribute cash when borrowing for the costs of infrastructure, and they are being introduced to farm environment plans (with the logical next step being to link them to those farm budgets). The extent to which a farmer views their farm as a business usually shows in the farm's governance and management.
5. **Farm debt**: Debt is both a choice and a vehicle to achieving outcomes in business. It must be viewed relative to cashflow (as cashflow increases, debt tends to follow and vice versa). Both are tied to a farmer's skill set and drive performance and they need to be understood by industry and by region because of variability in production systems. For dairy, differences in farm systems makes debt comparisons between farms using per kg of milk solids of very limited value. Also relevant is whether farm debt includes any off-farm debt (e.g. in the residential housing market) or off-farm income that helps with servicing debt repayments.
6. **Farm viability**: Banks focus on the viability of a farm, which is dependent on the farmer, because this is how a farmer pays for debt. How much debt a business can handle depends on cashflow and, to a certain extent, the valuations and security available – some farmers can support high levels of farm debt and still have a very viable business. The years with

good cashflow are used to strengthen their position, including investing in the environment. Smaller-scale farms are potentially less viable and need industry and community support.

7. **Land values**: A farm's value is the total farm capital, not just its land value. National environmental regulations have removed some sale options for sheep and beef farmers, although many sellers are not yet aware of the changes. Recent increases in the price of dairy farms suggests buyers are either 1) not making sure they are fully informed (i.e. due diligence) or 2) reasonably optimistic about the future. There might be substantial changes in land use with more regulation, and although land values may decline, they will not be predictable.

The Setting

8. **The Regulator**: just as the farmer's decision-making is crucial, so is that of the regulator. By design, policy constrains farming activities to achieve environmental outcomes. Its impacts will be determined, in part, by the level of certainty, clarity and flexibility to allow for farm adaptation and innovation at paddock, farm or catchment-scale. The impacts of policy will also be influenced by the regulator's approach to communication and implementation.
9. **The Banking Sector**: After a period of more freely accessible finance, banks have recently introduced stricter lending policies in response to new banking regulations. They use three key factors when making decisions about loans to a farm business (in this order): the skills and capabilities of the client (or farmer), income or business viability, and security position. As well, each bank is currently developing their own Environmental, Social and Governance policy framework and starting to report on it. The banks will support compliance with environmental regulations and, as a business themselves, they 'follow the money' in longer-term trends.
10. **Industry and community support**: Wider support for farmers generally occurs on two planes: the horizontal plane of what might be thought of as the old 'school community', the people in a district operating together and feeling a worthwhile part of that community; and the vertical plane, which is more the broad industry community (councils, agricultural services, banks, industry groups, processors and manufacturers). Support from both communities is seen as critical to the quality of farmer decision-making, especially in situations where there is more vulnerability. Ultimately, It all influences farm viability and community wellbeing.

Further Research

This research has established the importance of understanding a region's farm debt and farm viability profile. However, research of this type tends to raise more questions and there are many ways it can be taken further. The most important, and one that the Farm Debt Working Group emphasised, is ground-truthing with farmers from across the agricultural sector. In-depth case studies are proposed that take a whole farm approach to the topic, looking at ranges (not averages), and capture all the key factors farmers consider when making strategic decisions. A knowledge gap was identified around farms with little to no debt and low profitability. For land values, suggestions were to develop a valuation model to calculate a capitalisation rate, which can be used to test the impacts of policy on land values, and a focus on how rural land valuation influences environmental issues. Beyond this, an obvious research question is how can the understanding from this research be applied to help manage the potential impacts on farm viability while achieving environmental outcomes? It was highlighted that there are many things landing 'on the kitchen table' and any future investment in the region should incentivise innovation across multiple environmental outcomes. Other questions to come from this research include: how has the past use of farm debt as a business management tool influenced current environmental issues? And how will increasing farm scale and corporate ownership influence environmental outcomes and the wellbeing of local communities?

Contents

1 Introduction

The tension between the stewardship of fresh water and a farm's financial position, particularly in relation to farm debt and land values, is of real concern for communities across Southland (as it is in other regions around New Zealand). De-regulation of New Zealand's economy in the 1980s (which included the removal of agricultural subsidies) and subsequent land use change towards dairy farming in lowland areas, has seen many farmers increasingly using debt as a business management tool. Over a similar timeframe, farms across the agricultural sector have become more and more dependent on using fresh water as a resource – both to supply water takes and to receive waste products (e.g. excess nitrogen and suspended sediment) from production systems.

While farm debt is important in the context of freshwater management, the topic is complex, and our joint knowledge is limited. The topic has many aspects to it that are highly technical in nature and developing even a general understanding requires drawing on a broad range of skill sets – from agri-finance and land valuation to rural support services to environmental policy and science. Few people or organisations are in the position of holding more than a handful of pieces of the puzzle.

To shed some light, Environment Southland set up a research project in 2021 to consider farm debt and freshwater management in relation to pastoral farming. There were two main reasons for focusing the scope on pastoral farming. First, dairy farm debt has received a lot of recent attention, but farm debt is not limited to the dairy industry. Second, since the 1980s[3] Southland has become increasingly pastoral and now around ninety-nine percent of farms are predominantly pastoral: either drystock (sheep, beef and/or deer) or dairy (Moran et al., 2017).

The main purpose of the research project was to develop a shared understanding of the topic to inform its implementation of the National Policy Statement for Freshwater Management 2020 in Southland. To achieve this, the research centred on a panel of local experts, known as the Farm Debt Working Group (or the Group), supported by a technical team of representatives from industry-good groups.

This report follows the progression of the Farm Debt Working Group over a series of four workshops. It is the second and final output of the research project – the first being a background paper supplied to the Group by the technical team as a starting point for the workshops (Moran, Doole, Neal, Burtt, Fisher, Fung, Monge, and McDonald, 2021). The research methodology is outlined in the next section of this report, while sections 3 to 6 detail the content of the four workshops: a roundtable discussion, commentary on two 'what if' scenarios, and a simple 'systems mapping' exercise.

The research was briefly discussed with the Regional Forum[4] before its recommendations were finalised and the report will be used in the future as one of many inputs into the development of Plan

[3] Although land uses change over time, pastoral farming has always dominated agriculture in Southland. In the early days of colonial settlement, farms were truly mixed production systems, including drystock, dairy and arable enterprises, and up until the 1980s the region was second only to Canterbury for arable farming. Arable farms are usually a mix of crop and livestock enterprises, and most pastoral farms have some form of arable cropping, particularly winter forage and fodder crops, often grown for their own stock (Moran *et al*., 2017).

[4] The Regional Forum is the community group that Environment Southland's Council and Te Ao Marama Board set up under the National Objectives Framework, which is central to the National Policy Statement for Freshwater Management. Their task is to provide advice and recommendations on how to achieve the region's environmental outcomes for fresh water (i.e. the types of limits and methods and their timing). More information is available at https://waterandland.es.govt.nz/regional-forum

Change Tuatahi to the proposed Southland Water and Land Plan 2018[5]. The report's value lies in bringing together a range of perspectives for a more-informed conversation on the socio-economic impacts of freshwater management.

> *As banks and bankers, we have a massive part to play in environmental sustainability and helping our farmers succeed. Working collaboratively with regional councils, farm advisors and other professionals will be incredibly important. If farmers you know are struggling, please help them reach out for support.*
>
> ***James Laming (Senior Manager, Canterbury Provincial, ANZ) – June 2021***

2 Methodology

2.1 The Farm Debt Working Group

Farm debt and freshwater management intersects numerous fields of study, yet any foundational body of literature is still developing, at least in New Zealand. An extensive range of factors are relevant to this topic but there is a lack of publicly available data for most of them, especially at a regional scale, and without access to information it is difficult to understand the topic. Moreover, the relationship between farm debt and fresh water is shaped by the local economic, policy and environmental settings. In other words, there is a lot to know, not as much to work with, and context matters.

The primary method used in this research project was to form a panel of local experts, known as the Farm Debt Working Group, for a series of workshops that were supported by a technical team of economists and policy analysts[6]. This methodology recognised that much of what is known about farm debt sits within the agricultural services sector but, for reasons of commercial sensitivity and personal privacy, is not readily accessible in a quantitative sense. It also reflected the importance of industry knowledge and a detailed understanding of freshwater management. This report retains as much of the 'voices' of the group members from the workshops as possible to avoid inadvertently changing their meaning.

The Farm Debt Working Group comprised of seven professionals from agri-finance (3), agri-business (1), accountancy (1), land valuation (1), and rural support services (1). Each member brought different perspectives to the Group based on their individual skill sets and careers. Collectively, they hold just over 200 years' experience in their respective industries, almost all of which has been living and/or working in the south. Although in some cases it included farming, farmers were not specifically represented because the focus was on accessing knowledge of as many farming situations as possible while keeping the group's size manageable. The agri-finance members represented three of New Zealand's major trading banks: Westpac, ANZ, and Rabobank.

The technical support team was made up of representatives from industry-good groups: DairyNZ, Beef + Lamb New Zealand, and Deer Industry New Zealand. The team also included two consultants for Environment Southland with expertise in ecological economics and local government. This team developed a background paper summarising industry knowledge on farm debt in Southland, which

[5] This plan change will principally set environmental outcomes and limits for water quality and water quantity under the National Policy Statement for Freshwater Management 2020 in Southland.

[6] All of the participants in this research project are listed in the report's acknowledgements. Sadly, one member of the Farm Debt Working Group passed away during this research project.

was used as a starting point for the series of workshops. In addition, the Farm Debt Working Group had access (in general terms) to the environmental science and policy direction for Southland.

2.2 Workshops

Using tools developed within The Southland Economic Project[7], the Farm Debt Working Group explored the topic of farm debt and freshwater management over a series of four workshops between July 2021 and February 2022. In Workshops 1 to 3 the Group tested and developed their understanding of the topic through three mechanisms: a roundtable discussion, considering 'what if' scenarios for nitrogen and sediment, and an exercise that mapped as a system the relationships between the important factors influencing the topic. In Workshop 4 the Group drew some general conclusions, including identifying some possible areas for future work.

Roundtable Discussion (Workshop 1)

The first mechanism used in the workshops was a roundtable discussion of farm debt and freshwater management. In this in-depth discussion, each member of the Farm Debt Working Group had an opportunity to share their individual perspectives on the topic in turn and comment on the perspectives of others. These perspectives were subsequently used to compile a set of general themes reported in Section 3.

Two steps were taken to help give some shape to the roundtable discussion. First, the Group were supplied in advance with a background paper on farm debt in Southland produced by the Technical Team, and Beef + Lamb New Zealand gave an overview for the sheep and beef industry[8]. Second, the Group received a briefing on the general policy direction and science for this research and an introduction to The Southland Economic Model[9], which was used to develop "what if" scenarios for the following workshops. This briefing included an explanation of the regional policy processes for managing fresh water and an indication of the estimated contaminant reductions needed to reach different environmental outcomes.

'What if Scenarios' (Workshops 2 and 3)

The next mechanism used in the workshops was to present a pair of 'what if' scenarios to offer the Farm Debt Working Group different ways of looking at how freshwater management may impact

[7] The Southland Economic Project was a five year joint initiative to develop robust tools for understanding the impacts of implementing the National Policy Statement for Freshwater Management. DairyNZ, Beef + Lamb New Zealand, Department of Conservation, Ministry for the Environment, Ministry for Primary Industries, Southland Chamber of Commerce, Te Ao Mārama, and Environment Southland. A wider group of organisations were involved in the project, including the three local councils (Gore District Council, Invercargill City Council, and Southland District Council), Deer Industry New Zealand, Southland Branch - New Zealand Deer Farmers' Association, Foundation for Arable Research, and Horticulture New Zealand. More information is available at https://www.es.govt.nz/environment/economy

[8] DairyNZ and Deer Industry New Zealand gave similar overviews for their respective industries in Workshop 2.

[9] The Southland Economic Model is a model of the regional economy developed as part of The Southland Economic Project. It is a system dynamics class of model that includes core features of a Computable General Equilibrium (CGE) model. The model's dynamic nature allows it to test the implications of policy scenarios over time.

pastoral farming across the region. **These scenarios are purely hypothetical** and were developed to stimulate conversation rather than inform the drafting of future policy.

First was a relatively simple scenario designed to reduce losses of excess nitrogen[10] (refer to Section 4), and second, a more complex scenario to reduce suspended sediment (refer to Section 5). In both scenario sessions, the Farm Debt Working Group were asked to consider the interplay between the financial costs of these scenarios and farm debt as a business management tool.

The two 'what if' scenarios were originally developed for the Regional Forum in 2020 to show the capabilities of The Southland Economic Model and as an introduction to scenario testing. The full results of these scenarios are described in separate unpublished memos as that process is still underway. The relative effectiveness of these scenarios in achieving environmental outcomes across the region was not considered by the Farm Debt Working Group.

While the pair of scenarios just consider two of the four main contaminants of concern for water in Southland (nitrogen, phosphorus, sediment and microbes – as indicated by *E. coli*), they do broadly represent the vertical and horizontal contaminant flow pathways of the other contaminants. These flow pathways are directly relevant to the actions needed to manage contaminants, as well as the financial implications of those actions. The flow pathways are shown in *Figure 1*. While the Farm Debt Working Group considered the nitrogen and sediment 'what if' scenarios in turn, it was emphasised that in reality reductions in all four contaminants will be needed concurrently.

In considering the contaminant flowpaths it is important to understand their regional context.

In lowland Southland, wetlands originally covered roughly half of the area (Clarkson, Briggs, Fitzgerald, Rance, & Ogilvie, 2011). Over the years, these wetlands have been drained using extensive networks of tile and mole drains for the development of agriculture. Since 1840, the area of wetlands on land now in private ownership is estimated to have reduced from around 220,000 hectares to 8,486 hectares (or 3.2% of the original area) by 2015 (Dalley & Geddes, 2012; Ewans, 2016). The draining of wetlands has increased pressure on the environment by making more land available for use while reducing the environment's natural capacity to attenuate nutrient losses from this land (Moran *et al*., 2017). As well, the installation of tile and mole drains has created direct channels (or pathways) for losses of nutrients to enter surface water, bypassing some natural processes.

