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## National Treasure

Native biodiversity on-farm

Kellogg Rural Leadership  
Programme

Course 41 2020

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## 1. Executive Summary

Sheep and beef farms are home to a quarter of New Zealand's total national native vegetation. This means that sheep and beef property owners make up the second largest native biodiversity land holders, second only to Public Conservation land. As such, a large part of New Zealand's conservation effort is in their hands.

Many landowners have already taken steps to protect and enhance their slice of native bush. With appreciation for what has already been achieved it encourages more progress to be made by that person and those around them.

By nurturing this connection to the land and amplifying it through our communities we are more likely to gain long term biodiversity gains. Enhancing a culture of kaitiakitanga, guardianship or feelings of being stewards of the land.

This report endeavours to discover

The quality of the biodiversity held within the bush blocks on New Zealand sheep and beef farms.

What challenges native vegetation faces in these blocks and how best to maintain and/or improve these areas.

### Recommendations

#### 1. Manage

Where landowners' resources are limited a pest control management regime implementation would be a cost-effective use of capital that will produce the fastest benefits. Also changes to stock grazing practices have the potential to slow deterioration until fencing can be put in place.

The problem of funding the conservation efforts around the native bush on farms needs to be quickly addressed. This could be as simple as ensuring the carbon credits of these areas are financially recognised. With an inbuilt incentive to have them fenced off within the first 5 years of this financial recognition. This would enable the conservation efforts of landowners to be more easily financed, thus ensuring ongoing pest control and maintenance of these areas.

#### 2. Lead

We need to identify potential leaders who can pass on their knowledge, learnings and techniques to others. This would be best done with a framework in place that helps ensure these leaders are supported. This will help foster a collaborative approach to ensure biodiversity gains.

#### 3. Research

I feel research into stocks role in conservation and how grazing could help enable native regeneration is needed to establish if there are any positive effects as the Allison H.V.A survey and Longlands case study suggests there may be. This would help to decisively answer the stock exclusion argument.

The need for all the ecological significance assessments to be presented in the same way in the H.V.A surveys is a great missed opportunity. I feel that being able to successfully compare and contrast this information over a long period of time would give clarity to how native vegetation is tracking in comparison to where it started from. This would give clearer indications to how our management practices are affecting native vegetation.

The High Value Area surveys are a great source of information. However, I feel they would benefit from having more information about the options for the H.V.A, such as QE11 covenants and a list of potential funding grants that are available to help landowners with the ongoing protection of these areas.

## 2. Acknowledgements

Firstly, I would like to thank the Kellogg Rural Leadership Programme for giving me the wonderful opportunity to participate in this course. This programme gives such a great opportunity to learn from not only the amazing leaders facilitating the course but also the fantastic presenters and speakers that come to share their wisdom.

Thank you to all the other cohort members that helped make this process so beneficial. It's been a pleasure to go through this journey with you all.

Thank you to my husband and children for their understanding and support even when faced with eating tea on the floor as my project took up prime position at the dinner table.

Thank you to Environment Southland, AB Lime, QE11 trust and individual farm owners. I really appreciate the time you gave me and your willingness to help provide the information needed to complete this project.



*Figure 1 Olearia lineata, an 'at risk-declining' native tree daisy (Stowe, High Value Areas, Ecological assessment report, Longlands, 2020)*

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### 3. Introduction

With two new national policy statements, one on freshwater management and the other on indigenous biodiversity, today's political landscape is shining a spot light on our environment on-farm (Government) (MfE, 2019). These policies are creating a lot of discussion within the agricultural industries. It seems there hasn't been a rural media agency who haven't been talking on these topics at least once a week over this past year. Such as articles in Farmers Weekly and Rural News, and interviews on Sarah's Country and Newstalk ZB's The Country.

So how can we capitalise on these discussions and gain some quality long term outcomes for our native biodiversity.

This report tries to collate the different information and advice available in the hopes of productively furthering this discussion, in the hopes that it will give clarity to what is beneficial to native vegetation at an on-farm level.

