

# **Farmer Interviews on Practice, Perceptions and Knowledge of Trees on Farm**

Prepared for Te Uru Rākau One Billion Trees

Final Report

February 2020

Perrin Ag Consultants Ltd





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**February 2020**

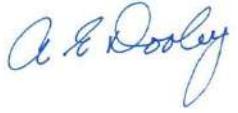
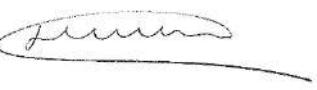
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## **Relevance to the Integrated Forestry Farm Systems case studies**

While comprising a standalone deliverable of the Integrated Forestry Farm Systems project, the research reported on in this document, has a critical function in the wider project.

As a result of this research, it has been identified that the 14 case studies that form the primary outputs and resources for enabling farmers to have the desire and confidence to plant “the right tree in the right place for the right purpose” must address the following concerns and knowledge gaps:

- (i) Detail the process for selecting and planting ‘the right tree in the right place to get the right outcome’. Communicate the planning required and build appreciation of the value of doing this process well. Communicate real examples of learnings from what has not worked in the past in order to illustrate and reinforce why tree species, site selection and silvicultural regimen are critical success factors for farm forestry.
- (ii) Provide farm specific information on the ETS, how carbon trading works (or could work where ETS registration is yet to occur) for the case farm, illustrate how differences in species carbon sequestration contribute to financial outcomes (and maybe inform a change from the farmers’ originally preferred species), demonstrate how requirements for ETS eligibility can be met, and cross-reference to existing Te Uru Rākau information on how to register. Illustrate the financial benefits and risks of registering plantings within the ETS.
- (iii) Provide robust financial and environmental analysis demonstrating the potential returns, impact on environmental externalities, and the overall performance of the farm system. This will be compared against the existing land use (i.e. with minus without trees) and clearly demonstrate (via KPIs such as Economic Farm Surplus, farm GHG net emissions, kg N leached) the value proposition to the land owner.
- (iv) Provide information and a detailed process for selecting wood harvesters and setting up wood harvesting agreements (such as PF Olsen’s proven guidelines). Also, define what is required by each party to ensure the farmer is not left with a ‘mess’ post-harvest.
- (v) Cross-link to the Project Literature Review to provide farmers and industry people reading the case studies with links to further information, help and support.
- (vi) Tailor best practice information regarding tree management and harvest process to the case farm, indicating how environmental externalities can be mitigated through good planning and harvest management in order to alleviate farmers concerns about securing resource consent and minimising the environmental impact at harvest.
- (vii) Illustrate for some case farms how natives could be established to provide integrated ‘best land-use’ and the various options available (direct planting, cover crop, natural regeneration).

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## 1 Executive Summary

Te Uru Rākau One Billion Trees and industry co-funders commissioned Perrin Ag Consultants Ltd (Perrin Ag) and PF Olsen (as collaborators) to undertake research on “*integrating dairy and hill country sheep & beef farming with forestry for profitable, sustainable land use*”.

This research project has three components. Findings from the second (farmer interview) stage of the project are reported here. The data collected through the interviews will inform the selection of case studies and land-use scenarios for in-depth investigation in the next stage of the project

The interview stage of this project comprised two phases, with the first phase informing the second. In the first phase, semi-structured, face-to-face interviews were conducted with 5 farmers from each region (BOP/Waikato and Rangitikei) to gain an in-depth insight into farm forestry practices, views and knowledge, and enablers and barriers to integrating forestry into pastoral farming businesses. This was followed by 50 more structured phone interviews exploring the same themes.

In total, 35 farmers were interviewed in the Waikato and BOP (5 face-to-face and 30 by phone). Of these, 18 were dairy farmers, 14 sheep and beef and 1 farm business with both farm enterprises, with half the farmers from each of these regions. Three face-to face interviews were dairy, and two sheep and beef, all of whom could potentially incorporate forestry on their farms or who had done so. Twenty-five farmers were interviewed in the Rangitikei, (5 face-to-face and 20 by phone), with all but 2 in the Taihape area in northern Rangitikei. All Rangitikei farmers were hill country sheep and beef cattle farmers.

Qualitative and quantitative data was collected, with the qualitative data largely collected in the 10 face-to face interviews, and the quantitative data through the phone questionnaires. This resulted in rich data providing strong insights into the interviewee’s business, intentions, knowledge and views of trees on farms.

As a result of the research, it was clear that farmers highly value trees, often for non-economic reasons, with most farmers interviewed having already engaged in tree planting of some sort, and many intending to do so in the future. They felt that these efforts, undertaken as stewards of the land, are often not appreciated/recognised outside the farming community.

Time and cost are key constraints to the level of tree planting farmers can engage in. A lack of understanding can also limit tree planting. Regional differences (climate, topography, forestry related capability and servicing infrastructure) clearly confirmed the need to consider “right tree, right place” in tree planting. Preferred species differed between the regions surveyed: *Pinus radiata* was less favoured in the Rangitikei whereas poplars were commonly planted for environmental reasons and shelter. Otherwise, species planted across the regions were similar.

Farmers expressed a universal dislike of blanket planting and land conversion. This was viewed as damaging rural communities and the aesthetics of the landscape. Rather, farmers believed there was a place for increasing tree plantings on-farm as smaller woodlots, increasing diversity, enhancing the landscape, and providing environmental, erosion control and shade benefits.

The data collected in this interview research is needed to inform case study selection and scenarios in the next stage of the project, and ensure project outputs meet the information gaps and knowledge requirements of interest to farmers, we make the following recommendations for the 10 individual case studies:

- (i) Detail the process for selecting and planting ‘the right tree in the right place to get the right outcome’.
- (ii) Provide farm specific information on the ETS.
- (iii) Provide robust financial and environmental analysis demonstrating the potential returns, impact on environmental externalities, and the overall performance of the farm system.
- (iv) Provide information and a detailed process for selecting wood harvesters and setting up wood harvesting agreements (such as PF Olsen’s proven guidelines).
- (v) Cross-link to the Project Literature Review to provide farmers and industry people reading the case studies with links to further information, help and support.
- (vi) Tailor best practice information regarding tree management and harvest process to the case farm, indicating how environmental externalities can be mitigated through good planning and harvest management in order to alleviate farmers concerns about securing resource consent and minimising the environmental impact at harvest.
- (vii) Illustrate for some case farms how natives could be established to provide integrated ‘best land-use’ and the various options available (direct planting, cover crop, natural regeneration).

As a result of this research, we believe there are also a number of key opportunities for Te Uru Rākau and the wider industry to consider:

- a. Provide a knowledge centre for farmers/land-owners that ‘packages’ current information into everyday language which is concise and easy to understand.
- b. Develop a ‘right tree, right place, right purpose’ tool.
- c. Add other sources of tree funding to the Te Uru Rakau One Billion Tree site.
- d. Develop user friendly forestry fact sheets that provide the essence of what farmers need to know on one page that is easy to find, read, understand and print out.
- e. A multi-media communication approach by Te Uru Rakau (and MfE) with website, rural media hard copy publications, downloadable fact sheets and field days (such as for the case farms near the end of this Project) is required to overcome knowledge gaps and misconceptions, and to keep farmers current with legislative changes and their implications.
- f. Communicate the aims of the One Billion Tree Programme to achieve best land-use, including through efficient integration with livestock farming.
- g. A log buyer registration scheme is recommended to weed-out ‘rogue buyers’ and to provide a minimum standard of professional forestry service that gives farmers’ confidence in the quality of the service they purchase.
- h. Consideration could be given to developing a list of recommended forestry advisors for each district to address this farmer need.
- i. There is a need for further extension efforts to relay information to farmers regarding the overall environmental impact of forestry and how externalities can be mitigated through implementing best practice and interventions such as riparian buffer strips and harvest process.
- j. The majority (86%) of land-owners plan to plant trees in the future with the decision driven by strong values regarding land stewardship for future generations and wanting to ‘do what is

'right' for the farm and environment. It is important that these farmer values are made known to the wider public as they demonstrate farmers' current and ongoing commitment and actions to improve land stewardship.

- k. Extend information on the financial support available to farmers for tree plantings through the case studies and the resources described above.
- l. Include small and fragmented plantings in the ETS for recognition of carbon credits. This supports the concept of 'right tree, right place'. Many farmers have small areas of land less suited to pastoral farming scattered through their property and allowing these to be recognised and included in the ETS will motivate tree planting.
- m. Investigate and/or package information regarding markets and supply chains for alternative species, which is sought after by farmers particularly in areas less suited to radiata pine.