In addition to its wetlands, Southland has a mosaic of unconfined, shallow groundwater aquifers that exchange groundwater to surface water relatively quickly (Moran *et al*., 2017). Around half of all of the water in Southland streams is groundwater from these aquifers, although it is highly variable across the region, with lowland streams having a much higher proportion of groundwater than alpine streams. The consequences of the quick exchange between groundwater and surface water are that there is often limited natural water storage in areas of developed land, and nutrient losses move through the landscape rapidly (i.e. short lag times). Accordingly, the modification of Southland's lowland hydrology favours the rapid transport of nutrients, sediment and microbes, reducing the time available for natural processes to attenuate these substances before they reach waterbodies

Before exploring the scenarios, the Farm Debt Working Group had an opportunity to question Environment Southland's Policy and Planning Manager about the general direction of freshwater management in the region. The Group were also introduced to the Southland Land Use Map as a tool for understanding the spatial distribution of activities across the landscape.

[10] Nitrogen in excess of a plant's requirements to grow. It is a contaminant in rivers, streams groundwater, lakes and estuaries that can cause environmental and human health issues.

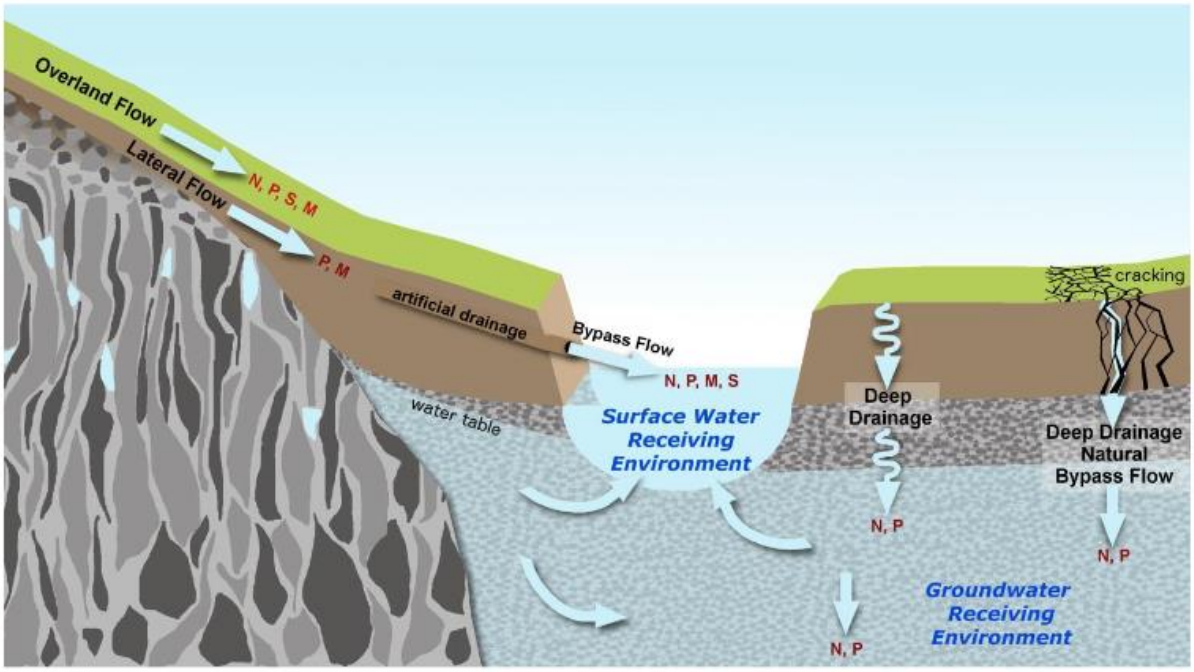

Figure 1: Pathways for nitrogen (N), phosphorus (P), microbes (M) and sediment (S) from the soil zone
Source: Physiographics of Southland, 2016

Systems Mapping Exercise (Workshops 3 and 4)

Although the roundtable discussion and the "what if" scenarios were insightful, the diversity and complexity of the topic proved to be challenging to manage, particularly in drawing together general conclusions. To address this issue a simple exercise was designed to 'map' (or draw) as a system the key factors (or variables) influencing, and being influenced by, farm debt. The aim of the exercise was to highlight important cause and effect relationships, particularly where a series of them might create either a 'ripple' or a 'spiral' situation that is anticipated to lead to either negative or positive outcomes.

In this exercise systems mapping was explained conceptually to the Farm Debt Working Group and then they were stepped through an initial version of a system diagram for farm debt developed within the technical team. This diagram was drawn from a farmer's perspective of the farming system within which they operate. The initial version was revised based on the Group's commentary and a second version was produced and reviewed by the Group before being finalised for this report (refer to Section 6). This exercise helped the Farm Debt Working Group shape their general conclusions from this research.

3 Roundtable Themes

The main part of this section is sourced from the Farm Debt Working Group' roundtable discussion, and the text follows the discussion closely to reflect the 'voices' of those in the group. Specific comments made by members of the Farm Debt Working Group are shown in italics.

As discussed in Section 2, the Farm Debt Working Group began in Workshop 1 with a roundtable discussion on farm debt and freshwater management with each participant sharing their perspectives

on the topic. Although the Group was given a broad scope for their discussion, two specific research questions were posed to them[11]:

1. How might the many factors that determine farm debt (e.g. cashflow, farm size, production system, a farmer's ability and skills, productive efficiency[12], profitability, and land values) influence the socio-economic impacts of environmental policy; and
2. How might the socio-economic impacts of environmental policy influence the uses of farm debt as a business management tool in the future?

The Group's discussion was wide-ranging, and as it moved around the table each member in turn focused on specific aspects of the topic, with early speakers covering territory that those that came later had intended to mention. Importantly, the group appeared to be in general agreement during the discussion, although there were some differences in perspective between each profession. Eight early themes emerged, although they were all closely connected in one way or another. This section summarises the discussion around those themes:

1. The farmer
2. Understanding farm debt: cash surplus, asset values, and security positions
3. Changing attitudes to farm debt and risk
4. Labour efficiency and economies of scale
5. Farming as a business
6. Farm succession
7. External factors and risks of assumptions
8. Stress, uncertainty and communication

The first two themes reflect three key factors that banks use when deciding whether to make a loan to a farm business: the skills and capabilities of the client (or farmer), income or business viability, and security position. Overall, it was clear that, while farm debt is a business management tool, the topic started with farmers and ended with farmers. Appendix 1 – Notes from Canterbury (July 2021) captures a banking perspective from Canterbury that was circulated to the Farm Debt Working Group ahead of their Roundtable Discussion.

3.1 The Farmer

- Within bank or accountancy client bases there are distributions for many aspects of farming. The reality is that managing farming activities to improve fresh water is likely to be a continuation of the 'survival of the fittest'. The farmers with the most viable farm businesses will clearly be more financially resilient, and so in the best position to adapt to changing circumstances, while those with less viable farms will find it challenging. Some may have little choice but to exit farming.

[11] A third question that was not considered in this research but may be relevant for future work is: how might the use of farm debt as a business management tool have influenced current environmental outcomes?

[12] Efficiency is one of those terms where usage is so commonplace that few people may ever stop to think about what it actual means. Efficiency is an economic concept and has four main components: technical, productive, allocative and dynamic efficiency. Productive efficiency relates to the use of different resources (e.g. labour, land, water) in the production of goods and services, including externalities such as contaminants. It is not the same as cost-effectiveness, which is simply a cost per unit of output. A useful reference is Australian Productivity Commission (2013) On efficiency and effectiveness: some definitions.

- A certain type of farmer, either because of their skill set, farm location (e.g. topography, physiographic zone, or catchment), or a combination of circumstances, is unlikely to last over the medium to long term (i.e. 25 to 30-year timeframe). It is anticipated the banks will see issues developing within their client base reasonably quickly and will need to move to address them.
- The farmers with less viable farm businesses are a long way from where the banks want them to get to, and often across many areas – the state of their financial planning, health and safety, animal health, attracting staff, farm infrastructure (including housing), and the environment. While around half of dairy farms have much improved their farm infrastructure, the other half are building up liabilities over time that will need to be addressed before they can turn their attention to new environmental policy (including regulation).
- The "*general consensus*" amongst dairy farmers is that achieving the first 15 percent reduction in excess nitrogen will be relatively straight forward, but further reductions will require system change and/or land use change. The farmers with the more viable farms are doing much of the first 15 percent already, those with the less viable farms appear not to be interested (or do not have all the skills or the cash needed), and the others tend to "*go with the flow*". A lot of dairy farmers are willing to commit capital now, but not if a whole system change will be required in 10 to 15 years.
- Less uncertainty, which shows as trust in local and central government policy direction, is important for these investments to be made, and it is at a low level at this stage. It is expected that the change resulting from freshwater management will be complex and massive at a farm level.

3.2 Understanding Farm Debt

- Farm debt should not be looked at in isolation – it must be seen alongside other financial measures, particularly net cash income (or cash surplus), which in this context generally means income minus operating expenses, and farm asset values. Farm debt also needs to be viewed by industry by region, especially where there are geographical differences in production systems that flow through the business, differences in farmer career cycles, and the scale of land use change.
- In dairy farming the variation in production systems makes debt comparisons between farms using per kg of milksolids of limited value because of the range in the use of inputs. For example, a high input system at 1,800 kg milksolids per hectare[13] may have low debt per kg milksolids but high farm working expenses (e.g. over $5.50 per kg milksolids) plus debt servicing costs. Debt comparisons also need to consider where there is off-farm debt.
- There is huge diversity in farms between and within localities, as well as variation in how they are managed. As a result, there is a need to start looking at ranges and groupings, rather than averages, which will become more and more meaningless at a farm level.

Cash Surplus

- To some degree, a farmer's debt arrangements influence their cash surplus (and vice versa), although it is important to understand the definition of cash surplus being used because it

[13] All financial metrics using hectares refer to a farm's grazing and cropping area (often referred to as 'effective area'), not its total land area. The distinction between 'effective' and 'ineffective' land, with the later implying it is of little to no value, is inconsistent with a whole farm approach.

may vary by industry. At present, many farmers are just managing to "*break even and adding environmental risk over their business may mean they are unlikely to survive*".

- More thought is needed on the ratios used to measure farm debt. A comparison of two Southland dairy farms that both have $35 of debt per kg milksolids shows one farm generates a cash surplus of $5,000 per hectare and is handling its debt level quite easily, while the other has a cash surplus of $1,500 per hectare and is under pressure from the bank to repay principal. It does not make sense to look at farm debt – or any other measure – in isolation.
- Southland's debt per kg of milksolids is reasonably low compared to other regions because of the high costs of wintering of stock in this region. Many dairy farmers only have their cows on the dairy platform from August to May, and during June and July they are grazed off with the costs for specialist grazier services being a farm working expense. In contrast, grass growth continues across most of the rest of New Zealand throughout winter, and so cows remain on the dairy farm and stocking rates are lower. As a result, the costs of wintering show up, not as a farm working expense but in farm debt, because the farmers need to own more land. However, increasingly Southland dairy farmers buying their own wintering blocks, either as part of their milking platform or on a separate property.
- Many North Island farms are self-contained and have better pasture growth over winter – their cost structure, and so operational expenditure, is quite often a lot lower than in the South. One region's average debt per kg of milksolids is not always comparable to elsewhere in the country because the metrics banks use can vary.
- The general policy of banks is to be more interested in whether a farmer can afford this debt level within their production system and enterprise than being concerned about the rate of return on a farmer's investment (or equity[14]). A farm is treated by the banks as a business, and how much cash is being generated relative to debt servicing costs is more important than indicators such as debt per kg of milksolids, which can be seen as "*largely irrelevant*".
- Dairy farms have been making additional debt repayments in a consistent fashion since 2019. However, much of the debt that has been repaid is incapable of being re-borrowed because it now sits outside of a bank's rural lending policy (e.g. their income criteria and security requirements for loans). Some clients in Southland, and throughout the South Island, have repaid at least $500,000 over the past two years and may still have an additional $1 million to repay to be within the lending policy. Banks want to see those clients who remain outside of their lending policy back within its limits, so they are in a position to relend to them, but realistically this may not happen.

Asset Values

- A farm's value is the total farm capital, not just its land value. Although it is based on a range of assets, it is primarily determined by its highest and best land use that is practical, feasible and legally permissible (including rules for freshwater management). Farmers finance the purchase of these assets using a combination of equity (or savings) and debt (or borrowings). More detail is available in Appendix 2 – Notes on Rural Land Valuation (July 2021).
- The market for rural farmland requires both willing and able buyers and sellers. Since 2014, the dairy industry has been through a phase of fluctuating returns, which has been reflected in the volume of farm sales being about one third of its normal level – about 16 dairy farms per year. In 2016 prime dairy land in Southland was worth between $42,000 and $45,000 per total hectare, whereas more recently it dropped to $35,000. When the land price dropped,

[14] Return on equity, or amount invested, differs from return on asset if not all the asset is owned by an individual or entity.

and if say 10 percent of Southland's 1,000 or so dairy farmers wanted to exit the industry, it would have taken three or four years to "*clear the decks*". Over the first half of 2021 the price rose back up to between $38,000 and $40,000 per total hectare. However, there is a wide variation in land values, from around $20,000 to well over $40,000, depending on the locality and quality of the dairy farm.

- There is a gradually increasing awareness and understanding amongst farmers about environmental issues, but there are going to be huge impacts on the various land use classes and movement between them. In discussions with clients around whether to sell farms with certain soil types, people generally appear to have faith in technology and believe they "*will be fine*" holding on to their land.
- The regulations around intensification in the National Environmental Standards for Freshwater have removed some sale options for sheep and beef farmers, but many people are not yet aware of the changes. Dairy farmer clients are not intending to buy sheep and beef farms because they can no longer intensify them – "*unless the price of that land drops by roughly half*". In the future there might be substantial changes around land use, and although land values may decline, they will not be as predictable as environmental limits "*start to bite*".

Security Positions

- Of the factors banks use in their decision-making on loans, a farm's security position (i.e. equity, or the value of an asset minus debt) is possibly a lesser consideration – typically, if there are security issues then there may also be business viability issues. While some people can operate at 70% debt successfully, most cannot; if there is a security issue with a drystock farm, then it is likely to be a problem.
- Managing the security positions of clients can be challenging, even for those that have generally been very profitable. Some farmers appear to carry a lot of farm debt, but because they are profitable the debt is "*neither here nor there*". Where clients have negotiated a good interest rate with their bank their debt servicing costs can be less than $0.50 per kg of milksolids, which is low for dairy – in the past it was fairly normal to have debt servicing of around $2.20 per kg of milksolids.
- Each bank actively manages its client base by measuring the bank's return on equity that it has committed as loans. Therefore, farmer security positions are critical to the approach to environmental actions. For example, there is little incentive for a farmer to invest $2 million on an asset, such as a cow wintering barn, if it is valued at $200,000 upon getting a registered valuation, because they will have lost $1.8 million of equity. If there are bank security issues there may be less ability to invest in farming, particularly if profitability declines as well.