#### 3.1. Methodology

I have used a mixture of literature review and case studies.

Environment Southland do High Value Area (H.V.A) Surveys for land owners in their region<sup>1</sup>. I was able to collect twelve of these surveys and have used them to get a general feel for some of the overall trends. I analysed the different H.V.A's by area size, their plant species lists and notable information.

##### 3.1.1. Limitations

I only used data from Environment Southland in the assumption that all these surveys would be carried out and completed in very similar ways, using the same ecologist/s so as to limit data collection variability.

Due to privacy issues I was limited in the surveys I was able to source. Therefore, some ecological regions are more heavily favoured in this research than others.

The surveys have been completed over the course of the last 10 years; therefore, these surveys may no longer be true representations of the native biodiversity currently in those areas.

Although most H.V.A's had some form of Ecological Significance Assessment done the way in which these were calculated differed considerably. This made it extremely hard to divine any trends using this information, therefore I have not been able to use that data.

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<sup>1</sup> <https://www.es.govt.nz/environment/biosecurity-and-biodiversity/high-value-areas>

## 4. Findings and Discussion

As part of my research I have reviewed a range of different material to try and gain a perspective in the challenges around native biodiversity and its conservation on-farm. I found three key themes that I will expand on. These are;

- Vision
- Management
- Collaboration

### 4.1. Vision

In order to achieve the best outcomes for native biodiversity fragments on farm, first we must create a clear plan. This should come with a clear framework of goals, backed up by a system of indicators, actions and monitoring (Dodd, et al., 2010). We must decide what we are aiming for with our on-farm conservation efforts. Do we want to revert back to what was originally there or do we look for an ecological resilience moving forward? It seems that there is no going back, as we have already lost many of our native species and introduced many more to our shores which have forever changed our biodiversity landscape.

Having a clear plan in place will enable sheep and beef farms to continue trading on New Zealand's clean, green image. This will be achieved by being able to give evidence for all we are doing to protect our environment. This will be the way in which we can achieve a return on our sustainability investment (Scott, 2019).

With a clear plan comes clear goals. These goals need to be backed up by careful prioritisation so that you can achieve the best outcomes from the available funds (Willis, 2017). This prioritisation will help sustain long term outcomes but will need constant reassessment and monitoring in order to achieve the desired results (Norton, Butt, & Bergin, 2018).

### 4.2. Management

Sheep and beef landowners see the biggest barrier to managing and protecting native biodiversity on-farm as economic (Maseyk, et al., 2020). Some feel that it may even compromise the financial viability of pastoral or forest based businesses (Ministry for the Environment, 2020). This will need to be amended so all landowners can achieve the best outcomes for their biodiversity.

To enable native biodiversity to thrive it must be well managed. This can come in many forms such as enrichment plantings, pest control or stock exclusion. However, the danger here is that one management tool on its own will likely not provide lasting positive impacts. An example of this is when possums alone are controlled this will often result in an increase in rats (Willis, 2017).

This contrasts significantly with the advice that exclusion of grazing animals (farmed and feral) is the single most effective thing farmers can do to sustain and enhance the remnants of native woody vegetation on sheep and beef properties (Norton & Pannell, 2018).

Interestingly, there is an argument that having these areas fenced off and a pest control management in place may not be the cure all we hope. Evidence suggests that these areas are unable to achieve natural forest conditions due to a mix of fragmentation effects and a lack of seed regeneration ability (Dodd, et al., 2010).

The biggest risk to our native biodiversity used to be land clearance but now the biggest risk is pest plants and animals (Willis, 2017). This highlights the need for continual active management of pests so as to ensure the best native biodiversity outcomes.

### 4.3. Collaboration

*“managing biodiversity means managing people.” (Willis, 2017)*

A big theme throughout was the need for a collaborative approach. Good native biodiversity outcomes depend on people, whether that is in the form of strong leadership or a team approach between landowners, community and government both local and national. Without people long term gains are harder to sustain.