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## 2 Introduction

Te Uru Rākau has been tasked with doubling the current NZ tree planting rate with the goal of establishing one billion trees by 2028, of which 500,000 trees will be new plantings. To support this initiative, the One Billion Trees funding programme (1BTP) has been established to support tree planting and research that helps facilitate this objective. The 1BTP is not species specific but rather based on the “right tree, right place, right purpose” to provide environmental, social and/or economic benefits.

Te Uru Rākau One Billion Trees and industry co-funders commissioned Perrin Ag Consultants Ltd (Perrin Ag) and PF Olsen (as collaborators) to undertake research on *“integrating dairy and hill country sheep & beef farming with forestry for profitable, sustainable land use”*. This research focused on the Waikato and Bay of Plenty (BOP) regions, and the Whanganui/Manawatu (northern Rangitikei) region, which are Provincial Growth Fund and One Billion Trees priority regions. The research team are also supported by an advisory governance group comprising representatives from funding organisations, farmers and iwi, and two regional steering groups with local farmers and industry representatives.

This research project has three components: (1) identifying information and resources available to farmers and industry on trees on farms; (2) face-to-face and phone interviews with a range of farmers to identify farmer practices, perceptions and knowledge pertaining to farm forestry and; (3) ten individual farm business case studies and four syndicated forestry case studies across the BOP and Waikato, and Whanganui/Manawatu hill country (in northern Rangitikei) to provide real-life information on a range of farm forestry alternatives that most farmers can relate to. On project completion, findings will be shared with local industry, farmers and iwi through workshops and presentations.

Findings from the second (farmer interview) stage of the project are reported here. This incorporated face-to-face interviews and phone interviews to explore farmers’ practices, perspectives and knowledge of farm forestry in order to identify knowledge gaps and needs, and barriers to adoption. Published information on farmers’ views, knowledge and farm forestry practice is limited and much of what is ‘known’ is anecdotal and/or in the ‘grey’ literature. Hence, the information from this stage of the project will increase visibility of the factors that influence or limit forestry uptake, and identify the information needed by farmers (and other land-owners) to support well-informed forestry decisions.

Critically, the data collected through the interviews will inform the selection of case studies and land-use scenarios for in-depth investigation in the next stage of the project. As well, the survey findings will help ensure project outputs address the specific information gaps and knowledge requirements of farmers in the research regions and, in this manner, will help inform tree planting decisions and increased tree planting on farm. Furthermore, the information on drivers, barriers to adoption, farmer practices and information gaps will be of direct interest to industry organisations and government to inform the design of extension and policy.

## 3 Method

The interview stage of this project comprised two phases, with the first phase informing the second. In the first phase, semi-structured, face-to-face interviews were conducted with 5 farmers from each region (BOP/Waikato and Rangitikei) to gain an in-depth insight into farm forestry practices, views and knowledge, and enablers and barriers to integrating forestry into pastoral farming businesses. This was followed by 50 more structured phone interviews exploring the same themes.

In total, 35 farmers were interviewed in the Waikato and BOP (5 face-to-face and 30 by phone). Of these, 18 were dairy farmers, 14 sheep and beef and 1 farm business with both farm enterprises, with half the farmers from each of these regions. Three face-to face interviews were dairy, and two sheep and beef, all of whom could potentially incorporate forestry on their farms or who had done so. Twenty-five farmers were interviewed in the Rangitikei, (5 face-to-face and 20 by phone), with all but 2 in the Taihape area in northern Rangitikei. All Rangitikei farmers were hill country sheep and beef cattle farmers.

A farmer-industry project steering group was available in each region to assist with project planning and support e.g. selection of interviewees and cases, identifying forestry scenarios relevant to their region, reviewing, and project communication and endorsement within their communities and organisations.

### 3.1 Interviewee Selection

In the Rangitikei, initial face-to-face interviewees were selected via the researcher's farmer contacts in the area. These farmers had wide connections in the Taihape farming community and assisted in coming up with other potential interviewees that met the criteria (snowballing technique), thus ensuring diverse selection of a range of interviewees across the wider Taihape area. The willingness of potential interviewees to contribute to the research was also a consideration in selection, given the timing of interviews (middle of shearing and a busy time of the year). Three of the farmers interviewed face-to face also agreed to be part of the local steering group. One member of this steering group is the local Horizons Regional Council representative nominated by Horizons; one of the farmers is a local Beef & Lamb farmer council member; another farmer is recognised for his knowledge of trees; and another member is currently on a research project steering group for Beef & Lamb and has previously been involved in research proposal and submissions. All are well connected locally. For the phone interviews, farmer names, phone numbers and some email addresses were provided by members of the local steering group. Since only 20 interviewees were required, approximately 25 names were requested (29 provided). Sourcing names through local contacts was found to be effective in achieving the farmer goodwill required to ensure cooperation for the phone interviews, despite these occurring over a very busy period. A Perrin Ag consultant also interviewed 4 clients in the wider region, including two from the Taihape area.

In the Waikato/BOP area, a different approach to identifying contacts was adopted. The industry organisations supporting the project were each asked to provide names and contacts (emails, phone) of 15 farmers that met the selection criteria. This was followed up with discussions with three members of the BOP Regional Council to discuss additional potential interviewees for both the face-to-face interviews and phone interviews. The final interview list comprised a mix of industry, regional council and Perrin Ag contacts.

Diversity in interviewees was required for phone and in person interviews so a purposive sampling approach (Bryman 2016) was taken. All interviewees had a significant role in the farm business decision making (the majority were owner-operators, with the balance in management roles) and had land suited to tree enterprises. To capture diversity in practice, perception and knowledge, interviewees with a range of experiences with respect to trees were selected. For example, some had few trees, others were known to be keen on trees and had considerable plantings. Types of trees planted varied. Some were considering tree planting. Others were known to be less interested in trees on farm. In this way, it was anticipated that the interviewees would reflect the range of practices, views and perceptions, knowledge, and enablers and barriers to integrating forestry into pastoral farming businesses.

### 3.2 Interview Themes and Question Design

Qualitative and quantitative data was collected, with the qualitative data largely collected in the 10 face-to face interviews, and the quantitative data through the phone questionnaires. This resulted in rich data providing strong insights into the interviewee's business, intentions, knowledge and views of trees on farms.

Face-to-face interview information was collected primarily through open-ended questions on the themes. However, data collection was integrated throughout the interview, with topics being inter-related. The themes for the face-to-face interviews are described below.

- Background information on:
  - the person interviewed e.g. experience, role in business, farming organisations;
  - the business e.g. farm sizes(s), topography, waterways, access, enterprises;
- Role and impact of forestry in their business and locally i.e. enterprises, past, present and planned (tree types, age, areas, management, ETS registration, returns), and regional services and markets;
- Perceptions and views on tree plantings and forestry, both from personal experience and general views, and including drivers and barriers to adoption; and
- Farmer knowledge of trees on farm, their sources of knowledge and information on trees and views on availability and value of information available.

The questions in the phone interview questionnaire aligned to the same themes as the face to face interviews. However, a more structured approach was used to collect data quantitatively e.g. numeric data, numeric coding of qualitative responses, or Likert scores to capture perceptions and opinions. Two previous surveys also helped inform the questions (Rodenberg & Manley 2011, West & Satchell 2017). The questionnaire, with potential prompts and coding notes can be found in Appendix 10.1. A few questions were open, with prompts available if required, and data collected from these was qualitative. This qualitative data was later analysed with some numerically coded for analysis. Farmers were also able to provide their general opinion re trees on farm as a final question which resulted in qualitative data. The questionnaire was piloted with one of the Perrin Ag consultants who supervises farms.

### 3.3 Interview Process and Data Analysis

A semi-structured interview approach (Bryman 2016) was considered most appropriate for the face-to-face interviews. While the broad themes and key questions to be covered in the interview were decided in advance, this allowed flexibility in the interview process enabling exploration of the themes in a manner relevant to each individual farmer's circumstances and perspectives.

For the face-to-face interviews, the farmers were contacted directly by phone to see if they would be willing to be interviewed, with a follow up email providing further information on the project, expectations and ethics considerations (Appendix 10.2). If they were willing to be interviewed, a time was arranged by email and/or phone. The interviews took about an hour (0.5 to 1.5 hours) and were recorded with permission from farmers. The project was explained to the interviewee and they were reassured that there was no 'correct' answer: rather we were interested in their experiences and views. The interviewee was also able to answer in their own terms and at the length and depth they were comfortable with. All interviews were transcribed for further analysis.