3.3 Changing Attitudes to Farm Debt and Risk

- Based on observation, attitudes to debt amongst farmers appear to vary markedly. Some farmers appear to be more like land developers and use debt for capital gain, whilst others "*do not want to pay a penny for debt*". Typically, farm debt only becomes a problem when people start to run out of profitability and so loan serviceability.
- Banks are now using interest rate margins based on debt and income risk grades (or ratings), along with security and capital (each individual client's capital allocation is a combination of their risk and security profile). While the banks have different approaches, farmers are often ranked into three groups, with the farmers of the less viable farms unable to access the best interest rates and so paying more for their borrowing.

- Attitudes to debt are similar to those for cash flow – in the past there has been an expectation that banks will step in when farmers run out of money and lend them more. However, banks have real concerns with funding ongoing losses because if a business is just not profitable then it can quickly get to the point where there are potential liability issues and past the point of no return back to profitability.
- Risk grading clients has become extremely important. In the past banks determined the capital requirements for borrowing "*on a book basis but now it is done on a client basis*". A high level of scrutiny is put on the risk, and so on a client, "*because the amount of capital required depends on the client*". For farmers who receive a poor risk grade, banks are unlikely to be able to charge them sufficient to cover a bank's costs because the capital allocation required of banks by the regulator rises as "an exponential curve" with risk.
- Ongoing financial losses can result in a drop in a client's risk grade, which is used to determine whether there is a significant increase in credit risk. Once a client is higher risk then if they get outside security the amount of capital needed against the debt "*balloons*". When this occurs, it is difficult to get a return, regardless of the interest rate charged.
- More research is needed on farmers with little to no debt and low profitability – their age group, farming intentions, and the scale of their operation – there are many "*one-man bands*". Those with lower stocking rates tend to be in their 50s and 60s (or older) and are often struggling with a succession plan (previously it was to sell for dairy grazing). By contrast, a client who is a top sheep and beef farmer has the highest debt loading and is involved in off-farm business because they can generate profits from scale and innovation. There is a likely correlation between cash surplus, profitability and debt.
- While the standard bank rural lending policy has not changed in the last ten years, adherence to it has. In the past bankers could go outside of their assessment parameters but now they are instructed not to. Loans are starting to be declined on environmental grounds ("not huge numbers yet but one or two") and banks can "come down extremely hard" where there are issues of non-compliance.
- In farming, banks are relatively lenient with poor performing businesses because they deal across years, often a three-year period, whereas for commercial businesses it may be only three months of rising debt before a bank requires a client to start making structural changes within the business.

3.4 Labour Efficiency and Economies of Scale

- Across agriculture, improvements in labour efficiency have been achieved by 'scaling up' and as farm systems change with freshwater management, labour efficiency will become even more important. However, the intensification regulations in the National Environment Standards for Freshwater may now be a risk for labour efficiency as it is difficult for dairy farms to gain a consent for additional land and/or cows.
- Constraints on scale are a real issue for smaller dairy farms (i.e. those with a herd size of 200 cows) that rely on increasing their scale over time to remain an economic unit. Where those farms carry higher levels of debt then they may be forced to exit the industry, which will create business opportunities for other dairy farms to expand, and result in a consolidation of the industry. More research is needed to understand the influence on environmental outcomes and outcomes for local communities[15].

[15] The Goldschmidt Hypothesis, which was developed in the United States in 1940s, argued that there is an inverse relationship between farm size and community wellbeing. More recently, there is some evidence to

- For large dairy farms scale can be a double-edged sword. As an example, a client with a large dairy farm worth about $30+ million and carrying $28 per kilo debt quickly found themselves in trouble when the farmgate milk price dropped a few years ago. The value of the farm created issues for the farmer and the bank because, if they had wanted to sell, there were few people in a position to buy it (including the next generation).
- Scale has a major impact across all businesses, but particularly drystock because of the number of smaller-scale farms. These farms might have a debt-to-equity ratio that seems strong, but their productive capacity is low with only 2,000 to 3,000 stock units, and their ability to absorb costs and make any changes is limited. Environmental limits "*might wipe out*" this group. As has been seen over the last 30 years, the scale of farms continues to grow.

3.5 Farming as a Business

- Traditionally, farming has not always been looked at primarily as a business. Many farmers were skilled in a practical sense, and enjoyed the outdoor work and the lifestyle, but had less interest in financial management[16]. To illustrate the point, a commercial client considering an acquisition usually expects a return on investment of anywhere from 20 percent to 35 percent, whereas a farm (even at low interest rates) is doing well to generate a 10 percent return on investment (or equity).
- These days a farmer who is looking at building infrastructure will have to contribute 50% of their own cash and the bank may finance the other 50%. In the past a bank might have financed 100% of the cost but "*those days are long gone*". Similarly, twenty years ago banks used to develop farm budgets for a farmer but now the task has shifted onto the farmer.
- Whether a farmer views their farm as a business shows in its governance and management. In Southland the larger farm businesses usually provide the banks with budgets and use online accounting software but the average sized farm businesses do not tend to do so. As an example, a reasonably profitable client who owed $11 million expected a good interest rate (based on their balance sheet) but was not using a budget and did not provide any financial information. Banks view having a farm budget as essential for a farmer to work through the implications of freshwater management with their bank.
- While some of the best performers are known to produce monthly financial reports, not all farmers have an annual farm budget, especially those who are under stress. As a rough estimate, possibly 60% of farmers have farm budgets and 40% of those who do (i.e. 24% of farmers) use them as a working tool – "*the rest just have them to keep the banks happy*".
- Developing financial management practices takes time "*and can be a journey*". Farmers who are behind are trying to catch up quickly, which itself can create more stress. Those farmers who make use of their farm budgets tend to be those who are running the most profitable operations. Some of these farmers are already mapping out what future environmental regulations may look like financially for their business.
- To treat the farm as a business needs a mind-set change within agriculture. The younger generation coming through tends to have more interest and openness to "*this is the way you*

show that smaller-scale, locally owned and operated farms are often connected with greater community wellbeing than larger-scale corporate-owned or industrialised farms, for example: Fairweather (1986) and Lobao and Stofferahn (2007).

[16] Increasingly, farms are being viewed as two businesses: a production business that creates value from pasture and crops, and an asset management business where assets can increase in value independently of the production (A. Burtt, *pers. comm*, March 2022).

have to do it", rather than, "*this is the way we've always done it*". However, there can still be a transfer of attitudes and practices between generations that perpetuates past situations. "*By default, they just carry on the same ways*."

3.6 Farm Succession

- The influence of farm debt is likely to show at farm succession, especially because freshwater management is likely to result in farm system adaptation and changes in productivity, profitability and capability. The 'first rule of farm succession' is to have a profitable business so there are usually some exits from farming for the less viable farms at this point. The next generation may be more open to change it still depends on a farm's financial situation.
- Freshwater management may cause an increase in exits rather than succession to the next generation, especially alongside increasing scale. Furthermore, the pace of those exits may be faster, which will affect the way they occur. Family members who believe that the future of a farm business is uncertain will be less willing to put their share of any inheritance into family debt where it might be at risk. If a farm is unprofitable and small-scale then a family is likely to have few options other than to exit.

3.7 External Factors

- The relationship between freshwater management and farm debt should not be thought about in isolation. To illustrate the point, two sheep and beef farms, both with over 5,000 stock units and 48% debt to equity ratios: the first farm has several investment properties on their balance sheet and is generating a cash surplus from farming of over $1,000 per hectare, while the second farm has no investment properties and a surplus of over $500 per hectare.
- Factors that drive debt include farm location, management ability, skills and age of the farmer and their appetite for risk to push the boundaries. Other factors also come into play – interest rate cycles, greenhouse gases, immigration staff issues, animal welfare issues, fluctuations in the share prices. Although interest rates are currently low, they will rise, especially as inflationary pressures build in the United States and around the world. More research is needed that takes a whole farm approach to the topic, capturing all the factors that farmers take into account when making business decisions (e.g. interest rates, production costs commodity prices, environmental compliance, and the intensity of production systems).
- Farm debt is usually thought of as relating to primary production but many clients who have "*been in the game for a long time have a lot of debt*" that is related to non-farm investment. When interest rates were low and cash more freely available they made investments that either generate additional income or are passive, which for Southlanders is typically a holiday home in locations such as Central Otago. This off-farm debt is used to manage the balance sheet and maximise leverage in the client's borrowing strategies.
- When farm debt is looked at as a stand-alone debt (e.g. per kg of milksolids or per stock unit), some of the farms with higher farm debt to equity ratios do not necessarily reflect the farm balance sheet because of their assets elsewhere. Recent government initiatives with residential rental properties are driving some of that restructuring.

3.8 Stress and Uncertainty

- The community is facing a lot of uncertainty and people are delaying decisions about investment strategies because of it. From conversations "*around the kitchen table*", farmers do not want to invest any capital they may have if a) they are unlikely to recover it when they eventually sell, or b) if they do not know an investment will help them meet future rules.
- Some farmers are not in a position to invest because they bought property at the height of the market and are now using any cash surplus to reduce their debt-to-equity ratio. Others are seeing applications for wintering barns and other infrastructure being declined because "*while the banks like doing business, they are not prepared to give another $2.5 million*".
- Good communication between farmers and banks will be key. Environmental actions will need funding, so farmers will have to talk to the banks, but it is a two-way conversation and the banks need to lead it more, especially with their business skills. While some farmers will want to get in front of it, others will either wait to see what happens before acting or they are just not interested. "*Trust is massive*." "*A lot of farmers do not understand what they need to do – for them it is a real problem.*"
- Many small-scale businesses are isolated and often in denial because they either do not have the scale to justify reaching out for help with environmental management or there is a perception that it will come at a cost they cannot afford. There is an opportunity to help these farmers, but they have to be open to the idea and it needs follow-up for change to happen.
- Farmer stress levels increase as banks start to question debt trends over time and the viability of a business that is unprofitable from one year to the next. At some stage, this can spill over into real concerns that often involve support agencies, such as Rural Support Trust.
- Typically, a farmer who is struggling will say something along the lines of: "*the bank is pressuring them to get out of farming, but the farmer will say they have done the numbers and if everything goes right all year, they will make money, and all will be right – and by the next year they have made another loss.*"

4 'What if' Nitrogen Scenario

In Workshop 2 the Farm Debt Working Group was presented with a 'what if' scenario to reduce excess nitrogen from more intensive pastoral farms. Excess nitrogen tends to follow the more vertical flowpaths to groundwater and through to surface waterbodies (refer to Figure 1).

The 'what if' nitrogen scenario was modelled as follows:

> *All pastoral farms losing more than 25 kg nitrogen per hectare per year (kg N/ha/year) in 2020 must reduce their nitrogen loss in two steps:*
>
> 1. *An initial reduction of 10% of a farm's 2020 nitrogen loss by 2025; and*
> 2. *If still above the threshold of 25 kg N/ha/year, then an additional reduction of 10% of a farm's 2020 nitrogen loss by 2030.*

This scenario was tested initially against four representative global 'economic futures', which vary assumptions about technological change, international co-operation, environmental action, and economic growth. The assumptions influence matters such as commodity markets and terms of trade.

Note – This scenario relates to losses of excess nitrogen that occur at the bottom of a plant's root zone. While 20 percent reduction (-10% by 2025 plus -10% by 2030) is not of a similar scale to the total reductions in nitrogen loads in fresh water needed in many localities to achieve Southland's draft

environmental outcomes, the stepped approach (i.e. -10% every 5 years) does reflect the target-setting that may be needed to reach those environmental outcomes over the next generation.

The scenario modelling was based on research from The Southland Economic Project. Figure 2 shows the case study farms from this research with base (or existing) nitrogen losses of more than 25 kg N/ha/year (this threshold is marked by the red line), which were: 1) 36 out of 41 dairy farms (or roughly 88%); and 2) 8 out of 43 drystock farms (or just under 20%). There was no clear relationship within an industry between a farm's base nutrient losses (either nitrogen or phosphorus) and its profitability. Farms losing less excess nitrogen were just as likely to be profitable as farms in the same industry losing more excess nitrogen. However, regardless of a farm's base nutrient losses, the actions to reduce excess nitrogen by 20 percent may reduce dairy farm profitability by between 5 percent and just under 30 percent. Figure 3 (on the next page) shows this distribution for the 38 of 41 dairy farms able to achieve a 20 percent reduction with the actions available in Overseer® (Version 6.2.1) before they had to turn to retiring land as an option – noting some of the 38 dairy farms may have been amongst the five dairy farms with base excess nitrogen losses of equal to or less than 25 kg N/ha/year.