An example of a successfully collaboration is the Hawkes Bay regional council’s Cape to city predator control and ecological restoration project. It brings together regional council, landowners and other organisations to gain lasting outcomes (Willis, 2017).

Training days, such as farm discussion and catchment groups, have the opportunity to put this collaboration to work. It is suggested that these opportunities to learn from others may in fact help bring positive outcomes for on-farm biodiversity (Ministry for the Environment, 2020).

Bold leadership will be needed to drive best results (Scott, 2019), and it is these leaders that will ensure training and collaboration are successful.



*Figure 2 Tall silver beech forest interior (Stowe, High Value Areas, Ecological assessment report, Longlands, 2020)*

#### 4.4. What's out there?

Since the arrival of humans to New Zealand, the natural landscape has gone through constant change (Hilton & Childs, 2018).

Before humans set foot on New Zealand there was native forest covering 85% of the land. With the introduction of Maori this was reduced to 50% as they cleared land for their kumara gardens. Europeans then arrived and further cleared land reducing the native forests to just 21%. (Tong & Cox, 2000)

The biggest driver in all this change was to develop an environment that could sustain humans. The need for dependable nutritional food drove the changes throughout the country. Therefore, as a country we now find ourselves with the highest percentage of farmland against total national land in the world. The world average in 1993 was 37% where as in New Zealand we have 52% (Tong & Cox, 2000).

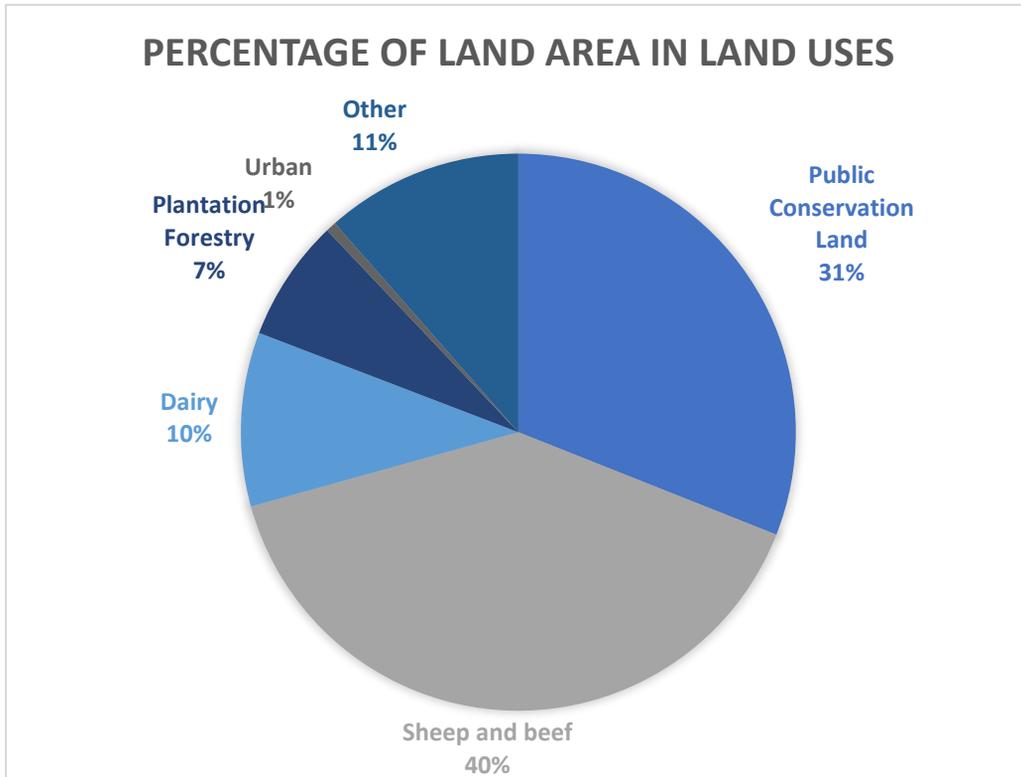


Figure 3 New Zealand land uses, derived from (Norton & Pannell, 2018)

