

Regional Forum – Gore workshop

Okapua and Wyndham Field Trip Notes

Bernadette Hunt: Setting the scene

We are not a special case... we are pretty “normal” farmers, going about our business, taking on best practice information as it comes to us and adopting it where it makes sense in our farming operation, and as budget allows.

Some key factors in our investment decision making include finance, balancing the multiple areas of focus on the farm including animal health, biosecurity, time and people management and health and safety.

With my husband Alistair we bought the first 93 ha of their farm in 2006, and took over its operation in 2007. Following the financial crisis managing a very high debt load became almost impossible and after almost losing the farm, it was only the opportunity to lease more land bringing economics of scale and ability to take on an employee which enabled us to continue.

For the next few years high principal and debt repayments were essential but meant cashflow was extremely constrained, with very little ability to choose to make investment in improvements once bank obligations were met and bills paid. Despite the challenges of debt management we have managed through good practice and management to make a good profit most years, and have grown the business substantially – We are now farming 650ha and employing 3 staff. However there are still lots of debts, and lots of costs which limit our ability to take all the actions we would like to.

We have a strategic management plan – vision to be an example of best farming practice, balancing profit, innovation, environmental sustainability, and work life balance. But that can be really hard to achieve (especially the work life balance bit!).

One of our key goals is to always look to do things the right way, rather than taking short term short cuts. We chip away and have taken significant steps to improve things. But a requirement to do it all now would break the business. If we had to walk away, you can bet that other family farmers wouldn't be able to afford to do it either... So you end up with more farms in corporate ownership – highly unlikely to result in better outcomes.

The rapid onset of regulation in this space, potentially demanding change at a rate beyond what we can manage is frightening. Especially when put into the context of looming regulation regarding climate change and biodiversity, plus biosecurity challenges, workforce issues, health and safety... And the advent of things like fake meat, marketed amid a lot of misinformation. The future is honestly feeling pretty uncertain right now – yet for us, farming is what we love, we're pretty good at it, and we are working hard to be good custodians of the land. It worries us to think what the future of Southland might look like if farming becomes unprofitable... Goodness knows what the future will look like for our kids if that happens. But it feels like a real possibility.

This generation of farmers is shifting the patterns that have been the history of farming in NZ. Until 10 years ago, success in farming (and actually, in pretty much everything here due to the pioneering origins of our country) was measured by improved output – how much drainage, how much land is now productive, how many more animals you can handle, how much they produce, how high the

crop yields are. The mindset has now changed for the vast majority and sustainability is a key focus, but financially it will take time to make all the physical changes we need to and want to.

We, as the Regional Forum, have to find a way to do this without sending a generation of farmers (and all the businesses in town, and people they employ) under.

Karl Erikson: Introduction to natural characteristics of the area and mitigation strategies

Karl Erikson works at Environment Southland with 12 years' experience in the hydrology space and 6 years as a Land Sustainability Officer.

3 key points:

- Natural land forms of the area including soils, geology and topography
- Contaminant pathways
- Mitigations

Geology – As we travel toward East Chatton to the Hunt farm you can see the major geological feature called the Mirihiku Escarpment or Southland Syncline or the Hokonui Hills, which was thrust upward by tectonic forces a few million years ago. We can see the Gore gap in which the Mataura River has carved its way through the syncline to then flow through to the down lands of Southland. Where the Hunt farm sits is on the Eastern side of the Gore Gap and nestled on top of lignite measures in the strongly rolling to undulating country just north of the Southland Syncline. The dominant geological/geomorphological process that shaped the land that the farm sits within is the formation of loess deposits – these loess deposits also play a major part of the soil formation for this area. Loess deposits are essentially wind-blown glacial dust. During the last glacial period 18000 years ago temperatures were much colder than today and subsequently southern alps glaciers were advancing and as they advanced their weight and movement crushed up the bed rock underneath, forming fine sediment or dust. Then the earth began to warm up as it moved into this current interglacial phase, and so the glaciers retreated leaving behind the fine sediments or dust which was then picked up on north westerly winds, carried and deposited to these areas.