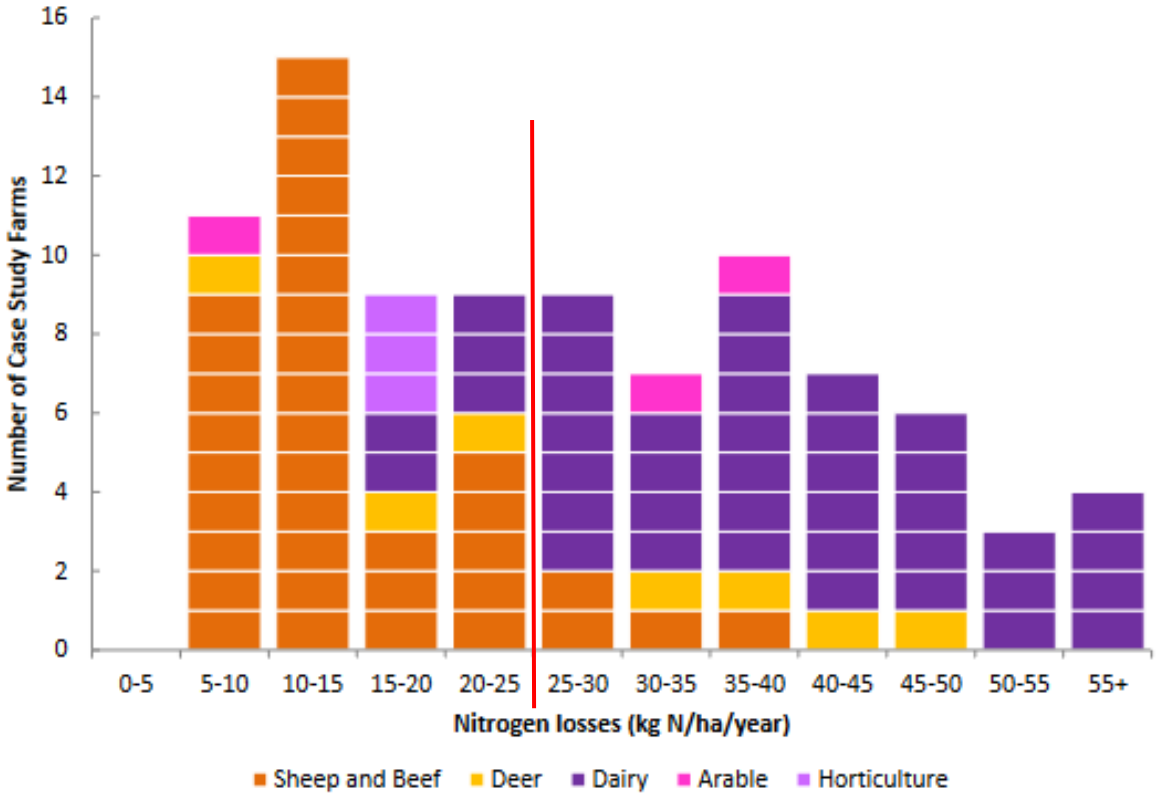

Figure 2: Baseline nitrogen for 95 farms in Southland (Moran et al, 2017)
Source: The Southland Economic Project: Agriculture and Forestry Report

Turning to drystock, the farms with excess nitrogen of more than 25 kg N/ha/year are unlikely to have a large land area (more than 1,000 hectares) but they are likely to either raise or graze dairy cows. In general, the drystock farms had fewer actions available to them in Overseer to reduce excess nitrogen by 20 percent (before having to turn to retiring land as an option) because they usually have lower input production systems (e.g. 25% of the case study farms did not apply nitrogen fertiliser to pasture).

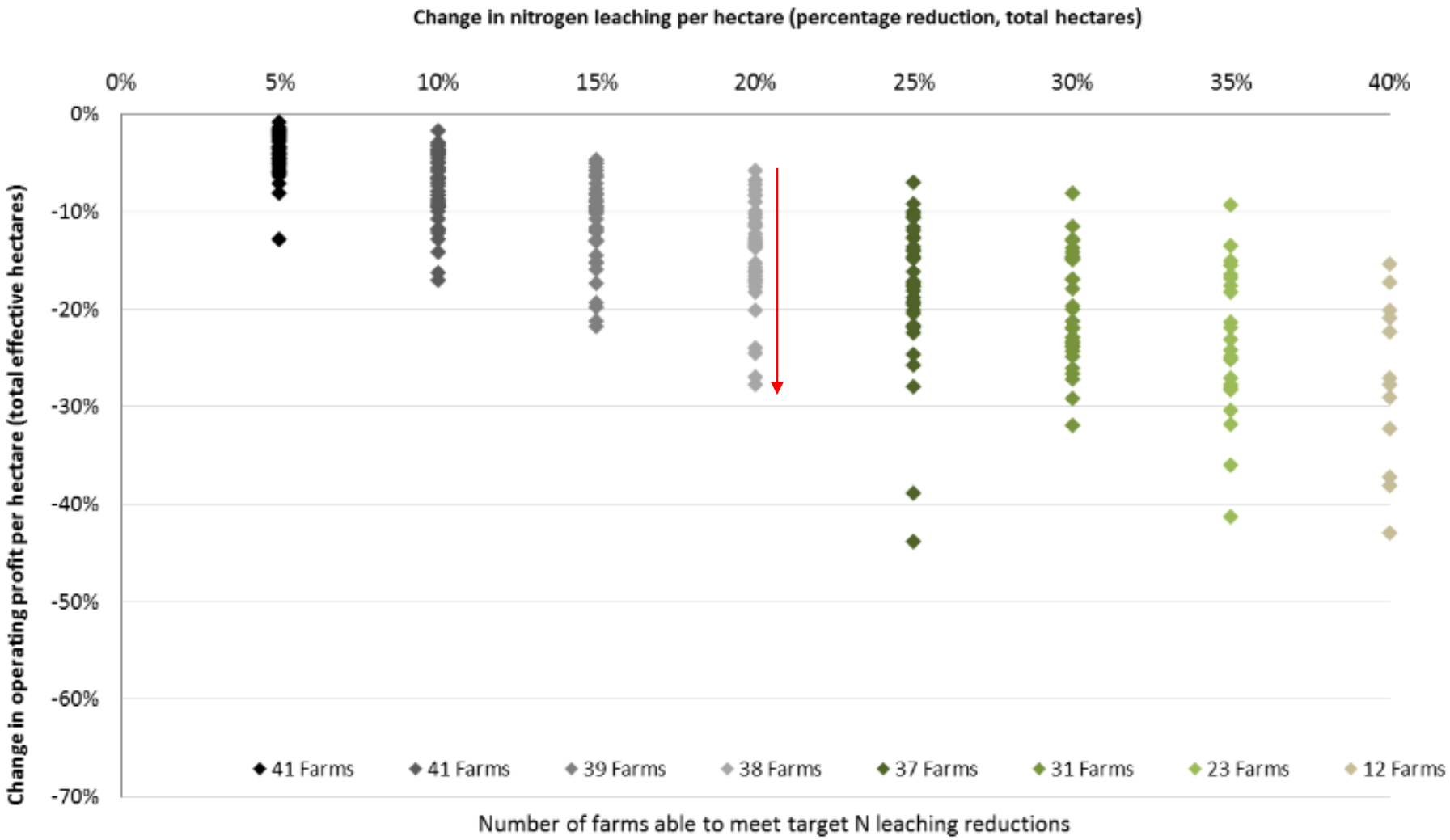

Figure 3: Distribution of nitrogen mitigation cost per dairy case study farm (using Overseer® Version 6.2.1)
Source: Newman and Muller (2017) in The Southland Economic Project: Agriculture and Forestry Report

The most effective action tested for drystock was to change a farmer's crop policy, especially for the farms with higher excess nitrogen, and it is likely to have a similar impact on profitability as for dairy. Reducing nitrogen fertiliser can increase profitability but it may be temporary if below maintenance level, and soil fertility and farm productivity decreases.

4.1 Results

The focus of this report is on the Farmer Debt Working Group's commentary around a nitrogen scenario in general terms, rather than the specific modelling results for this scenario. The scenario, and its results, is the subject of modelling prepared for the Regional Forum and yet to be published by Environment Southland. However, it is possible to briefly summarise the findings specific to agriculture (all financial results are adjusted to NZ$2017).

Overall, this nitrogen scenario projects a reduction in total value added for the Southland economy of around $160 million a year by 2040, or 1.9 percent of total value added. The impacts for dairy farming reach around $80 million a year less in value added by 2040 compared to what they may have otherwise been. Although the two nitrogen 'steps' in this scenario are achieved by 2030, the reductions in value added may continue to grow over time as the industry receives less investment and growth into the future than might have occurred otherwise. For employment, there is a possible loss of 186 employees in dairy farming by 2040 across the region – largely because of fewer resources (i.e. labour as well as capital) being invested in the industry over time, due to lower profitability.

This nitrogen scenario also projects around $21 million a year less in value added by 2040 combined across the other industries in the agricultural sector (sheep and beef, deer, and arable) and horticulture. In contrast, the forestry and logging industry may experience a gain in value added as it receives increasing investment over time in response to a decline in profitability of pastoral farming (and its related activities). Over time, around half the employment reductions for dairy farming are compensated by gains in employment in drystock farming as it becomes more attractive for the labour resource in the region.

4.2 Commentary from the Farm Debt Working Group

The following is a summary of the main points made by the Farm Debt Working Group when considering the nitrogen 'what if' scenario. Following the workshop the Farm Debt Working Group were asked to reflect on their discussion and asked to provide further comments. The notes received are included in Appendix 3.

- The modelling results from this scenario suggests a possible reduction of roughly 10% in the number of dairy cows in Southland. Farmers will be very reluctant to let profitability and production drop – "*they will die in the dust*" and will do everything they can to help maintain them. For a much larger drop in the region's dairy herd the farmgate milk price would have to increase to around $15 to $20 per kg of milk solids to be viable, which might be possible in the future but is not now. *"An end to dairy farming is unlikely to be an outcome the community wants."*
- There are alternative land uses available and there is always the next 'new thing' coming along – the world never stays the same. For example, by planting *Pinus radiata* as permanent carbon sinks, a buyer could afford to pay $15,500 per hectare for land to achieve an internal

rate of return[17] of 6%. However, forestry farming for carbon has a 30-year cycle and if 30 to 40 percent of Southland is planted in trees it may mean change for some local communities and their council services. The cashflow for building the roading infrastructure to access the forestry for harvesting may also be an issue.

- Some environmental actions can take longer to implement than is anticipated. For example, one farmer planned to establish a wetland over four years, but it ended up taking twice as long to make it happen. Building a herd home or wintering barn is difficult at present because of issues in the construction industry's supply chain. In the past farmers have had to wait two years for a builder, and now materials are hard to come by and prices have "shot up". Many farmers are being pushed to "shift a lot of debt" before even thinking about a project like a wetland or a herd home.
- Many farmers will be "totally lost and not have a clue what to do" in response to this scenario. Some are already deciding to exit farming and are starting to sell up, especially in the sheep and beef industry. "They are used to getting up in the morning and going out farming, they are not used to paperwork and rules". When change occurs, it tends to be that someone exits and someone else comes in and makes the change. "You end up with new people – someone with fresh ideas, fresh capital and fresh skills." However, change also means social upheaval, particularly when it occurs at scale and at pace.
- Some of the dairy farms in the scenario modelling have an economic farm surplus per hectare of less than $1,500. If a farmer is producing 1,300 kg of milksolids per hectare and had debt servicing of $1.20/kg of milksolids then that equates to $1,560 per hectare to service their interest. Any economic farm surplus lower than that will result in a considerable loss after tax and drawings etc. Banks are unlikely to continue lending to farmers in such a position for long.
- Banks are assessing the amount of debt a farm business can handle and, in this scenario, it will be "*drastically less*" than current debt levels. It is likely some dairy farmers will have to sell up and, if a farmer cannot sell, then the bank will sell for them. Their land value could drop down to an alternative land use that is profitable and bankable.[18] Lower profit dairy farms are likely to be sold as lowland sheep farms, which may also be impacted by this scenario in one way or another.
- In response to this scenario, banks may shift funding towards more profitable industries on to that land or move away from the rural sector. "*The banks will follow the market over a 25-30-year timeframe, so as the housing market drifts upwards, they will follow it.*" Banks may change their minimum equity ratio – at present this ratio sits at around 40 percent but might have to go up to 55 percent to cover the bank's Environmental, Social and Governance policies[19], which are under development, and overall risk. However, it will be a different situation if they see someone has already made big environmental changes. "*There is likely to be a reset*" across the region.
- When farm businesses run at a financial loss farmers tend to struggle through for a while hoping that things will improve in time. However, the reality is, when a farm must manage its

[17] Internal rate of return (IRR) used in financial analysis to estimate and compare the profitability of potential investments. Effectively, it is a discount rate that makes the net present value of cash flows equal to zero.

[18] The modelling results for profitability (measured in the dairy industry using EBIT[18]) can be used to calculate the capitalisation rates[18], which will indicate how the value per hectare of land may change (refer to Appendix 2 – Notes on Rural Land Valuation).

[19] For example: Westpac https://www.westpac.co.nz/about-us/sustainability-community/environmental-social-governance/; ANZ https://www.anz.co.nz/about-us/corporate-responsibility/; and Rabobank https://www.rabobank.co.nz/sustainable-farming/ and https://www.rabobank.co.nz/community/

nitrogen losses as well as everything else, it is likely to mean some farmers have to exit their industry. "*Conversations must be started now so this happens with dignity.*"

- Farm value is "*propped up*" (or supported) by the next alternate land use and it lies at the "*crossover*" between land uses. If an industry is not profitable then farmers will eventually leave to do something else. A shortage of young people "*coming through*" will translate into lower demand for farms. Under this scenario land values are likely to decline with some properties combined into larger farm units, which is already occurring, and an increase in corporate ownership. Corporatisation can result in lower performance where a farm's management lacks the work ethic that is often incentivised by being an owner/operator.
- The pathway for sharemilkers into a dairy farm is already changing – few people "*start from scratch*" and buy their own dairy farm anymore – they either have existing equity or it is a generational process. There are already labour supply issues across the agricultural sector, which is putting pressure on farmers and "*the fallout is already being seen*". Lower profitability is likely to impact wage rates for existing workers, who will then look elsewhere. The dairy industry is reliant on migrant labour but for migrants it is usually just a job rather than looking towards farm ownership. "*Locals are not there today and will not be in five to ten years' time either*." Who will own the farms in the future is unclear.
- There have been years over the last decade that have played out in a similar way to this scenario (i.e. a marked decrease in profitability) – but as a result of economic drivers rather than environmental. This experience suggests the real estate market does not react quickly because farmers "*hold on*", and it can be three or four years before it comes back. There was a point where dairy farms on the West Coast were not selling because the dairy company was for sale and, although that market lost momentum, people had confidence the issue would be resolved (eventually the dairy company recapitalised).
- This scenario is different because the change (i.e. a reduction in excess nitrogen) is more permanent so there is likely to be some downward pressure on land values. If profitability was to decline by 20 percent, then logically the value of land would come down similarly, but there is usually some kind of land use change that will support land values before it gets to that sort of level. Yet there may be some pressure on some drystock farms[20] if dairy support is no longer such a viable option to contribute to cash flow.
- While this scenario presents challenges, there are also other factors, such as the strength of the New Zealand dollar or interest rates, that influence land values. "*If the exchange rate was to come back because farmers are unable to maintain production, farmgate prices will go up and that may work as a buffer*." It is impossible to know what will happen long-term, but there is likely to be "*a negative bias to land values*". The value of dairy land increased over 2021, as the market responded to good returns "*and probably does not have much understanding of the environmental strategic picture, which in rural communities is low.*"
- The need to maintain and enhance water quality was introduced with the Resource Management Act in 1991 "*so it has been a generation since then where nobody seems to have taken much notice*". The attitude of some people appears to be: "*we have done it this way for generations, why should we change"*. It is going to be extremely difficult to get the momentum for change needed to make nitrogen reductions. "*Some are taking it seriously, but it is going to be a challenge to get the bulk of people on board. What people are prepared to pay for land now shows that they are not too concerned about the environmental stuff*."