The amazing thing about our agricultural land is that it is not made up internally of one ecosystem. In fact, sheep and beef land is 27% native vegetation, this equates to one quarter of the remaining total native vegetation left in New Zealand (Norton & Pannell, 2018). Only public conservation land has more native vegetation. Sheep and beef farmland also contain 45% of the total national area of native grasslands, mainly dominated by tussocks (Norton & Pannell, 2018).

There is potential to capture financial benefits for the native biodiversity found on sheep and beef farms due to their ability to offset their own carbon emissions by between 63% and 119% (Case & Ryan, 2020). This is due to tall naturally occurring indigenous forest being able to store on average twice as much carbon per hectare than exotic plantation forest over its harvest rotation timeframe (Case & Ryan, 2020).

Many landowners have taken steps to protect native vegetation on farm. This protection comes in many forms, at the passive end, land owners have left gullies undeveloped allowing native vegetation to escape early land clearance (Norton & Pannell, 2018). At the other end of the scale we have landowners that have placed QE11 covenants on these native blocks to ensure ongoing protection.

There are 4,608 registered QE11 covenants throughout New Zealand (QE11 National Trust, 2020). These protect a total of 180,258ha (QE11 National Trust, 2020) covering an array of different land types as shown in figure 3. New Zealand sheep and beef farms make up 54% of all QE11 covenants, that’s around 100,000ha (Norton & Pannell, 2018).

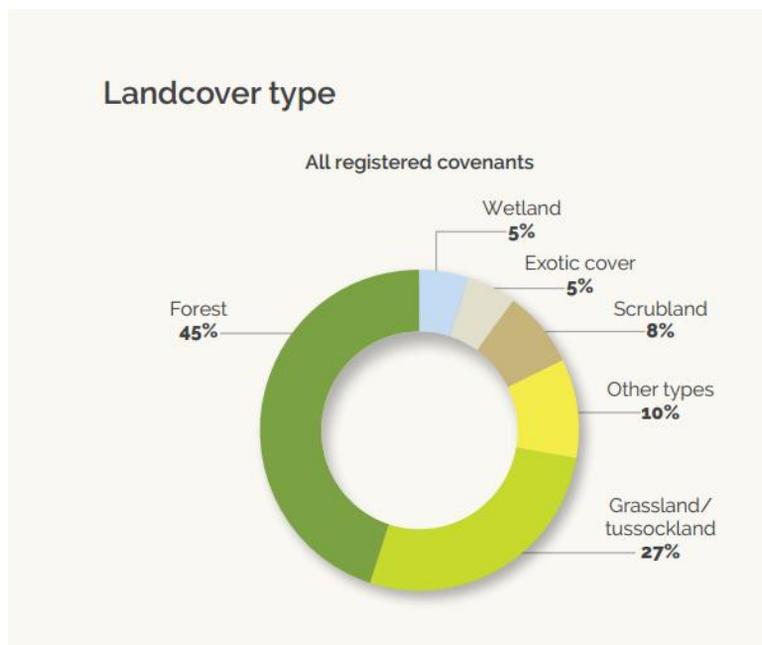


Figure 4 QE11 covenant land use type (QE11 National Trust, 2020)

#### 4.5. Quality vs Quantity

In this section I investigate the quality and quantity of native vegetation using High Value Area (H.V.A) surveys completed by Environment Southland.

All the properties had their own challenges, whether it was from the density of pest plants, their isolation from other native areas or their size. However, they all had the same core pest animals; rodents, mustelids, possums, deer and goats. Some properties also had pigs, hares and rabbits but not all. They also had similar pest species with all having gorse.