A thematic approach (Bryman 2016) was used in the analysis, and the results written up accordingly. There was a marked difference between regions, so regional cases were written separately. Where direct quotes or reference to interviewee's comments have been made in this report, a pseudonym has been used to replace their name (R1 to R5 for the Rangitikei interviewees, B6 to B9 for the BOP interviewees, W10 for the Waikato interviewee). Where more in-depth perspective in some areas was provided by interviewees, such expanded comments been included as end notes in the report.

For the phone interviews, farmers were initially contacted by phone (if no email address) and the project explained, or they were sent an email with information on the project, expectations and ethics considerations followed by a phone call to see if they would be willing to participate. If they agreed, an interview time to suit the farmer was agreed. Phone interviews took about half an hour to an hour. Data was captured directly in a pre-prepared spreadsheet and names were not recorded with the data to provide confidentiality. The quantitative data was reviewed, and summary data calculated. Some questions required recoding of qualitative data to capture findings numerically for analysis. General views and comments made when answering other questions were analysed by theme, using qualitative data analysis.

It is recognised that the numbers of interviews conducted is insufficient to render the quantitative findings statistically significant. However, the purpose of the interviews was primarily to explore practices, driving factors and views for the different regions to help inform the regional case studies, rather than look for statistically significant differences between and across the populations.

## 4 Face-to-face Interview Results

### 4.1 Rangitikei Region – Taihape Hill Country

#### 4.1.1 Interviewee and Farm Business Description

The Rangitikei farmers interviewed were all from the northern Rangitikei (Taihape area). Four were owners and one leased and managed a family property (R2), so all had responsibility for farm business decisions. All interviewees were on intergenerational family farms (i.e. 3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup> generation) which is not unusual in this area. Trees on the landscape are a common feature in the area, and all had some trees on their farms. R3 and R5 had considerable experience with tree planting and harvesting; R4 had some experience (had done some plantings); and R2 (interested in trees) and R1M (limited interest in trees) had the least involvement but still had some trees on their properties. The farmers interviewed and their businesses are described in Table 1.

**Table 1:** Description of the Rangitikei interviewees and their farm businesses.

ID	Farm Business Description	Farmer Description
R1	<p>Two properties east of Taihape about 15 mins drive apart. Farm 1: 1431 effective ha with Māori lease. Farm 2: 1131 effective ha with lease (purchased in last 10 years). Hill country farms. Farm 2 has 100 ha of flat to rolling country (tractor on) with 14 ha in lucerne. Farms are sandy loam (sandstone base). Farm 1 about half volcanic ash soils (low natural fertility). Relatively stable soils. Well reticulated (water scheme) with troughs and subdivided with lanes. Employs labour. Ewes and breeding cows.</p> <p>Farm 1: 15,000 SU (11,000 SSU, 4,000 CSU). Farm 2: 10,500 SU. (8,000 SSU, 2,500 CSU)</p> <p><i>Farm 1 has 9.4 ha and 2.7 ha blocks of 15 year old Douglas fir, and a 29 ha fenced block of retired native bush. 900 natives planted at property entrance.</i></p> <p><i>Farm 2 has 15 ha of retired bush, and has trees across the landscape (poplars, natives e.g. kōwhai, cabbage trees)</i></p>	<p>(R1M) Ag Sci degree, then returned to family farm (Farm 1). 40 years farming. Trustee and owner (family trust). Management role – primary farm business decision maker. Member of Fed Farmers and an RMPP group. Little interest in trees.</p> <p>(R1F) Makes suggestions on some farm business ideas. Some interest in trees and has contributed to tree initiatives.</p>
R2	<p>Lease 530 ha effective east of Taihape, mostly family land. Sandy loam (sandstone base). Medium to steep hill country, but relatively stable. Dams for water. Ewes and breeding cows. Extensive farming system - will continue as 'way of the future'. Farmworker employed. Also has hives across the Taihape area, including lease farm. Bees kept on another family mānuka bush block for 6 weeks of the year. Employs someone to manage bee operation.</p> <p><i>About 60 ha in unfenced native bush (in approx. 20 ha blocks). Small amount of regenerated mānuka that comes and goes (grazed). Some trees across landscape e.g. kōwhai, cabbage trees, natives, poplar. Trees help provide stock shade and shelter.</i></p>	<p>Main decision maker on lease with husband stock manager-operator and contributing to strategic decisions (he is also a full-time manager on another farm). Farming 10 years, previously shepherd for father, had experience with tree planting on that farm. Prior to farming worked in journalism for 10 years. Belongs to an RMPP group.</p>

ID	Farm Business Description	Farmer Description
R3	<p>360 ha west of Taihape (117 ha purchased 2014). Original 242 ha block is heavy clay hill country (papa base). Purchased adjoining block is ash-based easier country enabling more finishing. Mostly semi-steep to steep, with about a quarter flat to rolling useful for hay and a summer/winter feed crop rotation. 4 waterway areas through farm (dry in summer, can lose stock in winter) with ongoing fencing over last 6 years.</p> <p>1900 MA ewes, 600 EH. Finish all or most lambs.</p> <p>90 angus breeding cows and purchased replacements (empty heifers from an angus stud). Weaners sold.</p> <p><i>8 ha pruned radiata pine planted 1993 and 1994.</i></p> <p><i>2.6 ha pruned radiata pine planted 2000.</i></p> <p><i>9.4 ha afforestation grant block planted 2000 – mainly Douglas fir with Eucalyptus fastigata (ash), 2 ha Cupressus lusitanica and redwoods.</i></p> <p><i>7 ha exotics and natives around house, including stand of redwoods planted 1950 and some large Douglas firs.</i></p> <p><i>1 ha canker resistant macrocarpa planted this year.</i></p> <p><i>Poplars on farm planted from 1950s for soil stabilisation. The hybrids getting to end of life (falling over). Lombardy poplars still good. Space planting poles currently.</i></p> <p><i>Started riparian planting in natives along streams and putting a wetland in this year.</i></p>	<p>Returned to family farm after course at Flock House - 3 years as farm worker, 6 years as manager. Then 10 years as a builder.</p> <p>Returned to farm in 2005 Partner, owner-operator (one labour unit business). Farm business decision maker at all levels currently.</p> <p>Member of NZFFA and belongs to an RMPP group.</p>
R4	<p>440 ha just out of Taihape purchased from father 40 years ago. Marginal economic size.</p> <p>Silt loam (sandstone and papa base), some ash. 7% flat (arable), 30% rolling to steep, rest steep. Goes to 650 metres asl. Some major waterways and minor waterways. Few fenced, steep sides, <i>scrub and bush adjacent, inaccessible to stock</i>. No lanes but one long boundary along a little used road.</p> <p>Extensive operation. Ewes and breeding cows.</p> <p>About 10 SU/ha, 80:20 sheep to cattle ratio. Can fatten 50% to 90% lambs season dependent. Weaners sold.</p> <p>Recently purchased 220 ha property west of Taihape for takeover April.</p> <p><i>6 ha mixed C. lusitanica and macrocarpa planted 25 to 30 years ago as farm forestry (groups of 3).</i></p> <p><i>About 1.5.km of shelter belt planting with some suitable for timber (Thuja plicata (red cedar), Cedrus doedra (Himalayan cedar), Norfolk pines plus acacias and Olearia paniculate (ake raho) staggered 2 deep and a metre in. Planted over last 20 years. Unsuccessfully attempted a shelterbelt in natives 10 years ago – a few totara left.</i></p>	<p>Returned to family farm after doing an OE. Owner-operator, primary decision maker.</p> <p>Member of Fed Farmers and belongs to an RMPP group.</p>