[20] In the Southland Economic Project 12 of the 46 drystock farms surveyed (or roughly one quarter) earned revenue from dairy grazing.

5 'What if' Sediment Scenario

In Workshop 3 the Farm Debt Working Group was presented with a 'what if' scenario designed to reduce sediment from two main sources: surficial (or overland) erosion and erosion of the banks of rivers and streams[21]. However, in comparison with the nitrogen scenario, this sediment scenario was relatively complex but for the purposes of this report it is not necessary to fully understand the detail before turning to the Farm Debt Working Group's commentary in Section 5.2.

For the area covering the Waiau, Aparima, Ōreti, and Matāura FMUs it is estimated that 92 percent of the suspended sediment load comes from surficial erosion with eight percent from bank erosion (Neverman, Smith, Herzig, and Basher, 2021). The highest rates of erosion occur in the headwaters and along the main channels in the middle to lower reaches of the main surface water catchments[22] (Neverman *et al*., 2021).

To reduce sediment from these sources, the 'what if' scenario modelled the impacts of two actions being implemented on pastoral land across the region:

1. *Exclude stock and plant riparian buffers for all non-ephemeral waterbodies[23] at least 1 metre wide; PLUS*
2. *Retire steep erosion-prone farmland in the headwaters based on Land Use Capability (LUC) classes[24].*

These actions were tested using two alternative amounts of land retirement:

1. *5 metre riparian buffers and retiring all LUC 7 and 8; AND THEN*
2. *10 metre riparian buffers and retiring all LUC 7 and 8 land plus 17%25 of LUC 6e land (e.g. steep gullies).*

… as well as two alternative implementation timeframes:

3. *actions to be put in place over 10 years; AND THEN*
4. *actions to be put in place over 5 years.*

---

[21] Other sources, such as shallow landsliding or gully erosion, do occur within Southland (particularly in Fiordland and headwater catchments) but evidence suggests their contribution to loads of suspended sediment is relatively minor in the Ōreti and Aparima (Neverman et al., 2021: p 9). Environment Southland has commissioned the development of a landscape classification of erosion susceptibility across Southland (Rissmann et al., 2020).

[22] More information on suspended sediment in Southland, including estimates of the reductions needed across the region to achieve draft Freshwater Objectives under the National Policy Statement for Freshwater Management 2020, is available at https://www.es.govt.nz/environment/water/whats-in-our-waterways/sediment

[23] An ephemeral waterbody is one that only contains flowing or standing water following rainfall events or extended periods of above average rainfall.

[24] Land Use Capability (LUC) is a classification system that was develop in the 1960s to assess and map the productivity of soil and land resources across New Zealand at a scale of 1:50,000. An LUC assessment rates the ability of land to support agricultural and forestry production using five factors: soil, rock, slope, erosion, and vegetation cover. It also considers climate, the effects of past land use, and the potential for erosion. There are eight LUC classes, ranging from Class 1 (good multi-use flat land) to Class 8 (steep l and with severe physical limitations). Classes 1 to 4 are usually suitable for cultivation, Classes 5 to 7 tend to be better suited to pastoral farming and forestry, while Class 8 is typically not suitable for any agricultural or forestry use and is usually left in indigenous forest or tussock grasslands for catchment protection (Moran et al., 2017).

[25] The estimate of 17% of 6e land was based on detailed GIS analysis of steep gullies across pastoral land in Southland.

…that together created a set of four variations to this scenario.

The Farm Debt Working Group were presented with the least stringent and most stringent of these four variations, the details of which are summarised in Table 1.

In contrast with the nitrogen scenario, this scenario reflects more of the complexity involved in policy design. However, the scope of scenario does not capture the many relevant technologies that have been developed to manage losses of sediment, such as sediment traps and constructed wetlands.

Table 1: Summary of two variations of 'what if' sediment scenario

Variation 1: Less land and more time	**Variation 2: More land and less time**
Stock exclusion 5-metre planted riparian buffers Retire all LUC 7 and 8 farmland Implemented over 10 years	Stock exclusion 10 metre planted riparian buffers Retire all LUC 7 and 8 farmland **plus** 17% of 6e farmland (e.g. steep gullies) Implemented over 5 years

The scenario development included detailed geo-spatial analysis of the landscape and a series of simplifying of assumptions to create the inputs needed for the modelling. Key assumptions included:

a. If a stream is already required to be fenced for existing regulations, no additional fencing was needed under this scenario (even though the buffer width requirement might be more onerous under this scenario).
b. Although some farms have fencing for stock exclusion of waterbodies (especially for dairy), it is unlikely to be at the 5 metre or 10 metre buffer widths and it costs the same to move a fence as to create a new fence.
c. The type of fencing, and so its costs, varies by farm type (i.e. due to land use and slope). For example, whereas dairy needs an electric 2 wire fence, sheep and beef need an 8 wire non-electric fence, and deer need 1.9 to 2 metre netting[26].
d. Planting cost $16,000 per hectare (from an estimated range of $8,900 to $30,000)[27].
e. Fencing or planting of the retired steep erosion prone land was not included, and nor was the potential need for stock water reticulation[28].
f. The average per hectare productivity calculation for each farm type was adjusted using a land scalar to account for the less productive land being retired.

This sediment scenario clearly has strong spatial elements to it that create patterns of impacts across the landscape: the riparian buffers are applied to waterbodies on all pastoral farmland across the Waiau, Aparima, Ōreti, and Mātaura[29], while land retirement for surficial erosion is applied to the region's less agriculturally productive areas (generally away from the Southland Plains and the Waimea Plains). *Figure 4* shows the distribution of land use capability in Southland (noting there are

[26] https://www.deernz.org/deer-hub/handling-and-welfare/handling/fencing/
[27] Fencing and planting costs may have risen since this work was completed.
[28] A useful information source on stock water reticulation is: https://www.mpi.govt.nz/agriculture/farm-management-the-environment-and-land-use/stock-water-reticulation/
[29] Environment Southland used data on the proportion of land with riparian fences and buffers, including estimates of average buffer width, catchment by catchment (Ewen Rodway, pers. comm., 1/12/2021).

multiple subclasses, such as '6e', within each class)[30]. Drystock farming extends across all landscapes and all LUC classes (as finishing, breeding and finishing, hill country, and high country farms) while dairy farming is concentrated on LUC classes 1 to 2. As well, analysis of different types of land cover (e.g. pasture, crops, native forest, and wetlands) highlights the importance of considering farms as a whole farm system, rather than focusing on their main land use. In general, drystock has the highest proportion of extensive pasture and forest (exotic and native).

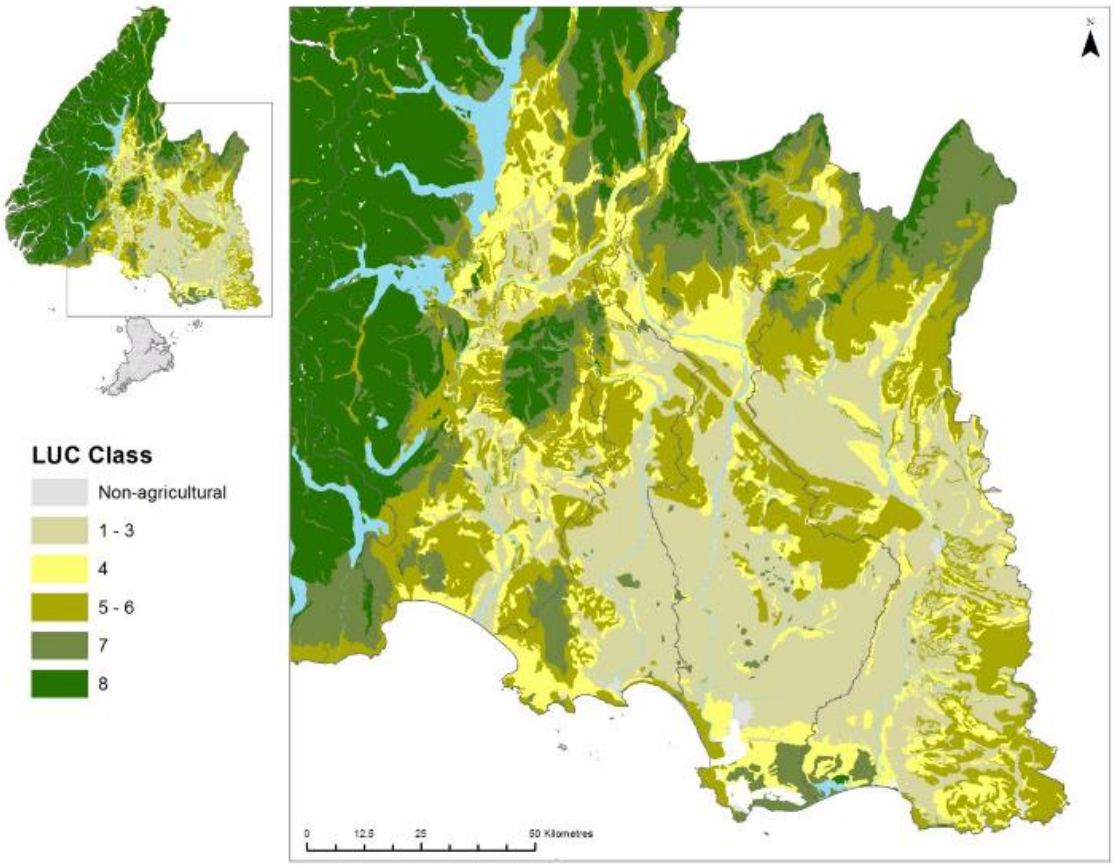

Figure 4: Land Use Capability classes in Southland
Source: The Southland Economic Project: Agriculture and Forestry Report

While the nitrogen scenario largely impacted dairy and drystock farms with more mixed production systems, which usually occur on LUC 1-4, this sediment scenario impacts all pastoral farmland but in different ways, and particularly drystock farming because of its extent and topography.

[30] Of the eight Land Use Capability Classes, Classes 1 to 4 are usually suitable for cultivation, Classes 5 to 7 tend to be better suited to pastoral farming and forestry, while Class 8 is typically not suitable for any agricultural or forestry use and is usually left in indigenous forest or tussock grasslands for catchment protection. Land use capability is a productivity assessment, it does not consider the sensitivity of soils and receiving water bodies to a land use. More information is available in Moran *et al*. (2017).

5.1 Results

As with the nitrogen scenario in Section 4, the focus of this report is on the Farmer Debt Working Group's commentary around a sediment scenario in general terms, rather than the specific modelling results. The scenario, and its results, is the subject of modelling prepared for the Regional Forum and not yet published by Environment Southland. However, it is possible to summarise the findings here for the agricultural sector (all financial results are adjusted to NZ$2017).

With the largest land area in rural Southland, the sheep and beef industry faces the highest total cost of fencing and planting of riparian buffers (out to 5 metres under Variation 1 and 10 metres under Variation 2) – estimated at around $140 million for Variation 1 and nearly $200 million for Variation 2. For the deer industry the estimated costs of fencing and planting are $68 million for Variation 1 and $90 million for Variation 2, driven by higher fencing costs, while for the dairy industry the costs are $70 million and $105 million. These estimates do not include the costs that are already faced by farmers under existing rules and regulations.

For both variations of this scenario, the proportion of total hectares retired as steep and erosion-prone land is similar between the sheep and beef industry and the deer industry –i.e. 4% of hectares for sheep and beef and 3% for deer under Variation 1 and 6% and 5% respectively under Variation 2. Unsurprisingly, the proportion of land retired is smaller for dairy at 1% for Variation 1 and 2% for Variation 2.

Overall, this sediment scenario projects a reduction in total value added for the Southland economy of around $102 million a year by 2040 (or 1.1%) for Variation 1, and $176 million a year (or 1.9%) for Variation 2. There are sizeable impacts across the agricultural sector over the initial years of the scenario because of the investment in planting and fencing, and when these activities are concentrated into 5 years (Variation 2) the impacts are more intense. The impacts in later years are largely driven by the retirement of land. The impacts for drystock farming are around $31 million a year less in value added by 2040 compared to what they may have otherwise been by then.

In percentage terms, the employment impacts are generally not as marked as the value added impacts – so although the number of people employed may be relatively stable the incomes generated for employees and business owners decline.

The sector that includes agricultural support services, which will supply fencing and planting services, initially has an increase in value added under both variations of the sediment scenario. This gain is temporary because 1. the riparian activities occur for a set period of time (i.e. 5 or 10 years depending on the Variation) and 2. the sector includes economic activities that are negatively impacted by the reduction in incomes from farms and flows through to the rest of the economy.

5.2 Commentary from the Farm Debt Working Group

The following is a summary of the main points made by the Farm Debt Working Group when considering the sediment 'what if' scenario:

- The results may underestimate the amount of land that drystock farms need to retire in this scenario. Although the scenario did not consider any need for reticulated water supplies for stock, reticulation might not work so well in some localities in Southland because of the low winter temperatures.