Soils and topography – The dominant soil type found on the Hunt farm is the Waikoikoi soil type. Waikoikoi soils are Pallic soils and they have silty clay textures and formed from loess parent material, they also have a fragipan at about 50 cm in depth and because of these properties this soil type tends to be poorly drained. A fragipan is a layer of sediments that is denser than the other sediments in the soil profile. This means water percolation through this pan is much less so water builds up. This poor drainage characteristic is one of the key drivers of the way that contaminants flow into receiving environments like the waterways on the farm. Another driver of contaminant loss is the farms topography. As I mentioned before the farm sits within an area that is considered to be undulating to rolling to strongly rolling in some areas. As you can imagine when we have rainfall events, that precipitation washes the landscape and the water moves to the lowest parts through critical source areas (gullies and swales), when the terrain is steep the water movement is hastened and so we tend to see more sediment making its way into those waterways, in other words steeper slopes promote more loss of contaminants.

Contaminant pathways – Why consider contaminant pathways? If we know where the contaminants are coming from then we can put in place measures that may mitigate over all losses to the receiving environments. The farm sits within the Lignite Marine terraces physiographic zone. This means that underneath the farm lies lignite deposits and that carbon source combined with wetter heavier soils, is very good at speeding up the denitrification process so we tend to see less accumulations of nitrates in the groundwater aquifers in these zones. But when we consider the contaminant pathways for this area (and the main considerations when I thought about mitigations for Bernadette and Alisters farm environmental plan) it very much comes down to:

- overland flow of contaminants
- bypass flow of contaminants through moles and tile drains

So why these two pathways?

As I mentioned the Waikoikoi soil type has poor drainage properties due to the higher clay contents (ie it's a heavy soil) and that fragipan which is dense and will not allow water to drain further down the profile. And so without adequate drainage there are inevitably moles and tiles installed to provide outfall but they don't take all the water away so we still see overland flow events during rainfall events.

Farm Environmental management plans (FEMP) – I want to make four key points about farm plans:

- What are farm plans?
- What are we trying to achieve with FEMP's
- What are some mitigation actions?
- What are the benefits?

Karl: Farm Environment Plans

FEMP's are an environmental plan that provide farm specific advice around good management practice which include recommendations to reduce the farm's overall environmental footprint.

The plans target those activities that can have undesirable effects to the environment by:

- Identifying the contaminants of concern specific to the property
- Identifying how those contaminants make their way to receiving environments on that property
- Providing information to the farmer on the ways and means to mitigate against contaminant loss to water

What are we trying to achieve with FEMP's?

As mentioned the primary goal is to reduce or stop contaminant loss to water. Its likely these mitigations will involve costs and therefore this requires commitment. The FEMP sets out a road map that explains how this might be achieved. Priorities are identified, the details on how to mitigate is explained and most importantly goals are set for the upcoming years with the intention of continuous improvement. With Bernadette and Alister's farm plan due to the topography and soil type the main contaminants of concern are sediment and phosphorus.

What are some mitigation actions?

- Manage our nutrients better ie, optimise our fertiliser inputs to match soil test values. Don't let phosphorus levels in soil exceed pasture optimums
- Protect soil structure (avoid soil compaction) by grazing wet paddocks before the onset of winter or standing stock off during very wet spells or wintering the animals in a barn
- Exclude stock from waterways to avoid direct deposition of dung and urine
- Plant out the riparian areas alongside waterways to intercept overland flow and to remove nutrient out of the system by plant uptake
- Protect those critical source areas by excluding stock from them and grazing toward them (particularly during winter grazing)
- Capture contaminants at drainage outflow points by sediment trapping or constructing a wetland. Bernadette and Alister example

What are the benefits?

- The environmental risks identified are specific to the property
- You can demonstrate that your management practices are having a positive impact on the environment
- If we can better target fertiliser use and match to soil testing there may be opportunities to save money on fertiliser costs
- Perhaps the biggest benefit that I have seen with the farm plans is that it creates better buy in from farmers, they become more engaged and subsequently motivated to achieve more from an environmental point of view. It becomes a useful tool in which to set goals for better environmental outcomes over time.