ID	Farm Business Description	Farmer Description
R5	<p>530 ha east of Taihape and a 100 ha lease property 8 km away (Māori Trust land with multiple owners). Volcanic ash soils. 10% of the farm is arable, with the rest moderate to steep hill country.</p> <p>Run 10.5 SU per ha. Approx 6000 SU. 5000 sheep SU and 300 cattle. Ewes and breeding cows, fatten lambs.</p> <p><i>First settler planted many trees, particularly American (redwoods, spruce, Monterey pines (radiata), Douglas fir - FRI later took seed. elm for firewood). Owner's family took over 1905. These provided timber for house and new woolshed in 90s. A few 140 year old redwoods remain. Tree area replanted and expanded on poor grazing blocks. Main planting about 1994. Currently have over 30 ha production forest: 90% low GF grade radiata, 4 to 9 ha Douglas fir, 5 ha C. lusitanica.</i></p> <p><i>Range of tree species planted over farm for shade, shelter and erosion control. Thousands of new hybrid poplars ("Kawa", P. yunnanensis) for erosion.</i></p> <p><i>4 pond wetland developed. Riparian planting underway. 13 ha scattered native bush on farm. To be fenced and under-planted for regeneration.</i></p>	<p>R5 has been on family farm whole life except for 5 years travel. Farming for 45 years. Principal owner of family trust with wife. Succession in transition. In a supervisory role now (son managing farm) with full responsibility for admin and accounting. Decisions joint 50:50 with son and daughter-in-law. Son is an Ag Commerce graduate and daughter-in-law is an Ag Science graduate.</p> <p>Members of Fed farmers. Belong to an RMPP group.</p>

Farms to the east of Taihape (R1, R2, R5) were not originally native bush, as all three interviewees mentioned. As R5 explained, “*this part of the northern Rangitikei wasn't native forest. It was basically tussock land, very similar to the Desert Road. ... the Taupō eruption, which burned all this north eastern side of the Desert Road. [Property name] was originally settled ... 1886 ... They [settlers] came from the east coast with their sheep to farm up here, ... they let them go in the tussock, using the surrounding river catchments as a boundary. There was very little timber and so they [early settlers] actually started planting trees*”. And, “*Around this area, ... the only bush that's survived, whether from volcanics or other events, is south eastern facing small pockets. It's mostly small totara, kōwhai, cabbage trees, rewarewa and some of the smaller pittosporums and other primary colonisers*” (R5). In contrast, R3 who farms west of Taihape, observed that his farm had originally been solid native bush which had been well cleared: the few remnants there include a very old totara, matai and kahikatea fenced with riparian planting.

The area is not highly forested compared to areas such as north of Taupō and going through the Bay of Plenty on the Matatā side and up the East Coast (R1F). It is a strong sheep and beef farming area. There is an active local Farm Forestry Association. The existing trees and retention of the natives reflect previous generation’s decisions. In particular, the R3 and R5 properties had a strong history of mixed tree plantings, and R5 had harvested trees planted by previous generations. Most properties have some poplar plantings for erosion control as recommended by Horizons currently and previous catchment boards (R1M), as well as remnants of the native species prevalent in their area either in bush blocks or as individual trees on the landscape. Interviewees were interested in preserving and encouraging regeneration of their natives.

In managing farm businesses, the interviewees pointed out that summers can now be dry: “*Weather patterns do seem to change. Taihape used to be known as summer safe country. It's not anymore*” (R4). Some farmers also mentioned that the streams on the farm that run high in winter, dry up in summer. Hence, they are dependent on dams or water schemes for stock water.

#### 4.1.2 Farm Forestry Practices and associated Drivers and Barriers

The current tree plantings are shown in the farm business description (Table 1). All interviewees have tree plantings, with areas of native bush and landscape trees for erosion control, shade, shelter and/or biodiversity. R1, R3, R4 and R5 all have timber plantations, with R4 and R5 having plantations nearing harvest. R3 and R5 are riparian planting and developing wetlands.

##### 4.1.2.1 Future Tree Planting Plans

R1M has no plans to plant trees in the future on Farm 1. He is considering planting poplars on Farm 2 for erosion control in some places, but he is “*a bit loathe to because they planted trees [poplars] in the seventies, one of those Italian hybrids*” which has resulted in negative outcomes. R1M and R1F had been considering purchase of a block for trees to offset carbon emissions but changed their mind when government policy on methane changed.

R3 and R5 are both focussing more on riparian works currently. In February, R3 plans to put in a wetland on one of the streams and complete stream fencing: “*all of the creeks are at least fenced on one side and the plan is to get them both fenced*”. R5 wants to get started on the riparian work and native bush retirement in their farm plan before he retires. He has recently started considerable riparian planting and noted that the subsidy for this type of work is a “*big incentive*”: they had a 50% subsidy to clear old willows out of creek beds, then plant natives and fence it.

R5 also intends to complete the retirement of 13 ha of scattered native bush in the next couple of years before he retires. “*It is pretty. ... there's two sorts of kōwhai [that] grow here – the deciduous small leafed variety and the large leafed variety, side by side. When they blossom, it's just gorgeous. And full of birds ... with the tuis and the pigeons*”. He explains “*with this push to plant natives, we've looked at it again because there is a 50% subsidy to help fence it and then plant it*”. It is not major New Zealand bush, “*it's mostly small totara, kōwhai, cabbage trees, rewarewa and some of the smaller pittosporums and small primary growth..... it's had livestock under it all my life<sup>1</sup>*”. He also thinks “*that there may be some kind of carbon mitigation for us down the line if we do something like that. Sooner or later, we're going to have to pay the piper as far as our emissions go ...*”.

R5 or his son will also be harvesting 30 ha of trees (predominantly *Pinus radiata*) within the next 5 years, and the block will need to be replanted. R5 is of the opinion that “*the only option for [name of son] to replant, from what I understand, would probably [be] in Douglas fir. I'm okay with that because they're small areas. They're not worth trying to reclaim for grazing. It's too steep and erosion prone*”. Carbon credits for about half the area have been surrendered with the emissions trading scheme so that area will need to be replanted: the other half is unencumbered.

Both R2 and R4 are seriously considering tree planting options but are undecided on how to proceed. R2 has looked at some forestry options but is uncertain as to what to plant. In the 5 years they have leased the property they have not planted trees and she commented that “*I've felt like there's been the fact that we have so many trees. For me, there are not many places left on the farm to plant trees*”. A forestry evaluation of a steep (LUC class 7) block was paid for by Horizons as part of their Sustainable

Land Use Initiative (SLUI) plan and she says “*they [forestry consultants] gave us three options pines, mānuka, and maybe there was a mixed mānuka, natives option as well ... with a few poplars thrown in there. Then, of course, we could just compare that to the sheep and beef numbers*”. This evaluation covered accessibility, harvesting, labour, markets and financial returns, although biodiversity and environmental factors were less well covered. “*We were really happy with that. We felt that they were really open*”. However, “*From an economic point of view, it didn’t stack up. Sheep and beef in this area is really profitable, ... also, we were advised even though we’re right on the Napier Road and relatively close to a port, there would still be challenges to fell the trees [steep slope to harvesting, comparatively small block for contractors]*”.

They have not yet made a decision on what to do with the steep land “*... it doesn’t look like it’s moving [erosion] ... we use it for sheep and cattle. It’s a handy enough paddock. ... it would be more valuable to have more shelter on the farm, not blocks of forest like that. That would have been 20 or 30 ha of forest*”. Trees for environmental (carbon offset, biodiversity) and animal welfare (shade, shelter) reasons are their preference. “*It is appealing if it [what is planted] can be something like a carbon sink and can help with global warming. That’s definitely something that appeals. It’s better for us if it can have a dual purpose*”. These views align with their farming philosophy: “*we’ve got no interest in intensifying or changing the management practices. It might seem a bit old fashioned, the way we farm, but I think it’s the way of the future really. It’s low input, it’s low cost. We do benchmarking and ... we’re happy with how we’re going*”.

In terms of planting, she believes “*there’s not a lot of advice around about long term implications [of trees]. We do need to have good grazing country too. The paddocks that we don’t have in the bush are a bit sunnier and a bit warmer, so they really counter each other nicely*”. The current bush blocks (unfenced) also integrate well with farming operations, “*We really value the trees for shade and shelter. Our best performing paddocks for lambing are our bush paddocks, so we choose to lamb all of our replacements ... because they have the best chance of survival in there*” and conversely “*we get some noxious weeds through them [trees] but we find the sheep are fantastic for cleaning those up*”.

The idea of planting shelterbelts and natives is attractive though. “*... small areas of trees, ... on fence lines [for shelter] and that kind of thing, would be amazing. A fence line is essentially dead area on a farm. ... and it’s not affecting the amount of pasture area that you’ve got. ... We have [looked into this] but the issue is the average has to be 30 metres wide and that just would take up far too much paddock space and wouldn’t be feasible in a lot of places on the farm. You could basically plant almost every fence line on the farm and you would end up with a huge number of trees, but we do understand that there has to be a decent amount of canopy cover [for the one billion trees subsidy]*”. They rely on dams and it can get very dry, so they do run out of water. Farmers are being encouraged to fence off and plant dams, and she commented that “*something like that really appeals, ... that helps the environment, and we can create little mini wetlands everywhere and plant, and our water is rationed and goes to troughs. That kind of thing. It could be really useful for us*”.