Table 1 High Value Areas Survey Results

Property	Ecological district	Number of Ecosystems present	Total area of H.V.A (ha)	Number of plant species present		
				Native	Exotic	Total
Longlands	Umbrella	6	90.1	79	13	92
Patterson	Umbrella	2	16.2	48	15	63
AB lime	Southland Plains	1	53.5	107	9	116
Walsh Bush	Waituna	1	6	45	6	51
Walsh Peat	Waituna	1	42	31	13	44
McKenzie <sup>2</sup>	Waituna	6	105.5	57	17	74
McKenzie Peat	Waituna	3	10	27	7	34
Smith	Waituna	3	3.7	23	5	28
O’Connell	Waituna	3	24.8	48	5	53
Allison	Waituna & Tahakopa	1	5	12	11	23
O’Neills A	Waituna	3	8.1	46	8	54
O’Neills B	Waituna	4	8.8	61	15	76

Derived from all referenced reports read for this project.

Table 1 shows that the size of an area of native vegetation doesn’t necessarily indicate the number of species present. For example, the McKenzie property is the largest area but only the fourth highest for native species and has the highest number of exotics. Even within the one

<sup>2</sup> This report is referenced as Lower Titiroa Wetland Reserve

ecological district there are vast differences with not only the size of the H.V.A but with how many plant species are present. This is a similar trend to the ecosystems present.

The O’Neills A and B blocks both had a previous H.V.A completed over a decade beforehand. Both of these H.V.A’s were registered as QE11 covenants in 1994. There were planting days undertaken with local school and community groups, which may have helped increase the native species present as shown in table 2. These days would have given a great opportunity for passing on valuable knowledge around native biodiversity and its protection.

Table 1 Native plants present during H.V.A survey

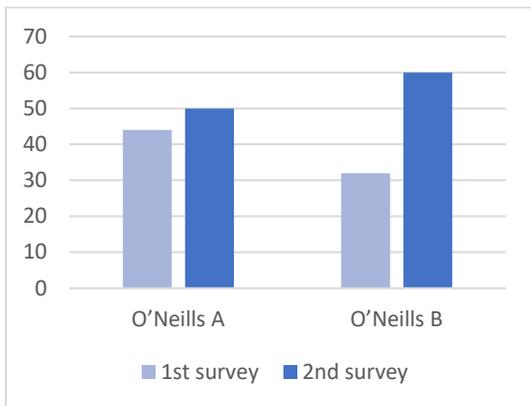
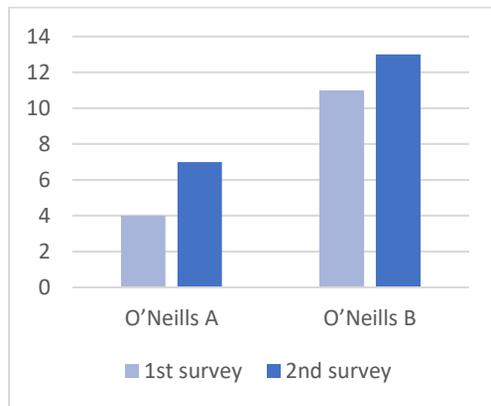


Table 2 Exotic plant species present in H.V.A survey



Weed and pest control were also undertaken although the latest survey shows an increase in exotic species as shown in Table 3. This highlights the need for continued active management of H.V.A’s.

Interestingly Longlands, Patterson, Walsh Peat, O’Connell and McKenzie blocks were not fully fenced at the time of their survey. However, the O’Connell, Walsh Peat and McKenzie areas that were not fenced used a drain to prevent stock entering. There doesn’t appear to be a noticeable difference in species present between these blocks and the fully fenced ones.

Ring drains, such as those used in the previous example, while being an effective way to keep stock out can cause a negative impact to some native vegetation due to its effect on water retention (Mitchell, High Value Areas, Ecological assessment report, Walsh Block QE11 Bush, 2010). However, some ecosystems benefit from the addition of these drains (Golder Associates (NZ) Ltd, 2010). This highlights a need of continually monitoring and the importance of customizing responses to the ecosystems present in each area.