Bernadette: Mitigations

Each farmer has to work out what is best for them and their operation...making decisions based on the maximum impact for the investment. Here are some of the mitigation strategies we use:

Manage our nutrients better

- soil test
- calcium/magnesium balance in the soil right, the plants are more able to take up the nitrogen we feed them

- apply fertiliser at the right stage of the growth cycle so that the nutrients will get uptaken by the plants and used

Protect soil structure

- We focus a lot of attention on protecting soil
- Minimise soil disturbance whenever possible through min/no till when possible (ie instead of ploughing)

Exclude stock from waterways

- everything is fenced off here.
- lease blocks may not have permanent fencing to protect waterways, but we use temporary fencing to achieve this until we can permanently fence them (or the farm owner does).

Plant out the riparian areas alongside waterways

- This is a perfect example of farmers needing to make choices – riparian planting not always the best option, it is just one option

Protect those critical source areas by excluding stock from them and grazing toward them (particularly during winter grazing)

- Critical source areas (CSA) are our biggest source of nutrient loss.
- 10 years ago, we didn't give them a thought
- Sediment traps are a great tool – but takes maintenance
- almost all of our paddocks have a critical source area - Often leave these uncultivated; graze last if winter cropped; protect outflow area
- Paddock with sediment trap: fenced off CSA during winter grazing

Wintering

- Winter grazing is essential in Southland
- Grass doesn't grow (don't need to mow the lawn) and everything gets sodden
- have to grow the crop in advance so we have it for the winter
- needs to be able to survive frosts and snow without rotting
- want to get as much feed in the smallest area as possible to minimise the amount of the farm being damaged
- We all hate winter grazing. But we can't just not feed the stock!
- lots we can do to mitigate the effects.
- Wintering barns are another way, but not the solution for all - cost, not effective for sheep, effluent. But great for us – growth, ease of feeding, paddock benefits, compost effluent for later
- we'd do all our wintering indoors if we could - that's our goal.

Managing sediment run off on steep slopes



Sediment trap in action

Not a situation we want at all... but at least most of the sediment remains in the paddock to be dragged back where it belongs, rather than running into a waterway.





Indoor wintering

The ideal solution to wintering, and definitely cost effective ... but high investment costs to establish. We will eventually do all our wintering this way but it is a long term plan due to the capital outlay required..

Karl: Nutrient management and Overseer

The two plant nutrients that we call contaminants are N (Nitrogen) and P (Phosphorus).

Both of these nutrients cause undesirable outcomes when they end up in places that we don't want them. As these nutrients are quite expensive to buy so it really is an inefficiency if they end up being lost to water. So if we want to manage our nutrients better or more efficiently we need to understand things like:

- What are the sources or inputs of nutrients to the farm?
- Where are the nutrients that remain on farm?
- How do nutrients leave the farm?

Inputs – Fertiliser, Animal dung and urine return, effluent, Nitrogen fixation by clover legumes, irrigation or animal supplements brought onto the farm

Outputs – Products like milk or meat, supplements made on farm, losses to the atmosphere and losses to water

Cycling nutrients – these nutrients remain in the soil as organic or inorganic material

So now we have an idea of the input and outputs and the nutrients that remain cycling on farm the next step is if we can begin to quantify or put numerical values to inputs and losses etc. How many people have heard of Overseer?

Overseer is a web based application that tracks nutrient use and movement within a farm, assigns numbers in terms of kilograms of nutrient per hectare. For example

Inputs of N to the farm include 129kg/ha/yr in fertiliser, 89 kg/ha/yr of N is fixed by clover legumes and 3 kg/ha/yr is bought in as supplements bought in.

The 60kg/ha/yr of N leave the farm as product, 60kg/ha/yr is lost to the atmosphere by denitrification and volatilisation and 33kg/ha/yr of N is lost to water.

The useful thing about overseer is that (if you are a competent user) you can model scenario's. For example: a farmer wants to buy the block next door and run a few extra stock numbers. The data for the extra land, stock, fertiliser etc is entered into the model, the farmer can check to see what or how those changes would take effect in terms of nutrient loss. What do those numbers look like?

As you will know Overseer is used in regulation for limit setting purposes by other regional councils, however were ES stands with this is yet to be determined.