She concedes that “*...the mantra, right tree, right place is not something that I really understand. I wouldn’t know what the right tree was for this place. I would probably assume what’s already here and what’s thriving*”. This perception of the ‘natural landscape’ influenced her views. She explains “*I have a much stronger lean towards natives but that [is] just because I think it’s important for farms to reflect how they would look naturally and how they would look pre-farming*”, although the steep area in question “*probably wasn’t ever in native bush, it was probably tussock, flax country ... to me, it would be more valuable to have more shelter*”. ... “*I think there should be some flexibility. Even one standalone tree is good for the environment. The block of land that we lease from our neighbour is*

*dotted with just cabbage trees, and there are few poplars actually, but it's great in summer, seeing the stock gravitate towards the small amount of shade that one cabbage tree produces".*

*"It would be nice if there was a bit more of a holistic approach to it [encouraging tree planting] and a bit more focus on natives. I think climate change and water ways is one thing, but biodiversity is another thing, creating habitats for birds and insects. We keep bees as well. Most of the forestry options we hear about are from farmers that are pole planting and pine trees. I don't think they offer a lot in terms of biodiversity, particularly for a bee business. We've had a bit of a chat about willows and that kind of thing, which definitely would be better for the bees. Cabbage trees, kōwhai, all of those plants are really good. ... this farm has the best performing beehives"*<sup>2</sup>.

R4 "didn't follow through and plant anymore [timber trees after the initial planting] basically because the returns from timber just didn't seem to be there. ... Planted quite a few shelter belts". However, "the whole carbon credit thing ... puts a different perspective on it". He is considering planting trees for carbon credits, although his preference would be to plant trees for harvest as well as carbon. He described an area with "a very steep face and it's not just mānuka, it's all sorts of native stuff there ... and probably marginal for sheep and beef that I was considering planting for carbon credits. That's over one of these gorges ... and the access is horrendous. I think the harvesting wouldn't really be on. I was thinking ... if I didn't plant pines, [but instead] planted something slower growing and just sort of left them forever to get the carbon credits", observing that "of course, the slower growing species don't attract as many credits either do they?" However, he has an added dilemma in that some of the block had scattered mānuka on it in 1990, so there is a question as to how much can be classified as being eligible for carbon credits. He is uncertain as to what to do and is interested in getting a forestry report to find out whether it is eligible for carbon credits and what the potential rewards from tree planting could be. Returns would need to be good to better sheep and beef returns, although he recognises "its reasonably marginal country and ... although ... erosion's a natural thing, obviously we don't want to enhance it. It's the sort of block [that] would suit being in trees".

#### 4.1.2.2 Tree Management

R3, R4 and R5 are familiar with how to thin and prune their timber trees and manage this themselves, sometimes with additional labour employed to assist (R3, R4, R5). In contrast, R1M is reliant on advice and external support for tree management. He engaged a forestry consultant to plant and manage his Douglas fir block but this has been a negative experience. "There's a forestry guy up in Ohakune and I used him but he's let me down in latter years. He's supposed to have come back and pruned them and he hasn't thinned them. He should've come back and thinned them. ... I think it's too late now because the trees will hang up. You can't fell them". There has been no response despite follow up phone calls.

R4 has had mixed results with his tree plantings. His initial tree planting (*C. lusitanica*, macrocarpa about 25 years ago) was in a farm forestry configuration popular at that time "in groups of three and about ten metres apart ... prune two of the three and have fairly well spaced plantation that you could graze underneath. It was obviously a reasonably short-lived theory .. often there'd be three lovely trees because being not pine clones there was quite a bit of variability in the growth style of them. In a group of three you'd have three beautiful trees with natural leaders and then the next group of trees would be all runty, double leaded, falling over ones. To prune two of those three wasn't all that practical in the end. I pruned some"<sup>3</sup>. He also had some challenges with his shelter belt trees (staggered 2 deep, planted over 20 years, various species – mainly exotics with plans to harvest timber species). "Most of the red cedars didn't go nearly as well as I hoped for. I ended up pruning every

*second one so that it still a reasonably solid shelter belt. Hopefully the alternate ones will be timber, eventually. I think they didn't like the site. Obviously, the problem is where I want shelter belts is where it's exposed because that's why I want shelter. The trees don't like being exposed either. Seems to be a problem". He also unsuccessfully attempted to plant a native shelterbelt about 10 years ago, again staggered<sup>4</sup>. He lost most to hares and problems releasing the trees. A few totara remain and replanting was in exotics. If he plants the larger block he is considering, he will get contractors to do this. The integration of trees on farm with their farming operation was important to some farmers: as previously mentioned R2 valued the natural bush blocks and other trees across the farm for shade and shelter. R3 also integrates his timber blocks with the farming operations to mutual benefit, with some grazing under the trees and for stock shelter e.g. after shearing. "Your management, in the first three years - stock exclusions, you've probably got to keep them out. ... From year four, you can introduce some young animals at the right time of year. It's beneficial for both. If you can keep it green underneath, you've got way less fire risk<sup>5</sup>". He adds "eventually you'll get a green grassland under it. .... If we're shearing in the winter, we've got safe pasture in there and we've got shelter. It's win/win like that". He believes "most of the guys that have been through the Farm Forestry [do this], I guess because they do field days when you see what other guys are doing. The knowledge is probably shared that way"<sup>6</sup>"*

As mentioned, R4 has planted fence lines for shelterbelts as well as timber. This resulted in slowed timber growth in the red cedars but the stock benefit. Tree plantings do affect the farm enterprise. "*Obviously, more trees, less grass, less grass, less stock. I think it's naïve to say that you can integrate, and have trees and sheep growing underneath them*". He does not graze under the trees. "*If you had them far enough spaced apart, I guess. ... part of the whole silviculture thing is having them close enough together that the outside trees of the block always grow all those branches and the inside ones [grow straight]. So, you've got to have them close enough together to do that. Well if you have them close enough to do that, then it restricts the light getting down to the ground. ... and also the trees suck out the water and the nutrients*".

R5s driving motivation is his appreciation of trees. "*Probably that's been my main driver over the years ... I like the environment that they give you to live and work in. I think it's good for animals and it's good for people to work*". "*I took a great shine to all sort of trees in the landscape because [of] where [his wife is] from, she's from Georgia. That state is 90% hardwood trees. In fact, it's just beautiful. The farms are little pockets in the trees ... That's been the main driver. I've planted a hell of a lot of trees around here just because I wanted to try and make something like that*".

R5 has trees plantings for timber, either to market or on-farm use, and for environmental and animal welfare reasons. The 10 ha where the old trees were harvested, was replanted in the 90s, expanding this to 30 ha with the addition of poorer, steeper areas. He has managed these to keep his market options open: "*we've actually thinned them out to about 350 stems a hectare. They're fully pruned to six metres, basically to try and maximise return, however we use it. I would think within five years*". "*90% of it is radiata. I think there is about eight/nine ha of Douglas fir ... they're basically a hundred-year tree ... I planted them because I love them. They're beautiful forests. ... Five ha of lusitanicas. That is the production side of what we've planted. It's basically looking for something that we were going to be able to sell or use in some way on the farm*".

He has planted and fenced off a block of trees at the time he was fencing off a stream "*That was when I put the Douglas firs [in] I just wanted to see it established quickly, whereas there wasn't the push for native planting, like there is now*". He has found this very effective and observed "*That little stream runs through 800 metres ... there are Douglas firs ... and they've been planted for 36 years. It's just a mass of ferns and beautiful. It's quite a dense bush landscape underneath. It just looks better*".

R5 and his son are keen to have trees on the farm for shelter and erosion control and have done significant planting for that purpose. They plant a mix of species, mostly new hybrid poplars for erosion control, and have virtually stopped any soil erosion by planting. Thousands of poles have been planted: “*It’s great for livestock, for shade/shelter, however, they have a life too. I’ve gone along pretty much with what Horizons have advised us to do and we’ve planted basically only two species [of poplars] in the last 10 or 15 years ...[P. ] yunnanensis and ‘Kawa’, which is a hardwood. They have quite slender form and not too many branches. I’m thinking further down the line, when they do grow out their useful life, they’re not too much of a problem to get rid of as far as that’*

Some areas are fenced off because they have cattle. Poles are sleeved and ring-fenced where possible for a couple of years to keep the cattle away. “*It’s mainly that first year until they get a footing in the ground but after that, they seem to be fine. The new growth is up above the reach of bigger animals and they’re stable enough in the ground not to be pushed out by cattle or livestock rubbing against them and that sort of thing*”. They have also planted a lot on fence lines and “*that’s mainly for shade for sheep in paddocks where they’re exposed. They’re not that good for shelter really because we haven’t under-planted. We’ve planted rows ... close to a fence line. It’s easy enough to put a two wire fence out for five years and once they’re established, we just pull the fence down and let the stock underneath. It’s great to drive out on a farm and see animals during the summer in the shade*”.