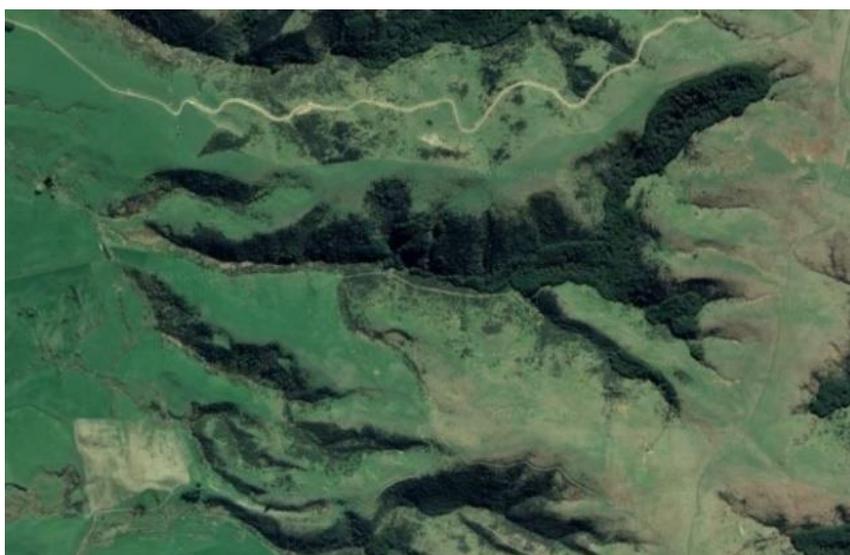
Surprisingly in the Allison H.V.A there was a recommendation of allowing stock to occasionally be allowed in the area. It was felt that low levels of sheep grazing could benefit the recovery of tussocks by keeping the pasture sward down (Mitchell, High Value Area Assessment Report and Tussock Health Transect Baseline, Allison Block, 2010). It also noted that stock grazing should be closely monitored to ensure beneficial impacts are achieved.

There is discussion that the best way to protect native bush is to have it completely fenced off from stock. However, this theory is challenged by the H.V.A of both Allison and Longlands. Contained within the Longlands H.V.A survey was a satellite image from 1946. When this photo is compared with a recent photo it is apparent that not only has the native bush thrived but that it appears to have significantly expanded in size especially the grey scrub.

Stocking rates and grazing habits have been closely monitored in the last 17 years with the current owners and I believe that this may be the key in why this expansion has been seen.



*Figure 3 Aerial photograph from 1946 (Stowe, High Value Areas, Ecological assessment report, Longlands, 2020)*



*Figure 4 Satellite photo of the same area today*

## 4.6. Case studies

### 4.6.1. Longlands

Longlands is a 396ha property in Southland ranging in altitude of 250-600meters above sea level. It is farmed as a sheep and beef unit, in conjunction with a run off block that is used for finishing dairy beef and hogget grazing. Longlands is divided into two areas;

- Hill block. Higher altitude areas, with a soil type of Pukekoma
- Lowland. Lower altitude flatter area, Waikoikoi and Pukekoma soil types

The current owners have farmed Longlands for the last 17 years. In that time their general observations are that the fern cover and undergrowth in the bush has increased as well as an increase of grey scrub. They have also noticed that the feral goat population has stayed the same throughout that time. Whereas the deer population which started off being mainly red deer has steadily increased but is now mainly fellow.

The majority of the high value area is located on the “Hill block” except for the red tussock land. The Hill block is divided into five paddocks. 50 mixed age cows are rotationally grazed on these paddocks from weaning (March) until approximately mid-June. They spend the rest of their year grazing the ‘lowland’ which consists of the remainder of the farm.