- In this scenario, farm scale and contour may be seen as a liability. On-farm streams have always had their advantages (e.g. aesthetics, water supply) and disadvantages (e.g. flooding and eroding land). Potential buyers will factor in the extent to which streams are fenced and planted when deciding what they are prepared to pay for a property, alongside the potential land uses. While the nitrogen scenario was largely about de-intensification within a farm system, the sediment scenario involves capital expenditure and ongoing maintenance as well as using less land. Both scenarios will potentially see adjustments in the market values of some farms, which will influence both existing and new farm debt.
- The modelling results do not appear to include the advantages that time gives an industry in allowing farm systems to adapt to change. One farmer increased their stock carrying capacity three times by changing their farm processes, which in this scenario would allow farmers to retire land and still be profitable – "*it might force others to up their game*". The farmers with less-viable farms have huge potential for improvement in their all-round performance.
- However, clearly sediment will not be managed in isolation – there will be requirements for other contaminants, including nitrogen, that will constrain a farm's carrying capacity. Anecdotally, farmers are already talking about trying to lower their use of nitrogen fertiliser voluntarily, and many are finding they are still able to improve productivity – "*it needed someone to impose it though before they were willing to look at how they could do it*".
- In response to both scenarios, farmers will be looking for what alternative funding opportunities are available other than just a bank loan – they will be asking "*we are doing this to fix a national problem so what is available to help us?*". "*For those who are struggling most, anything you ask them to do will look like just another cost – they will need to get contractors in to fence and to plant.*" Dairy farmers have been used to getting on with riparian management, "*although their cash flow has admittedly been good*". Yet clearly, the relative cost of this scenario to a sheep and beef farmer will be much higher than for dairy.
- In most situations there may not be as much debt in drystock farming as there is in dairy, but there is not as much cash available either across a year and between years. As well, it is not just the investment to make these changes for fencing and planting but also the ongoing costs of maintenance. There is an important question about who will do the work – there are already supply issues with farm labour, and this scenario will put farmers under even more pressure.
- From a banker's perspective, the two main considerations will be: a) understanding the capital costs, which will include how they are funded; and b) looking at a farm's ongoing viability assessment where the land used for pasture and cropping is reduced. Even if the proportion of this land is relatively small, it will still change a farmer's ability to service debt. The likelihood of being able to borrow funds for the actions in this type of scenario will come down to the individual business' metrics – "*basically, how profitable they are and what their balance sheet looks like*". Environmentally enhancing a farm will be looked at positively by banks, but it will come down to a case-by-case basis, so it is not possible to generalise.
- Farmers will probably resent making these changes as once they have made the investment the banks may tell them that their farm will be worth less. However, "*it is often that, given some perspective, the situation ends up being a lot better than it first seemed.*" The banks often see a connection between farm profitability and good environmental performance. However, for some farmers the solution may be land use change. Drystock farms that are struggling now are likely to be pushed further into forestry and, while longer term that may be a better outcome for the climate, in the medium term "*it is not so good – Southland could see the closure of other businesses e.g. freezing works.*"

- If the region is unable to meet any limits that are set for sediment then there might be a need to look further to more drastic actions, such as taking down flood banks in some places. Every system has its "*weakest link*", and the situation will be different for each catchment or stream across the region. In a decade any limit set now will have been updated so, rather than being too concerned about what the limit is, "*the focus should be on getting the process started*".
- From a banking perspective, there is likely to be a preference for "*bespoke solutions*", such as operating with robust farm environmental plans with actions "*to be ticked off*", rather than a blanket approach. In terms of their involvement in the process, each banks is currently developing their Environmental, Social and Governance policy framework and starting to report on it. Banks do tend to report in a historical format against rules, but where a farm environment plan is in place, banks (as well as meat and milk processing companies) will end up reporting each individual supplier against that plan.
- However, banks are really "*the spectator on the side lines and it is not their job to lead it*". The innovations usually come from individuals and non-corporate groups, but it is the large corporate groups that try and direct things, almost ignoring individuals and non-corporate groups. It should be commercial enterprises rather than the banks that drive the process. "*And clearly, the more rules you put across the sector, no matter what they are for, stifle innovation.*"[31]

6 System Mapping of Freshwater Management and Farm Viability

6.1 Introduction

The roundtable discussion and the two scenarios made it clear that most (if not all) farms in Southland are likely to be impacted by the combination of freshwater management and farm debt at some level. However, the diversity of farming situations across the pastoral sector and the complexity of the farming system within which they operate make it challenging to synthesise how these impacts may play out in a meaningful and concise way.

As a way of dealing with this diversity and complexity, the Farm Debt Working Group took part in an exercise that used 'system mapping' (Maani, and Cavana, 2007) to visually represent their collective understanding of the topic as a diagram.

The system diagram produced from this exercise (*Figure 5*) is drawn from the perspective of a farmer (because farm debt occurs at the level of the individual) and the possible pathways they may each take in response to environmental regulation for freshwater management. During the exercise the Farm Debt Working Group emphasised that the topic was in fact more about farm viability than just farm debt, and this is reflected in the diagram.

The diagram is a simplified version of reality, and so tries to balance having to include sufficient detail to show what is happening with not letting the detail become overwhelming. Beyond this, there are many factors that sit outside this diagram but still influence a farmer's decision-making response (e.g. other government requirements, staffing, tax system, commodity markets, and farmer values).

[31] This is not always the case as, in many circumstances, constraints on an activity can in fact drive technological innovation. For example, the requirement for the exclusion of deer from waterbodies has resulted in the development of new fencing techniques. In the construction sector, the biophysical and planning limitations on a site can lead to clever new design solutions.

Even though the result is relatively 'simple', the diagram and its pathways are still challenging to follow at first glance. There is an explanation of the diagram in Section 6.3 that suggests where to start and end, and steps through each of its component parts.

This explanation includes relevant comments made by members of the Farm Debt Working Group (shown in italics) during their discussions, particularly where it turned towards the more human-side of the diagram, and focused on stress and uncertainty, decision-making and wellbeing.

While the system diagram is based on the Southland experience (via the Farm Debt Working Group) it is likely to be relevant to other parts of New Zealand. It can be used to identify connections for closer attention and to trace possible pathways for different types of farmers.

6.2 System mapping

In a system diagram a set of key **factors** (or variables) are set out with **arrows** to show the connections between them. Each arrow has a sign on it (by the arrow's head) to denote how a pair of factors are connected (i.e. the nature of the relationship):

- a **'+' sign** (a change in the first factor has a similar effect on the second – either both increase or both decrease); and
- a **'-' sign** (a change in the first factor has the opposite effect on the second – as one increases the other decreases, or vice versa).

Where a set of two or more factors and arrows circle around each other they create a **feedback loop** (much like an eddy in a stream). These feedback loops show how the system evolves over time and there are two main types:

1. a 'balancing' feedback loop where a subsequent factor works to counter the change in the first factor and so deflate its effect; and
2. a 'reinforcing' feedback loop where a subsequent factor works to support the change in the first factor and so inflate its effect.

During an event, such as the introduction of new environmental regulation, it is the balancing loops that tend to dampen the impacts and help move the system towards a new equilibrium; while any 'reinforcing' loops in a system can expand an event's impacts, creating ripples that can have either positive or negative results. For example, on the positive-side, a profitable farmer has more access to finance and so more ability to keep on top of farm maintenance and stay profitable, but on the negative-side, a stressed farmer can lead to poor decision-making, which in turn creates more stress.

The Farm Debt Working Group's discussion of the initial version of the system diagram the members focused on the non-tangibles, such as stress, workload and wellbeing, as much as the tangibles.

> *"I find it very interesting to see that we are all discussing the human impacts rather than the financial impacts." "But people are right at the forefront – they are the ones you are lending the money to, so they have to come first."*

With further work, the diagram could be adapted to consider the system at other scales (i.e. beyond the individual farmer), such as at an industry level, or for the region or New Zealand as a whole. As well, the scope could be widened to be more inclusive of other parts of the community.

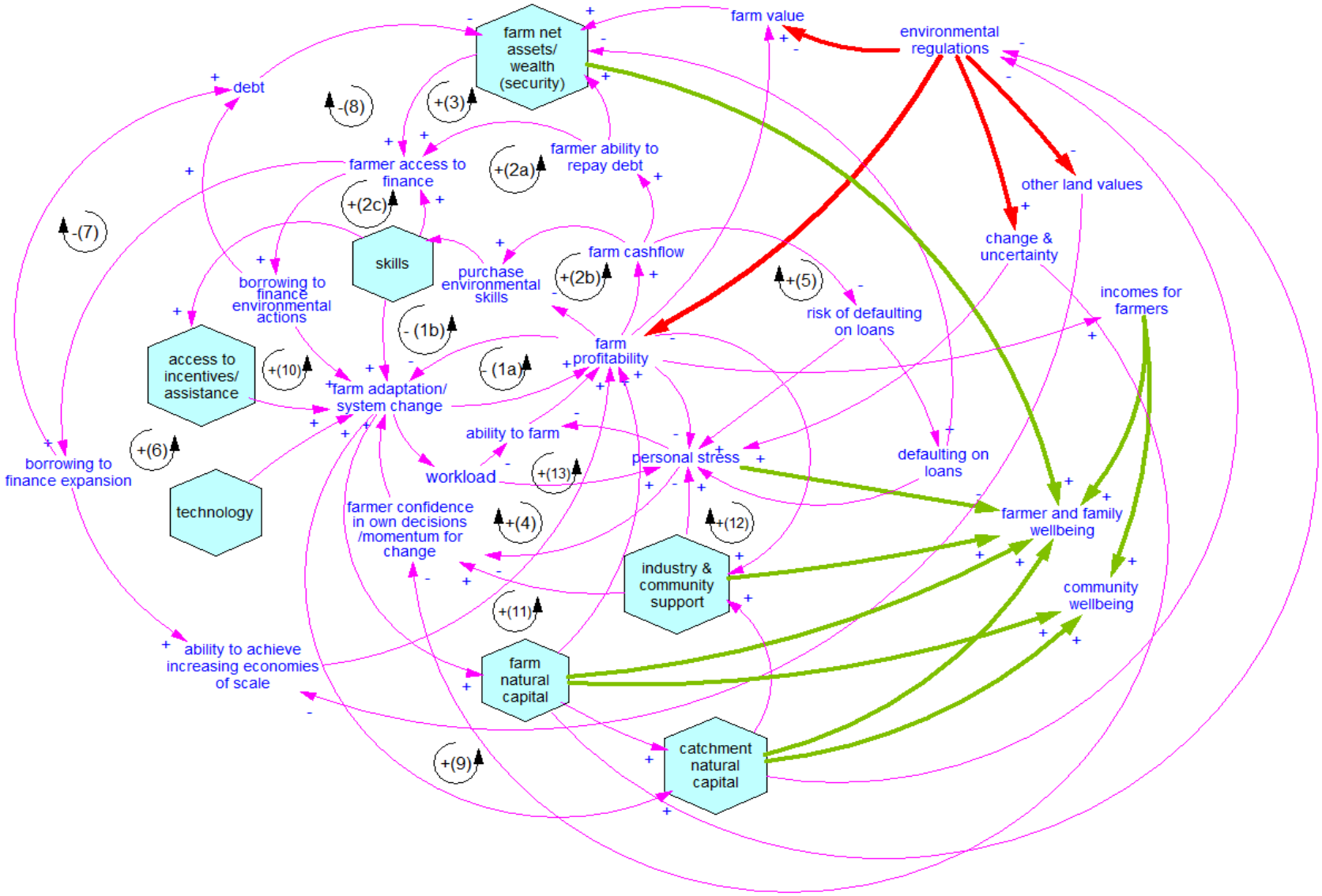

Figure 5: System Mapping of Farm Viability under Environmental Regulation

"We all tend to concentrate on the financials when it comes to banking and valuation, numbers being the language of business, but through this diagram I see the connectivity between society, environment and the financials… It shows there is no 'silver bullet', and it is about how, whatever decisions are made when setting limits, they are going to take society through to achieve the necessary results. So, while the diagram will never be perfect, there is real value in it for understanding the complexity of the whole situation."

"In this report Environmental, Social, Governance policies are mentioned, which have become almost universal in terms of the structure of businesses and the basis for investment. To me what I see in this diagram is Environmental, Social, and Governance for the farming sector – good environmental practices, social conscience, and good governance."

6.3 Farm Viability System Diagram – Explanation

The bold text in this section relates specifically to what is shown in the diagram to make it easier to follow the different pathways through it.

The Farm Viability System Diagram (Figure 5) is drawn from the perspective of a farmer (as an owner-operator). At a basic level, the diagram has five main elements: blue hexagons and blue text labels that are linked by either red arrows, green arrows or pink arrows.

Blue hexagons represent the key stocks that are available in the system: farm net assets or wealth, labour skills (e.g. farmer, workers, contractors), industry and community support, farm natural capital, catchment natural capital, access to incentives or assistance, and technology relevant to environmental actions. **Blue text labels** are used for all the other factors in the diagram. **Pink arrows** show many of the important relationships between factors, but because it is a system all the factors are connected in one way or another.

The initial change in the farm viability system, and the start of the diagram, is the introduction of new **environmental regulations**[32]**.** However, **environmental regulation** itself has direct connections from **farm natural capital** and **catchment natural capital** because decreasing natural capital will eventually lead to increasing environment regulation (note - the pink arrows have a '-' sign at their head to denote the two factors have an 'opposite' relationship). In the diagram natural capital represents the state of the environment.

Red arrows highlight direct connections from **environmental regulations** to four key factors:

1. **Farm profitability** may decline as constraints on the farming activity impact the farmer's ability to generate profits, at least in the short term. How any impacts on profitability play out is influenced by a range of input costs (e.g. labour) and commodity prices at the time.
2. **Farm value** may decline not just when lower **farm profitability** influences a farm's future earning potential, but also where there are few options for the land. Although pastoral land may convert to plantation forestry, this in turn can create sediment issues at harvest.

[32] Environmental regulations are a type of environmental policy where specific actions are mandatory and implemented through a combination of mechanisms (e.g. rules, guidance and education). From an impact perspective, environmental regulations tend to fall into two types: those that (1) cause farms to change practices typically leading to lower profitability, and (2) those that require farmers to invest in new capital or land development. Both types are captured in the red arrow showing a drop in farm profitability because, prior to a farmer's response, they will not be able to operate in the same way as before.

3. **Other land values** may similarly decline as those farms are also impacted by the new regulations. However, as environmental actions that involve investment in infrastructure are increasingly adopted on-farm it is likely to be reflected in the market.
4. **Change and uncertainty** about the future adds to a farmer's **personal stress** and **workload** and can undermine **farmer confidence in their own decisions**. **Change and uncertainty** about the **environmental regulation** (existing and new) itself also influences a farmer's **decision-making**. This means the quality of the regulator's implementation process, which is captured in **industry and community support**, has a direct influence on the impacts of regulation.

Green arrows show some of the important connections to wellbeing at two scales: the **wellbeing of individual farmers and their families**, and the **wellbeing of local communities (**most of the green arrows have a '+' sign at their head to denote the two factors have a 'similar' relationship). If **environmental regulation** is the initial change in the Farm Viability System then wellbeing is an outcome of that change, and the end of the diagram.

Amongst the factors contributing to **farmer and family wellbeing** captured in the diagram are **incomes for farmers**, **farm net assets or wealth**, and **personal stress**. **Incomes for farmers** are driven by **farm profitability**. **Farm net assets and wealth** includes the farmer's debt and income risk grades, which influence their **access to finance**. **Industry and community support** influences **farmer and family wellbeing**, for example through comradeship or neighbourliness, as does **farm natural capital and catchment natural capital**. These components are recognised in Treasury's Living Standards Framework, which has wellbeing categories for income, subjective wellbeing, environmental amenity, financial and physical capital and natural environment wealth[33].