As previously explained, R5 will also fence off and under-plant 13 ha of scattered native bush. Controlling gorse remains a challenge. They have been spraying this for years to try and control it. “*We killed it off there, so we’ve got these patches. I would think they’re pretty easily filled up if you ring-fenced this whole thing and say ‘We’ll fill in’*”. Nurseries supplying native plants have been a useful source of information. “*They’re doing so much, and they know what will grow and how to grow it*”. He thought he had to plant the species he wanted but was advised otherwise. “*Most of the natives ... you’re planting almost a primary species to propagate. You actually start something going, and then you’re hoping the birds will then introduce [other species]. As they [birds] come, they will bring the other seed. I’ve actually only just learned that really from talking with people. I thought you plant these native trees but now I know that you don’t ... You plant the smaller stuff*”.

Having seen some riparian work during a farm visit where water is captured in four ponds as it moves down a planted creek, he created something similar his property. “*It’s mainly for a silt capture and stuff below at the sheep yards. It’s at the bottom of about a 200 ha catchment on the farm where a lot of water runs through it*”. During the summer, very little water runs in the creek. But in winter months, “*it’s just pouring off hillsides and sluicing down gullies. If we can keep it and store some of it for the dryer months, but at the same time ... slow that sluicing effect down, there’s got to be benefit to it*”. Adding ponds and slowing the flow helps capture nutrients and sediment. This area has been planted. He “*wants to see how we can change it basically from the time it goes into the top and then flows through ... about ¾ of a kilometre ... [of] completely fenced off creek bed, below the house and when it leaves the farm see if we can say we’ve got reasonably clean water leaving this place. It’d be interesting to see. I’m hoping*”.

#### [4.1.2.3 Species Selection and Availability](#)

R1M chose Douglas fir as he explained: “*I was just retiring country that was steep and hard to muster. I chose Douglas firs because I hate pine trees and I didn’t want to have to mill the trees in my lifetime*”. Douglas fir is a species suited to higher altitude regions that are prone to receiving heavy snow and he contracted a consultant for tree management. In contrast, R1F stated “*I like natives. That appeals to me, the concept of planting natives. And I don’t have an abhorrence of making money out of pine trees,*

*I just don't believe there is money in pine trees where we live". Hence, her suggestions "to plant natives at the entrance of Farm 1 and to purchase a block outside the region more suited to pines for carbon credits to offset the farm business".*

Like R1F, R2 is not averse to pines, but prefers natives and trees that are natural to the landscape and can provide environmental, biodiversity, shade and shelter benefits. This has been expanded on earlier in the future plans section. She is still considering tree planting options. With respect to species, R1F mentions a local farmer grows alder trees<sup>8</sup>.

R4 does not like pines either, explaining "*I don't particularly like the look of the tree, I don't particularly like the timber. Obviously, it's the way the industry has been geared, it's a marketable product .... it's just one of those things. We all have preferences*", later adding "*I don't think they're good for the soil environment, ... they deplete the soil of nutrients. They add a toxin ... that's another reason why I don't particularly like pines*". Consequently, he has planted a range of tree species. Timber species *Cupressus lusitanica* (white cedar) and macrocarpa (cypress species with similar timber) were selected for his earlier forestry block planting (about 25 years ago) because he really likes macrocarpa as a timber, although he also acknowledged that the one bad thing about macrocarpa is it is toxic to pregnant cattle. He was "*hoping that some of these niche timbers might get more of a foothold and be more lucrative which doesn't seem to have happened. I mean there is some market for them, there's just not the infrastructure*". Hence, he has not planted more timber blocks.

R3 and R5 are both very knowledgeable about trees and have grown a range of tree species. When R3 went farming, he was keen on silviculture but admits he "probably didn't have that much knowledge". "*I guess with the initial [P.] radiata, we went to because that's what everyone else did*". He later realised that it is not suited to the area. *Three years ago, a snowfall of about 18 inches of snow settled in one of the 1994-planted blocks and "it's broken spars off halfway up, snapped them completely in half and toppled them. Luckily, it wasn't bad enough we had to log the block ... [it] has left it a little bit open in a few places*". Others' blocks were also badly damaged. A later event "*just prior to their final prune ... didn't break trees but it ripped a heap of branches off ... so it was bloody hard to prune*". "*We wouldn't want another weather event because if we do, then we could be faced with having to go in [harvest] before our intended final rotation length*". Furthermore, "*the costs of getting it out in country like this are pretty expensive. ... that's another reason we put in Douglas fir, because the end price at port was ahead of [P.] radiata. It's pointless trying to go radiata if ... at the end of it, you're not going to end up making any money out of it, all your money's gone in cost*".

In selecting a species, R3 explains "*You've got to remember where it [P. radiata] grows. It's coastal. ... whereas Douglas fir is used to growing in that environment [snow country] where its provenance is really key. Even the eucalypts, ... there's over 200 varieties of eucalypts in Australia and a lot of them grow in mountainous regions. We had zero damage in the eucalypts, just because their leaves don't grab hold of the wet snow, whereas radiata is great at doing that [holding snow].*" This knowledge about radiata is not new, yet people are still planting it locally. He has recently seen it planted in another site which is much higher than his, and "*I'd say they're going to have massive damage*". He speculates that "*They probably didn't have information. They probably just thought, we'll plant some pine trees .... There's a massive gap in the knowledge that needs to be passed on. It's a major issue*".

After his initial pine plantings, he "*started looking at other species ... inside the garden here that Dad had planted, you started seeing the benefit of those mature trees. We've got some 70 year-old Douglas [firs] and redwoods. They're pretty impressive sticks and they've stood the test of time because they can handle this environment and they've grown really well*". When the Americans came to have a look at the redwoods they "*were so blown away at how much growth we got. I guess our environment's not as harsh as the States. They get long cold winters, whereas ours are much shorter comparatively*".

*Our growth is much greater over a year*". He later planted Douglas fir, *Eucalyptus fastigata* (ash), *Cupressus lusitanica* and redwoods on his afforestation plantation block.

R3 also suggests it is important to "*look at what grows well locally, and then tailor that*". Native forestry grew really well on his property west of Taihape. "*This was all solid bush country, so maybe you need to turn the clock back a bit and actually have a look*". The few bits of remaining native include a very large, 800 year old totara, and a few matai and some kahikatea. "*You've only got to look ... when you start breaking in a bit of new ground, how much natives are in the ground. It's heaps. ... There's a lot of really strong bush and a lot of tawa through here. It's pleasing to see the regeneration happening in the natives*".

R5, like R3, is experienced with a range of tree species. An enthusiastic settler "*brought with him a lot of pot specimens, and believe it or not, the original pine trees were Monterey pines [P. radiata] from California. He brought ... coast redwoods and various other spruces and northern American trees, ... and a lot of Douglas fir [Oregon pine from Northern California and Oregon]*". The Forestry Institute in Rotorua took seed from the Douglas firs, the redwoods and the old pines about 40 years ago: "*There was no doubt about it that the trees here grew so much quicker than in their native habitat. ... Within 50 years, they [the pines] were huge. We've still got some coastal redwoods ... they would have to be 140 years old now. They're about the same height as their forebears in California at about four or 500 years. That's how quickly they've grown*".

They have harvested some of these. Redwood is quite a soft timber which was originally used for weatherboards and that sort of thing. Douglas fir "*is a beautiful framing timber which we've used a lot in buildings here. It can't be treated, and nowadays I don't think it can be used structurally in New Zealand since the weather-tight homes thing. It's fine as long as it's kept dry, but it will weather*". Elms were planted on the farm primarily for firewood because they grew quickly. "*It is also a pretty timber, used in England for caskets ... very fast growing and easy to grow. It's a hardwood as well ... makes quite good coffins*".