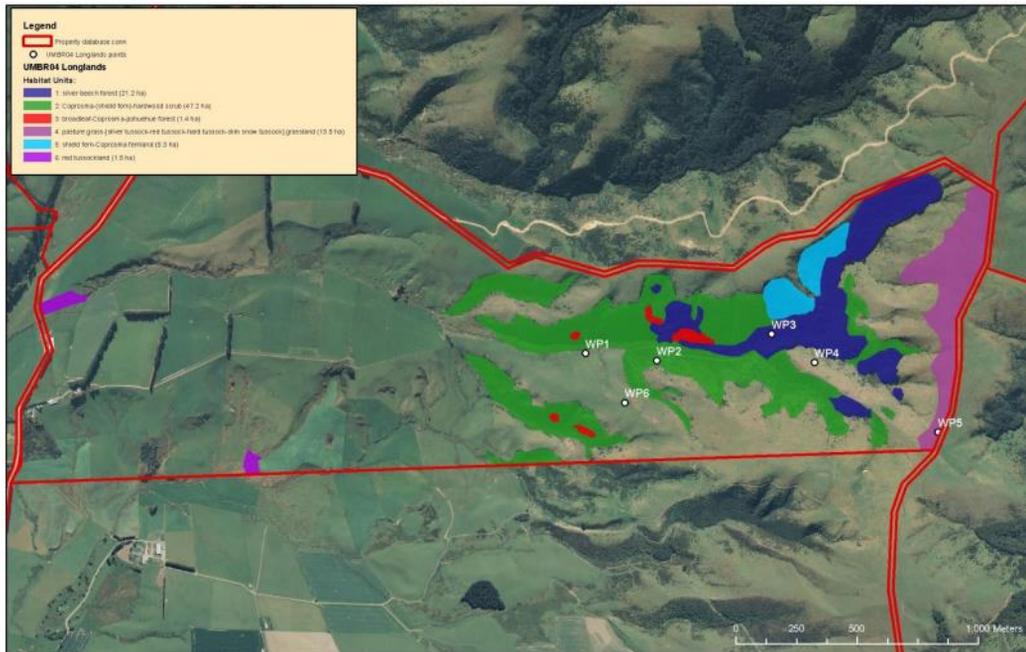


Figure 5 Map of Longlands showing the High Value Areas

450 ewes are set stocked on the 10 September over these 5 paddocks for lambing. These are mainly single bearing ewes with a lambing date of 20 September. They stay there until weaning, approximately 20 December, before all the ewes are mobbed up and rotationally graze the hill block and 3-4 lowland paddocks until the end of May. From May-September they winter graze on lowland.

The Hill Blocks are stock free from approximately mid-June through to the beginning of September. Longlands is part of a possum control area and is actively hunted throughout most of the year.

The obvious increase of grey scrub on Longlands may be the result of rotational grazing keeping the grass sward down to a level that allows the seeds that are naturally getting deposited over this area to germinate. By then having no stock on this area over the winter months it may give these seeds time to establish. All though there will be some plants effected by stock when they are grazing in that area. If this stock were not given access to this pasture would the rank grass sword be to long for seed germination to effectively take place? This would make for an interesting further study.

#### 4.6.2. AB Lime

AB Lime Ltd is a multifaceted family business that is located half way between Winton and Browns in Southland. AB Lime employ 45 staff and hold themselves strongly to their core values; Teamwork, Respect and Integrity.

AB Lime sells lime and fertiliser, they have been operating for over 100 years and service 80% of Southland.

Besides the lime quarry they have a 374 hectare dairy farm milking 950 cows with an average of 450 kg of milk solids per cow.

AB Lime also has a Class A landfill which takes all of Southland's municipal household waste and some special industrial waste as well.

They also have a 63 hectare block of native bush which is the second-most important forest remnant on a limestone substrate on the Southland Plains (Clayton & Stowe, 2014). The first being Forest Hill Reserve. This bush has been given the name Motu Ngahere, which is Maori for 'Island of Bush'

AB Lime also has a wetland that has been in place for over 20 years. All though this area has always been a great way of reducing sediment runoff AB Lime have taken steps to restore this area by planting native vegetation along the banks. This will help improve both water quality and native biodiversity.