Not shown in the diagram, but highly relevant, are the intricate connections between **farmer and family wellbeing** and **community wellbeing**, as well as those between **wellbeing** for both present and future generations and **environmental regulations**. For example, personal stress is particularly important to the wellbeing of the farmer and their family, but it will also influence community wellbeing because stress can threaten personal relationships and degrade social capital. Also missing is the feedback loop between **industry and community support** and **community wellbeing**, although this relationship is touched on later in this section.

> *"Adversity can bring communities together, or it can destroy communities e.g. forestry on the West Coast. In the late 1980s farming went through tough times and at that time communities maybe didn't come together as much as they could have."*

The usual response of farmers to **environmental regulations** that lower **farm profitability** is to adopt new environmental actions, which are part of continuous **farm adaptation and system change**, to help soften the potential impact on **farm profitability** in the short-term: **feedback loop (1a)** (at the centre of the diagram). In situations where all the **skills** needed to undertake such actions are not held within a farm business (and they are not available as **industry and community support**), a farmer may need to hire or **purchase environmental skills** externally: **feedback loop (1b)**. Overtime, farmers are likely to develop at least some of these skills themselves (i.e. they will shift from feedback loop (1b) to (1a)). Where skills are available within the business it is likely to lead to wellbeing, but where skills are not available or come as an additional financial cost to the business, it can lead to stress.

[33] There are different ways of thinking about wellbeing – some schools of thought suggest it should be measured by a person's capabilities. In this diagram the connection between skills and personal wellbeing is less obvious – skills affect a farmer's workload, ability to farm and their farm profitability that all eventually lead to wellbeing.

*"With the **adoption of new practices and system change**, if you do it and it works, then you get a feel-good factor which helps bring down stress levels which feeds into **farmer and family wellbeing**. In the same way, public perception and media may add to the stresses."*

Feedback loops (1a and 1b) capture a range of responses a farmer might have to **environmental regulation**: from investing in capital works or farm development (e.g. fencing, riparian buffers, wetlands), through to adjusting the farm system (e.g. shifting to a lower input system), and possibly partial or full land use change. Such responses may be designed to allow the farm operation to continue while future environmental **technologies** (in the broadest sense) are developed, which can be driven by **environmental regulation**. Particularly for capital works, there is the potential for it to not be entirely funded by the farmer, and those with more **skills** may have a better chance of **access to incentives or assistance**: **feedback loop (10)**.

However, there are ripples in the system that may reduce a farmer's ability to respond effectively to environmental regulation[34]. Lower **farm profitability** and **farm cashflow** means a farmer has both less **ability to repay debt** and **access to finance** that might be needed to adopt new environmental actions: **feedback loop (2a)**. In some situations, **farm profitability** may be reliant on activities that have environmental risks, such as dairy grazing. Furthermore, a farmer who is unable to comply with new environmental regulations may have more limited **access to finance** in the future, as their bank implements its Environmental, Social and Governance policies.

"From a profit perspective, drystock farmers who have dairy grazing may be less able to invest capital to change, particularly as many of them are older generation farmers. They see farm values as not as buoyant as they once were and are probably in the process of farm succession. There is just not enough in the pot to make that investment. Stress is really going to be compounding for those guys."

Lower **farm profitability** and **farm cashflow** also means less funds available to afford the hire or **purchase environmental skills**: **feedback loop (2b)**. In turn a **farmer's access to finance** is also **skill** dependent, and their capital allocation from the bank being a combination of their risk and security profile: **feedback loop (2c)**. Those with less viable farms are unable to access the best interest rates and so pay more for their borrowing.

These ripples all may result in a lower **farm value** and, without adequate security as **farm net assets or wealth**, **farmer's access to finance** becomes more constrained: **feedback loop (3).** Unfortunately, this situation may continue for some farmers – they are unable to afford to adopt new environmental actions or new **technologies** and innovations that help keep pace with their industry. Without **farm adaptation and system change**, there may be further drops in **farm profitability**.

A further ripple, which can lead to something of a downward spiral, may occur when farmers are unsuccessful in making profits over time, their **personal stress increases** and they lose **confidence in their own decisions**. This situation can prevent them from adopting new environmental actions: **feedback loop (4)** and is sometimes so debilitating that even day-to-day operations or the farmer's **ability to farm** is compromised.

"As an example, Rural Support have been promoting each farm having a Covid farm plan, but every farm adviser tells me that they don't know any farm that does have one – it was just another

[34] Usually termed 'policy resistance' in system dynamics.

job for farmers to do. All that stuff – stress and compliance becomes glue in the system, it slows them down or they just walk away from it."

Stress is only increased further when lower **farm profitability** puts strain on **farm cashflow** and creates higher risk of **defaulting on existing loans**, which may continue for several years without decision-making: **feedback loop (5)**. Where a farmer is **defaulting on loans** the impacts flow on, via **farm net assets or wealth,** to **farmer and family wellbeing**. To complicate matters further, **stress** can be exacerbated when farmers undertake environmental actions in response to **environmental regulation** and those actions result in an increased **workload**: **feedback loop (13)**. Nevertheless, more successful farmers will become practiced over time, improving their **skills**, and find **farm adaptations** that will improve labour efficiency and reduce **workload**.

Some farmers may have the **ability to achieve economies of scale** to help maintain **farm profitability** by reducing costs (e.g. for labour), which in turn adds to a farmer's **ability to access finance** and **borrow to finance expansion**: **feedback loop (6)**. In these situations, **feedback loops (2) (3) (4) (10) (11)** could act as more of an upward spiral where there is a successful combination of factors, including **farm profitability, access to incentives or assistance,** and **skills**, as well as a **farm natural capital**.

"The smaller-scale farm often gives a return on labour and investment, and that allows a living. A larger-scale farm allows a living plus extra, and that's why these farms tend to get larger."

Increasing farm scale will probably result in fewer owner-operators and reductions in farm workers, as well as fewer potential individual buyers for such farms. However, it is unclear how farm scale and possibly more corporate ownership will influence **community wellbeing** in Southland or both **on-farm and catchment natural capital** and is an area for further research.

Of course, there are factors at play in the system that will eventually slow this upward spiral of increasing farm scale. In particular, as farmers **borrow to finance expansion** and take on more **debt,** their **farm net assets/wealth** and **access to finance** declines, particularly with recent changes to banking policy: **feedback loops (7) and (8)**. Additionally, in larger scale operations capital owners tend to have less oversight over the entire operations and employees do not necessarily have the same motivations as owners.

Shifting to the bottom of the diagram, the adoption of environmental actions through **farm adaptation and system change** is likely to improve **catchment natural capital**, an intended outcome of freshwater management. These improvements benefit the **farmer and family wellbeing** of others downstream and **community wellbeing** in general. Where environmental actions are shown to be successful through effective monitoring by the regulator, which is an important part of the implementation process**,** it will reinforce **industry and community support** and **farmer confidence in their own decisions and momentum for change,** and in time encourage more environmental actions: **feedback loop (9)**.

"The need to maintain or improve water quality was introduced in the RMA back in 1991… but we have pretty much ignored this for the last 30 years. It is only in the last 5 years or so we have started to try to get things under control and recognise what the real issue is. So, it is understandable farmers being reluctant to spend money if they don't know if they will achieve anything. Until there is a clear path, they are going to sit on the fence and see what happens – this might include 80% of farmers."

When public recognition is given to farmers for improving **catchment natural capital**, such as by communicating success stories, it helps promote change within an industry and local community alongside the use of environmental regulation as a driver:

> *"The more you measure, the more likely you are to succeed. There are lots of successes and this feedback loop allows people to celebrate that."*

> *"Promotion of positive effects is key as it shows people that something is worth doing and gives them something to hang their hat on."*

The adoption of environmental actions through **farm adaptation and system change** is also likely to improve **farm natural capital**, which should benefit the farmer directly by helping to maintain the productivity (e.g. reducing erosion of topsoil, protecting the family's drinking water supply) and ensuring **farm profitability**: **feedback loop (11)**.

Industry and community support[35] includes supplier minimum standards set by processors and helps farmers gain the **skills** for **access to incentives and assistance** as well as **access to finance**. It can promote **farmer confidence in their own decisions**, particularly for early adopters, and **momentum** for **farm adaptation and system change**. This support can help farmers cope with, and possibly reduce, **personal stress** and improves both **wellbeing** and **natural capital**.

> *"The community operates on two planes: the horizontal plane of just what we would consider as the old school community, the people in that district operating together and feeling a worthwhile part of that community; and then there is a vertical plane which I see as being the industry community."*

> *"Support falls into two categories, the type of emotional support offered by Rural Support Trust, and the type of support offered by banks and farm advisors who will assist farmers in their decision making. It is a team effort."*

However, lower **farm profitability** may eventually constrain **industry and community support** by impacting the ability of industry good groups and councils to respectively levy or rate farmers to maintain level of services: **feedback loop 12**.

The system diagram works on the premise that farmers must comply with new environmental regulations, either by **farm adaptation and system change** in their business or exiting their industry and shifting to the next most profitable land use if they have these skills. Many farming families already have alternative income streams, and this could increase over time. A few farmers may prefer to turn away from agriculture and look to other options, such as entering an equity partnership to grow trees, which can impact community wellbeing. However, there is a risk some farmers will choose not to comply, especially those who feel overwhelmed or powerless and are influenced by peers (e.g. friends and neighbours) with similar perspectives. Such situations will clearly have adverse consequences.

[35] Industry and community support is a broad term that is both vertical (i.e. following an industry's value chain) and horizontal (i.e. industries within a local area), across formal and informal structures and networks. The term captures the activities of councils, industry good-groups, processors / manufacturers, agricultural suppliers / services, farmer leader groups, catchment and other community groups, neighbours, and social attitudes, including in the media, that add up to positive action and encouragement. The Farm Debt Working Group noted that if this support is reinforcing and perpetuating negative views then it can have the opposite effect, leading to farmers' reluctance to act and disempowerment.

"Stress often leads to a fight or flight reaction. Those who fight will probably become innovative and move on, those that go towards flight may head towards stagnating and exiting over time. "

The feeling of being overwhelmed, and possibly unable or unwilling to comply, is likely to become more common – especially in drystock farming.

"…because dairy farmers have farmed with the consent process and consents have slowly built up in complexity. Dairy farmers are now used to farming to consents and understand applying for consents. Many drystock farmers have never had a consent in their life, are not used to being told how to farm in their life, which is why there has been more of a reaction there. Dairy farmers are used to rules changing, they hate it, don't enjoy it, but are more up to date with it."

At the farm level there are cases of non-compliance and, even though farmers continue to operate in the short-term, it causes **personal stress** within the business and family life and affects **workload** ("*the more stress builds up, the less will get done*"). An ongoing lack of action can eventually affect the **ability to farm** and **farm profitability**. At a community level non-compliance leads to inefficient use of resources in enforcement and litigation but even more seriously has the potential to damage the social fabric and so **community wellbeing**.

"Farmers will default on regulations, the consequence of which is that the banks will react – at times slowly, but they will start to react more and more… In the interim it will cause stress, fines, court cases etc. If the bank sees that you are in default of environmental regulations they will try and help you, but if you don't do anything to rectify that they will put you in default of your loan."

There is less available cash in drystock farming, so to comply you need to use debt and debt puts you in a more precarious situation and up goes stress and around we go again. Even if farmers comply they are often doing it under stress and what stress does is put 'a fog' over all those things in the system. People don't want to move, are reluctant to move.

Some farmers may not be as caught up in the system's ripples and will be in a better position to seek opportunities, especially those with sufficient capital or who are more 'bankable' from an Environmental, Social Governance policy perspective. With lower farm values, their **farm profitability** may mean they can expand by purchasing surrounding farms (or parts of farms) as they come on the market.

"Our longer-term trend is larger scale farms with higher profits that tend to have more opportunity because they have more access to capital. We are already seeing more concentration of ownership. Sometimes even the smaller dairy farms with good profit will struggle to have the cash to do some of the things they want or have to do. Around fifty dairy farms are already on the market and larger farms will be looking at purchasing some of them."

"If you're unprofitable, you're still going to be unprofitable regardless of your scale. Maybe there are a couple of extra options for a larger-scale unprofitable farm that a smaller-scale unprofitable farm doesn't have, such as downscaling or selling some assets, whereas the smaller scale would only have the option to sell up and get out."

Opportunities may also be created for overseas investors that results in conversion of farmland to forestry, as forestry becomes a more attractive land use. As less productive land continues to gain value where it is suitable for conversion to forestry it will be another factor for farmers who may already be questioning whether they want to continue farming.

All of the feedback loops discussed above (plus more) can happen simultaneously (although some will have time lags and take longer than others). For many farmers one feedback loop may be more dominant than the others because of their past decisions and the way they choose now to respond to **environmental regulation,** and it will send them down different pathways. This circumstance suggests that the impacts of environmental regulation on the farm viability system are not necessarily a foregone conclusion and will be influenced by personal and collective responsibility.

> *"I think people will concentrate on different parts of the diagram, given their profitability. The less profitable ones will revolve around the right-hand side while good operators will spend all their time on the left, looking at adopting new practices, borrowing money to do this."*

As noted previously, banks often see a connection between farm profitability and good environmental performance. When new **environmental regulations** are introduced, farmers with profitable businesses (and possibly a lower debt to asset ratio), who have already made progress environmentally (or had a small environmental 'footprint' to begin with), and importantly have more of a positive mindset will be in the best position to respond effectively to change and remain viable.

One member of the Technical Support Team summed the system mapping exercise as "*What really came through is the importance of the human factor: farmers are unique, diverse and complex, just like the rest of us.*" Another commented that "*A lot of the Farm Debt Group's discussion has been about people and their response, which is surprising in one way, but not in another because you are all local and in the community*."