R5 mentioned high genetic radiata is not suited to the area. About 1994, he replanted the area where old trees had been harvested with a lower GF species of radiata. "*We grew lower GF species here because traditionally, we've had a lot of snow. This farm is 700 metres above sea level*". A consultant working with Winstones in Ohakune suggested planting these, which back then were probably half what they are nowadays. "*It was simply because they were slower growing, and they would stand the snow better. That was a really wise piece of advice because probably 10 years into their growth cycle, we had a really big snowfall here, probably about a metre. A lot of those trees, the tops broke but it wasn't a disaster as such. It was prior to thinning, so as we thinned for our actual production stands, we were able to cut them out.*" ... He has seen bad snow damage in pines. "... *on this road to Napier, a similar thing happened three or four years ago to one of the forests here. I would say 75% of the trees were ruined. That's simply because they grow so fast, they have this long soft leader, which just can't stand under the snow and they bend to the stage where they snap. Then, your tree has virtually had it*".

Regarding availability of trees for planting, R4 and R5 were both able to readily access the trees they needed through commercial tree growers, although R4 added he was not buying large numbers and may have "*paid through the nose for them*".

In contrast, R3 suggests if you intend to plant trees (timber species other than radiata), "*You'll definitely have to book those seedlings and probably get them grown on two years in advance ... if you want good stuff, then you need to go and source it. That can take time.*" He focuses on sourcing high quality trees with known provenance. "*To source good quality seedlings, you need to have good*

*contacts ... There's been enough work done out there if you know the right contacts to go to, to look at getting good stock from provenance. ... You need to do your homework": when accessing his Douglas fir seedlings, he says "I went through my brother, who's involved with the Farm Forestry. ... the provenance of ours is Fort Bragg. ... two lots [were brought into the country] and that was the better one of the two. Some of the other stuff didn't tend to have as good a form, growth and that sort of thing". This year they planted a hectare of canker-resistant macrocarpa. "We had to actually source that seed and get it grown on by a nursery. That's two years ago ... and it went in the ground this year. Unfortunately, a year after we'd had that going, I saw some much better trees that are grown locally .... They'd be the best macrocarpas I've ever seen. He [grower] had some of the same provenance of seed that I've put in on this property. These things are like Olympic athletes compared to someone at the pub. ... If we'd known that then I would have sourced that seed from those trees". This variation in tree genetics were also observed by R4, as previously mentioned, with respect to the trees he planted "... being not pine clones there was quite a bit of variability in the growth style of them. In a group of three you'd have three beautiful trees with natural leaders and then the next group of trees would be all runty, double leaded, falling over ones".*

R3 believes there is a gap in the industry on work regarding tree genetics other than pine. "*There's work being done now, actually by our local Farm Forestry Association, to try and source that seed or do a seed collection (this is going back to grassroots stuff) and do selection on that. It's like sheep genetics, in my opinion. The best stuff you can get, that's where you need to look first and probably don't rush into it. It needs to take time. ... You're making a decision that could be forty [years] down the track*". He also mentions "*The New Zealand Redwood Company have done massive genetics going through the redwoods that have come in from the States. They've been doing this stuff for years. They've done the same work there that New Zealand has done on [P.] radiata. ... Their technology and their growth and traits like that they've chosen are way superior to anything that we'd have in New Zealand. That's what I mean. You need to try and source that ... whereas probably in 30 years, that won't be the best, it will have been superseded like anything in life but at the time it was the best you can get when you made that decision*".

R5 sourced the native plants for his riparian planting from a plant nursery in Palmerston North, although they were all grown in Auckland and delivered by truck. He found that natives are readily available "*I hadn't realised until I started looking. Just in Palmerston North alone, if you go looking for native trees, there's three or four nurseries there, which are dealing in huge numbers*". The nursery advised smaller species which provide ground cover in which naturally occurring tree species will establish. Species planted included "*mānuka, mostly pittosporums, a lot of flaxes, cabbage trees, the cordylines and toetoes*".

#### *4.1.2.4 Harvesting*

Both R3 and R4 have trees that could be harvested now but they both plan to wait a few more years.

R4 is "*pleased with that little block [macrocarpa, C. lusitanica] and looking forward to harvesting it. ... As I say they're a good 25 years old now. ... they do vary too as the slope goes around<sup>9</sup>. ... I think most of them you could harvest now. ... I figure might as well leave them and get a bit more weight into them*". They will be harvested for timber, but he has not yet researched markets or the availability of harvest crews. They are easily accessed for harvesting: "*you could harvest directly onto the road from the bottom of the paddock*". He also has a small block of pines as a shelter belt at the back of the farm and believes "*harvesting for a small block like that would ... not [be] worthwhile. Although that's*

*where I thought if I did get a full forestry report it would be interesting to know if they thought that these ones were worth harvesting".*

R3 explains his plans. "*The Pinus radiata that was planted in 1993 and 1994 [27 years] is obviously coming up to the end of its rotation, so with the wall of wood that's predicted, I think we'll probably look at taking those three past 30 years .... The only reason I say we'd take them through longer is because those would go to the port. You're getting paid for tonnage. The bigger they are, the more you're going to get paid. In my lifetime, I'm only going to get one crack at it, so the more tonnes you can produce out of there, the better. That would be replanted but whether I would use radiata in there would be questionable*". They planned their planting so the trees are close to the road so access for harvest is good.

He has seen neighbours given bad advice re planting. A neighbour in the 70s or 80s was advised by "*people that were supposedly in the know, to plant off that corner off the back of the farm in radiata or plant off around that creek with radiata. It was really bad [advice] ... that block at the back of the farm now has got 3 kms of road. If you want to get it out, you're going [to] have to construct. The cost of doing that is going to prohibitive*". Similarly, he warns against planting pines next to a creek as a neighbour did. "*They will generally end up in the creek. They're really hard to harvest. They'll tend to chase the light so they grow into the middle of the river or creek ... you get them leaning the wrong way. That was really bad advice*".

R5 has harvested trees in his time. Trees have been a valuable source of construction material here for the whole life of the farm. "*That, I think, has been one of the main drivers behind mine and my family's interest in propagating trees for use on the farm*". When his grandfather purchased the property in 1905, there were already extensive plantations which they used for building, firewood and amenity, and over the years, most of the buildings were built from those trees: woolshed, two houses, various outbuildings and workshops. Most of the structural timber was cut and used or swapped with a local mill in Taihape for sawn timber in return for logs. For the last build in 1980 (woolshed) 100% of the timber (Douglas fir, 80% radiata i.e. old Monterey pines) was sawn on the farm with a portable mill, treated in Taihape when there was a mill and a treatment plant there, and returned.<sup>10</sup>

After harvesting "*there were a lot of really ugly timber left here during the seventies and eighties, which were a real problem to us*". An export market opened up around about 1990 when the Chinese started taking pine basically for construction boxing. The form of the trees create issues for harvesting and timber value depended on the availability of a variety of different markets. "*That's when we cleaned all these up and they were shocking, ugly, big logs. Some of them were almost two metres across at the stump, just massive. The ones that weren't suitable, they took them to Karioi and split them for pulp. The big saw logs, there was some good stuff. ... They were 40 to 50 tonnes each in logs, about a hundred years old. Basically, a truckload on one tree per truck. ... The smallest timber higher up in the trees was sawn in New Zealand. The rest of it all went as K-grade to China. ... prior to that period in the early nineties, there was a cost to try and deal with it. "We made enough out of that venture at that time to be able to replant and refence the whole thing and came out about square, which was really lucky"*<sup>11</sup>.

The 30 ha of timber trees R5 planted in the 90s will be harvested within 5 years. "*That was going to be one of my last jobs, but ... I might just leave that for the son to do really. It's [harvesting] tremendously destructive ... You've got the felling and the cleaning up. Refencing and replanting is pretty major. It was expensive when I did it ... from what I remember*". The trees were planted for easy access. "*We've planted next to roadsides, which are good, for the ease of getting them*".

He gets advice from a forestry consultant. “*We would probably go to him as far as the ultimate of when we would cut it down or do any harvesting of it*”. In terms of timing, he believes flexibility in timing is important. “*timber [can keep growing] ... as long as it doesn't get too big to where it can't be processed*. ... We did have that problem with those big old logs. There were ... only two mills who were able to take those big logs in New Zealand, which was a bit of a nuisance. That still gives you a decade in there to say, ‘Yes, I will do it now’”.

R5 has been told many times that “*These little farm lots are not economic to do*”. Nevertheless, he is confident “*Someone will cut them down. If necessary, we will go and buy a mill ourselves. I've often thought that*”. There would potentially be work in milling small farm lots without the mess: “*the big boys, because they have such big machinery there, they do, they need big tracks. They need this, that and the other*”.