The environmental impacts of their business play a key role in everyday at AB Lime. They are constantly monitoring water quality, pest animals and landfill gas to ensure the best outcomes for the environment.

AB Lime are keen members of their local community, they sponsor over 50 events and organisations such as the recent Pack the Park rugby game. They are members of the local catchment group and have had farm discussion groups visiting. They also have had the local primary school come to visit their native block to learn about the environment and plants.

One of AB Lime's goals is to manage landholdings so that biodiversity is protected and enhanced, where practicable, throughout AB Lime operations.

AB Lime have undertaken a large amount of work to improve their slice of native New Zealand. AB Lime completely bought out the native plant stock of two local nurseries so now they have gone so far as to create their own plant nursery enabling them to have a constant supply. Since 2018 they have employed a full-time conservation officer and as part of this role, he undertakes seed collection, from February through to June, of around 30 different plant species. These are then taken to their nursery where they can hold 40,000 medium sized plants. AB Lime then waits until these plants are around 1meter in height before planting them out, this gives the plant the best chance for survival with minimal maintenance.

AB Lime have shown leadership with their conservation efforts and willingness to pass on their learnings to others.



*Figure 6 Interior of rata-podocarp forest (Clayton & Stowe, 2014)*

## 5. Conclusions

I feel on farm conservation begins with finding an accurate baseline of data. Whether this is nationally, regionally or privately. Having accurate information on what is already there and how it compares to other areas will enable better decisions to be made on the path forward. However, data collection methods historically have been un-systemised nationwide (Willis, 2017). Therefore, making it hard to gage any true trends. For example, an ecosystem could be classed differently in different regions even when it has the same characteristics. This has led to data where we cannot show with clarity what is actually happening within our native ecosystems.

The most cost effective first step in a land owners conservation journey is pest control and grazing management. Controlling both pest weeds and animals is an important factor for native bush, even more so in areas that are fenced. By having a management control plan in place pest numbers are less like to surge once the area is fenced off. If the native vegetation isn't fenced off from stock, ensuring a small stocking rate with rotational patterns that have no stock through the seed establishment period may enable natural regeneration to occur.

A collaborative approach that brings together the efforts of a community will be very beneficial in producing long lasting positive effects. This will need strong leadership and ongoing management in order to achieve these results.

## 6. Recommendations

### 1. Manage

Where landowners' resources are limited a pest control management regime implementation would be a cost-effective use of capital that will produce the fastest benefits. Also changes to stock grazing practices have the potential to slow deterioration until fencing can be put in place.

The problem of funding the conservation efforts around the native bush on farms needs to be quickly addressed. This could be as simple as ensuring the carbon credits of these areas are financially recognised. With an inbuilt incentive to have them fenced off within the first 5 years of this financial recognition. This would enable the conservation efforts of landowners to be more easily financed, thus ensuring ongoing pest control and maintenance of these areas.

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## 7. Appendices

### 7.1. References

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## 7.2. Appendix 2; Longlands questionnaire

How long have the current owners had this property?

How long have you been working on this property?

What size and altitude are the property?

What are your observations with regards to the native bush on this property?

What is your observation in regards to pest species?

What are the management practices in regard to the areas with native bush in them?

## 7.3. Appendix 3; AB Lime introduction and questions

Below is an outline of the way in which I gathered my information for the AB Lime case study.

Hi, I'm Catherine Dickson, I'm currently doing the Kellogg's Rural Leadership course. You may remember talking to me earlier in the year when you allowed me access to your H.V.A results. I'm looking at making AB Lime a case study in my report and was hoping you would answer some questions for me.

I have gathered some information from your website regarding the business, is this information still correct?

Is there anything you feel needs to be added to the background information?

Have you had school or community groups involved with the native bush block?

How many different species do you collect?

When do you collect seeds?

How long does it take for these seeds to germinate?