7 Final Observations

At the end of Workshop 4 the Farm Debt Working Group reflected on the workshop process, through the themes from the Roundtable Discussion, the 'what if' nitrogen and sediment scenarios, and the Farm Viability System Diagram. In conclusion, the members of the Group made these observations:

- *Debt is debt, and just a vehicle to achieve outcomes in business. Debt is relative to cashflow, so if cashflow increases, debt tends to follow. The farmers who can operate well with debt will tend to buy out those who are less able – that has been the case in the last 100 years in farming. If cashflow decreases, a farmer's ability to borrow debt will reduce too.*
- *Debt is a relative item; it is just a portion of the total capital on a business. Banks are focused on farm viability because it is this that pays for the debt. How much debt a business can handle is reliant on cashflow and, to a certain extent, the valuations and security available. For a bank, the first way for to service a loan is through farm viability. Some farmers have high levels of farm debt but still have a very viable business. Farm viability determines whether they are able to pay for environmental actions.*
- *Whether people take on debt to achieve what they want is an individual decision. It may feel like a fact of life but it is actually a choice - about how much debt and risk to take on. There is a continuum of farmers and farm businesses. Some have no debt or leverage but will not want to be told what to do; at the other end; others are highly leveraged (possibly beyond where their bank want them to be) but willing to adapt their farm systems to comply with regulations. If the change required goes beyond adapting the farm system, then the choice might be taken out of the farmer's hands. The decision will then be about the capital structure of their business, their production system, or to exit farming. A farmer's mindset is important.*

- *The human factor stands out. We are trying to make rules for the environment, while working around, and trying to make sense of, human beings and their mix of land use and businesses. The toughest hurdle will be how to manage people through what needs to happen. There are families around the kitchen table saying that they just 'want to get out of farming with their head up'. For the smaller farms (less than 1,000 acres) it is particularly hard to handle.*
- *There are many continuums: the continuum of environmental issues, the continuum of people, and of land use types etc. They all affect each other, and it is not possible to define a particular way through. It will be more about setting out a series of options that can be taken depending on where someone is on these continuums.*
- *Without farm profitability those at the lower end of the bell curve are always going to struggle. We covered the changing scene in the banking sector but may have underplayed it. A debt equity ratio that was acceptable not so long ago for new entrants is now not the case. So, there are external factors that are limiting people's options. We have all known it is coming but need clarity – when is it coming and what is the timeframe?*
- *A prudent financial investor will suggest diversifying your business as much as you can to give broad coverage. However, a lot of the rural community keep reinvesting in rural land – "The only thing I know is farming". We may see that change with succession and diversification off farm. There will be people with more flexibility and more options coming through.*
- *It is all about complexity: where are we, where do we need to be and how do we get there? There is lack of certainty or direction at present. Whatever happens, if it is going to cost money to make changes on the farm, and/or reduce profits, then it is likely to negatively impact on land values. People will not accept that and so will try and resist that as much as possible.*
- *The average price for dairy farm sales in 2021 increased at least 20 percent compared to 2020. The rural real estate market should be fully informed with everyone aware of what is coming. Are buyers thinking they can overcome all these things? Or are they thinking it will take care of itself and they will just wait until regulation comes?*
- *Back in 1991, New Zealand's agricultural debt was roughly $5 billion whereas now it is somewhere around $63 billion[36]. It would be interesting to compare water quality back then to what it is now as the whole topic is about water quality, environmental limits and regulations. Obviously, debt is a huge component of the agricultural sector now compared to what it used to be (even taking into account changes in land values).*
- *Currently farmers are trying to digest everything that is going to come their way, relate it back to their situation and try to make decisions that work best for them and their family. If profitability declines, as it appears it might from the nitrogen and sediment scenarios, then people have some difficult decisions to make. If they make farm improvements like riparian planting which is a cost or requires capital then they are unlikely to get a return.*
- *It is not uncommon to want to blame someone or something for what is happening to your property – it happened in the 1980s and lasted for a long time in the farming community. The way communities react to these things and tackle them is quite important. If addressing freshwater issues is done as a community then it is more likely to be a success. If everybody is an island or isolated, there could be a problem.*
- *Communities have changed. In the 1980s we still had a 10-kilometre community, mostly around the local primary school, whereas now it is more like a 30-kilometre community and it*

[36] Levels of agricultural debt by region are unavailable. However, it is estimated that the dairy industry in Southland may have roughly $4.6 billion of debt. This estimate is based on the distribution of debt between agricultural industries at a national level in the Reserve Bank of New Zealand's May 2021 Financial Stability Report and Southland's 12.2% share of the national dairy herd from LIC 2020-2021 New Zealand Dairy Statistics.

is less connected. It is also more transient, especially with share-milkers. It is often the case that are few local farmers left who were there a generation ago. Most families have changed.

With the agreement of the Farm Debt Working Group, a member of the Technical Support Team summarised the discussion at three levels: personal resilience (i.e. a farmer's character, skills and experience), business resilience (e.g. financial management, asset values, governance, environmental progress) and community wellbeing (e.g. the success of environmental actions, timeframes for environmental outcomes, industry and community support).

Finally, the relationship between freshwater management and farm viability is determined to some extent by the nature of the intervention (the environmental actions and the mechanisms used to implement them). By design, freshwater management constrains farming activities to achieve environmental outcomes. Its impacts on farm viability will depend, in part, on the extent to which it has the flexibility to allow for, or even promote, farm adaptation and innovative solutions to be found at paddock, farm or catchment-scale.

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Appendix 1 – Notes from Canterbury (July 2021)

James Laming (ANZ)

Like Southland, Canterbury has seen a real expansion in dairy farming over the past 25 years. This expansion has been fuelled by: strong commodity prices driving on farm profitability, capital gains, bank appetite (interest-only loan terms, growth, competition), and irrigation development. A shift from old border dyke irrigation systems to spray irrigation systems. More production, more cows.

ECAN was an early adopter of the environmental policy change needed in Canterbury. Baseline nutrient budgets complete – particularly in the dairy industry. There was a big focus on water quality because of increased nitrate levels and water quantity: introduced zoning (red, orange, green zones), better understanding of aquifer levels and monitoring, and it became very challenging to get a new groundwater consent outside of a green zone. Consent to farm: individual farmers vs irrigation schemes. Many irrigation schemes hold the consents for their scheme and farmers within it. Farmers must provide Farm Environment Plans when required, which are independently audited.

Like Southland, a lot of work has been done by farmers in Canterbury over the past 10 or so years: more efficient irrigation application (VRI in some instances), riparian planting, fencing waterways, effluent system upgrade – effluent through pivot irrigators, water monitoring. This work has come at a reasonable cost to farmers.

Environmental and financial modelling gives farmers a clearer picture of where they need to achieve environmentally (e.g. reduce nitrogen loss by 25% by 2030). If farmers know what they are aiming for they will be in a better position to see what in their farm programme may need to change to get there (e.g. reduce stock numbers, manipulate farm system, irrigation development). They can then develop contingencies and costs. If a farmer knows they need to reduce cows then what will it mean for production and profitability, and if profitability is reduced then what does a sustainable debt level look like, and how will the farmer get there (e.g. accelerated debt repayment, introduction of capital, asset sale). Asset sale is hopefully the last resort and may be more a case for farmers with multiple assets that could sell down one to reduce debt. Developing a nutrient budget before a financial budget almost becomes more important when understanding the long-term position of the business.

The cost of compliance for these businesses in the sheep and beef industry can be high when thinking about relative profitability. Fencing of waterways becomes a challenge on extensive farms (access to stock drinking water, flooding (as seen recently) cost to complete). These operations do not usually have the high levels of profitability that are seen in the dairy industry to sustain a lot more debt.

Bank clients are feeling a bit aggrieved that all this cost associated with compliance is not necessarily adding any value to their product and having a negative impact on profitability. Interest rates remain low but are rising. Are our farmers using these highly profitable years to strengthen their positions: accelerated debt repayment, investment in the operation to future proof against environmental challenges, income generating off farm assets? It may take generational change - younger farmers seem to be adapting better to environmental challenges, better adopters of technology to assist, tend to be more collaborative in their approach. How do we all work together to get the best outcome for everyone (the Farm Debt Working Group is a great example of this)?

"Lastly, we as banks and bankers have a massive part to play in environmental sustainability and helping our farmers succeed in this space. Working collaboratively with regional councils, farm advisors and other professionals will be incredibly important. If you have farmers you know are struggling in this space, please ask them to reach out to their bankers and other professionals."

Appendix 2 – Notes on Rural Land Valuation (July 2021)

Grant Barron (Loganstone)

A farm's financial value is the total farm capital, not just its land value. Using dairy farms as an example, total farm capital includes (in usual order of importance):

- *land value (generally around 80% of farm value)*
- *improvements (buildings, fencing etc.)*
- *stock*
- *plant and chattels (milking shed, effluent pond and irrigators etc)*
- *shares (applies to Fonterra milk suppliers)*

To finance the purchase of these assets, farmers use a combination of:

- *equity (or savings)*
- *debt (or borrowings)*

The value of a farm is determined by its 'highest and best' land use that is practical, feasible and legally permissible. As an example, in Southland dairy farming requires resource consents for activities such as effluent discharge and water takes. So for dairy farming to be legally permissible it must be possible to acquire those consents. The value of any resource consents is usually tied to the land value.

The 'highest and best' land use in Southland (in descending order noting it may vary slightly by locality) areas):

1. *Horticulture (e.g. tulips, vegetables)*
2. *Dairy*
3. *Dairy support*
4. *Sheep & beef farming and deer farming*
5. *Greenfield forestry (i.e. converting pasture to forestry, which has a higher value due to income from carbon credits)*
6. *Plantation forestry*

In the event of policy changes that makes a more intensive land use challenging a farmer may need to shift to the next highest and best land use.

Rural land valuation uses three approaches under the International Valuation Standards, being the market approach, the income approach and the cost approach. The market approach involves looking at other comparable properties sold recently and compare to the one being valued. It often relies on specific metrics (e.g. dairy farming = kg milksolids/ha, sheep and beef farming = per stock unit, viticulture = net plantable area) and is usually used for lending purposes. The income approach is based on a 'productive valuation related to income' methodology, which is more appropriate for assessing impacts of policy. The cost approach is not normally used when determining a property value for secure lending purposes and is less satisfactory.

A barrier to environmental action is that the market is currently not reflecting the value/cost of some investments. For example, the market is not reflecting the cost of a wintering barn on a dairy farm, which may be around $4,000 per cow, when the farm is valued.

There are three key factors used when a bank decides whether to make a loan on a property: personal factor, financial profitability and viability, and security value. It is anticipated that the personal factor will become even more important in the future as the skill levels needed to be successful in the primary sector increase.

Appendix 3 – Notes from the Farm Debt Working Group on the nitrogen scenario (August 2021)

Debt levels

Currently, banks generally use debt of 60% of farming assets as their maximum lending criteria. For anything above this they require either actively paying the debt down or being encouraged to sell up and liquidate. Any responsible bank would sell a farmer up long before they got to a 90% debt level.

Debt should not be treated as a standalone figure. Some sheep/beef units have virtually no debt and still struggle to make ends meet while some of the best dairy units sitting at 60-65% debt, make status quo cash profits of $2 per kg milksolids. The profitability of a business is key to what debt level is sustainable. If environmental restrictions (whether nutrient loss, greenhouse gases, or water allocation) reduce profitability or remove it, then debt will need to be very low for the farming business to be sustainable.

For dairying the debt per kg milksolids is not often used anymore in Southland as the production systems vary so much. It is seen as a fairly blunt metric.

Reducing stocking rate

The most profitable farmers generally run the higher stocking rates because it maximises grass quality and so the technical efficiency of converting pasture into milk. These farmers will do everything they can to avoid dropping their stocking rate. Even when they are required to, they will want to maintain total milk production by lifting per cow production. We are seeing higher per cow production achieved in Southland because of the limit to milking cow numbers in recent years. There has been more culling and so better-quality herds. Also, there has been more focus on the business rather than adding land for the capital gains.

A lowering stocking rate that results in grass wastage and lower grass quality is inherently unprofitable. A below average dairy farmer may see declining profits and potentially losses while an above average farmer might use the extra land profitably. For example, if a 300-hectare dairy farm milking 1,000 cows (3.33 cows/ha) drops to 800 cows then the farmer will milk these on 240 hectares and use the other 60 hectares for something else. If other constraints allow this could be used to winter cows on crop or if a wintering shed can be built to grow silage for wintering on.

The soils in many parts of Southland are not suitable long-term for winter crops from a social licence (and nutrient loss in a wet winter) perspective. Aside from pugging issues, the ability to grow spring catch crops, and other nutrient loss minimisation strategies, in most of Southland is severely limited or impossible because of wet soils in spring.

Capital Value of Farms

Farm value, now that the capital gain part of the system is removed, relies on the underlying profitability of the asset. Dairy farm profitability has lifted markedly in the past 18 months, mainly due to a high milk price and low interest rates, which has led to dairy farm prices rising 10% over the last six months. With some debt reduction over this period, the rise in dairy farm prices has also seen a decline in bank pressure on farmers. However, it is clear banks will just follow the market.

Longer term if farm profitability drops, it will lead to farm value drop, hence significant debt reduction will be required just to maintain bank security margins. This leaves little ability to borrow further for capital investment and so will see significant ownership change overtime – forced or otherwise. This process takes a while in farming, as it is not like cash businesses in the city which change hands very quickly. This is because farms are people's homes and have often been in the family for generations.

Farming businesses that slowly go broke over time will not be able to afford to follow strict environmental rules that are enforced too quickly, without other realistic options. In fact, environmental performance usually worsens when under financial stress.

Farm System Change

While some sheep and beef farmers may reduce area available to winter cows, other livestock classes will get used to a consenting regime just like dairy farmers had to do. Winter grazing is often more profitable than sheep/beef farming, which is why so many farmers do it. Long term profitability dictates land use – it always has, which is why land went into dairying in the first place.

If winter grazing remains more profitable than sheep farming, then supply of winter grazing will remain. However, there is now more pressure on the viability of land currently used for winter grazing, which may constrain supply.

More silage and grain cropping will be done locally. Dairy farmers in strong capital positions will build more wintering sheds.

System change to horticulture, as is possible in almost all other areas of NZ, is unlikely given current climate conditions. If it was profitable then it would have happened already. The most likely thing long-term is that farm prices drop to the point that a purchaser can make a good return given the current environmental restrictions. However, what happens to the local infrastructure and economy over this period may also determine farming viability.

It may be better to think about a toolbox of options available on each farm to reduce nutrient loss now, over the next 5 years, and likely to be available longer term. This toolbox may be by climate area, soil type as well as catchment. For example, in the areas with drainage we could think more about nutrient filtering rather than nutrient loss. It may be more effective for nutrient loss, and a lot cheaper, to place 5-10% of a farm into well-constructed wetlands to filter nutrients from drains, rather than reducing stocking rates.

Thinking of terms like 'system adaptation' rather than 'system change' will seem a lot less threatening to farmers and is more likely to lead to positive change.