R1M will not harvest the Douglas firs that he planted, that will be the next generation. However, he believes they will be accessible when it comes to harvest. “*It's steep but it's right on my boundary against the neighbour and there's a road, so they'd have to run a wire out and shoot them down a wire across the river. They've got quite good flat land with the road. They'd have to be getting on with the neighbour, although that's a legal road though. They can get logging trucks in*”.

Although R2 has yet to decide whether she will plant trees, and what, she was advised if she planted pine that logging could be expensive. “*I think because they'd have to haul the logs upwards, and I think there was a bit of concern with the number of trees being planted at the moment that this would be considered a less attractive job because of the location ... they pointed out was that perhaps it would be different if there was a very, very large plantation forest just next door. For a crew to come and do that harvest, I think it would only be about 30 ha, it wouldn't be worthwhile*”.

With respect to logging trucks, RF1 expressed concern about the impact of forestry harvesting on local roads and the community. “*About six years ago it [harvesting logs] totally wrecked our road. That's what I remember. They'd only just sealed the [Gentle] Annie [Taihape-Napier road] and they had to reseal most of it again because of the logging trucks*”. The way the trucks were driving on the local gravel roads was also concerning: “*those truck drivers were driving like maniacs and that is one hell of a narrow road. [name] was really upset about it and almost got taken out by a logging truck*”.

#### 4.1.2.5 Poplar Plantings

Poplars have been widely used throughout the region for erosion control, with various species recommended over the years by catchment boards and regional councils. Feedback from some of the interviewees identified concerns about hybrid species recommended in the past which are now widely spread and are causing problems. This is causing some resistance to further poplar planting.

When R1M purchased Farm 2, the farm had been planted with 1970s hybrid poplars for erosion. “*They're planted too close and now they're mature, they're just falling branches and just making a hell of a mess*” (R1M). R1M is thinking “*I'll probably have to poison some of them and just let them fall down*”. These were recommended by the catchment at the time, and they are now “*everywhere throughout the countryside*”. R1M suggests that historically, poor tree advice has been provided “*Not just the catchment, forestry planted [Pinus] contorta for erosion in the ranges. Historically, they've stuffed up quite a lot, planting trees. They're talking now it's the right tree in the right place - but in 40 years' time, will it be?*”

These trees are expensive to get rid of as R1F explained. “[husband] cleaned up four. Cost him \$6,000 ... [with] the digger and the labour and because it was near the road, the stop/go sign and all the drama involved with OSH. It's huge. He might have 500 [trees]. I don't know ...but enough to make you think, I cannot afford to get rid of them”. “That's why he's now thinking of killing them and letting them drop because ... they're dropping big branches but they're still alive. It's the branch fall that's the problem ... [they also] have all that fluff we've got floating around in the air at the moment so no good for allergy sufferers either”. Hence the cynicism about recommendations of the latest variety. “Once bitten, twice shy. Why would you do this again?” “The resistance to the poplars will be because ... the people who have got the 1970s poplars won't be planting until they've got rid of those ones. ... but definitely getting rid of the existing poplars is not something that Horizons will look at funding”.

R2 presents another perspective. Her husband manages a property where poplars have already been poisoned by the previous owner. The farm has “hundreds of poplars on it but hundreds have been poisoned, ... We've got huge safety concerns ... because they just fall down on fence lines and on tracks. There are people working out there, [it's] a huge, huge mess to clean up and a very, very dangerous situation”. She is uncertain as to why it happened but surmises that “they shaded too much of the land, and there is also a view among some farmers that underneath poplar trees the pasture is perhaps sour, ... maybe some of the poplars were an older variety that were starting to fall down anyway. It's quite sad to see really, particularly in winter ... it's just a landscape of dead trees”. “It would be useful if there was some help in situations like this to fix the problem. I suppose it's a private landowner's issue. I guess that's why it's so important to have the right trees in the right place because this has just been an absolute disaster for us”. She is also of the view that “it probably puts a lot of people off ... planting poplars when this kind of thing happens”.

R3 also commented on poplars planted for soil conservation. These were hybrids and Lombardy poplars planted by his father in the 50s. “Now, we're at the stage where ... the hybrids are getting to the end of their use by date. They're tipping out and they do have their liabilities ... the big hybrids, when they get really wet, they tend to blow over. The whole root ball lets go”.

In contrast, R3 is very positive about the Lombardy poplars. “The Lombardy poplar that was planted is still as good as the day they went in. From a farming point of view, aesthetically they're very fastigate, so you can see if you're moving stock in through them. They're much, much more user friendly. ... They've done an absolutely brilliant job of soil conservation, keeping it on the hills. In 2004 [wet year] the faces that have got solid Lombardy on, we didn't have any erosion, no damage at all. We're still growing grass. You don't get the shade and the stock camps under them. ... That's what I mean about the right tree for the right job”. R5 has planted poplars more recently (last 10 to 15 years) and is confident that the varieties he planted will not be a problem.

#### 4.1.2.6 Availability of Labour and Markets

R1M, R1F, R2 and R4 were uncertain as to where logs would go and labour availability, not having harvested logs, or not yet, so have not looked into this. A pulp mill at Tangiwai was identified (R1M, R2) but R1F thinks this is a closed operation supplying their own logs. They assumed most logs are trucked to port which is where R3, R4 and R5 are likely to send theirs. R5 identified both pulp and log options: “there's logs going through this road all the time, going both directions to the pulp mill and export logs to Napier or for Taranaki, which is another pulp mill”.

Farm forest blocks tend to be smaller and R5 says “Nowadays there is a lot of worry that small wood lots like this are not really economic, but I still believe they're a marketable option for a farm. They're relatively small in scale, so I think you could probably cut them [trees] down and replant without too

*much bother to the rest of the farming operation".* Planting near the road ensures they are easy access. He is confident there will be ways to process the trees. He dislikes seeing all the logs being shipped offshore and does "*really wish it could be processed here*" but will sell where they are most profitable. Similarly, R4's view is that infrastructure for non-pine timbers is limited: "*there is some market for them, there's just not the infrastructure. Everything's geared towards Radiata and there doesn't seem to be any infrastructure for marketing and processing of alternative species*".

Logs can also be milled on farm for farm use. R5 has milled his own trees for building on the farm and R1M mentioned that a neighbour recently hired a portable mill from Wanganui for two or three days to mill small stands for own use e.g. railing.

In terms of getting help with silviculture, R3 considers "*it's actually a bit of a dilemma. In ... forestry, it's either boom or bust. When prices are high, you can't find a contractor for love nor money, and the same for harvesting. What would be really good to see is a bit more of a level curve, which we probably are seeing at the moment. The highs and lows are really what kills an industry.<sup>12</sup> ... Getting labour is tough. .... There's not an over-abundance of them ... There's been a lot of mānuka planted locally here by one of the outfits and they brought in outside labour.... just because there wasn't enough skilled staff here*".

R5 has no problem in accessing labour to help with planting and pruning and is positive about the help he has had. "*In fact, ... the same people that did the forestry work have actually done a lot of the native work for us as well. They seem to have branched out there*". He contracts a local tree gang (family business) from Hunterville that Horizons initially recommended: "*he [contractor] and his father planted these trees for me in 1990 and then ... sure enough, after all these years, when we go to do this riparian work, I said, 'We've got 5,000 natives we need to plant'. They turned up*". The contractor commented that "*I'm already replanting trees that I planted as pine trees at the same time*". It transpires that he has been doing a lot of environmental work for Horizons for years. R5 guesses they have branched out from the forestry side to the native side because it has filled a gap for them.

R1M planted about 900 natives on Farm 1 which he found considerable work. Most work on the property is done by staff with one labour unit per 5000 SU employed and they "*just don't have the time to go cleaning it [trees] up. .... With the maintenance of the infrastructure, you've really got to employ another labourer [to do tree work] which goes against the grain a bit*". While he could employ people with trees expertise to do the work, they are expensive. "*The other thing now with OSH, you can't just give a ... kid a chainsaw and tell him to go and clean up trees. You can - but you run a hell of a risk*".

#### 4.1.2.7 Carbon

R3 and R5 have registered trees for the emissions trading scheme, but the others have not.

R1M did two plantings of Douglas fir, one possibly pre-1990 and one post-1990 which could have been eligible. He does not know how to register the trees. R1F, who has recently looked into carbon and emissions trading, explains "*the reticence for registering it was the payback of credits, and not understanding. There's so many misconceptions around the credits. My understanding, currently, is that you've got an option to choose whether you take 100% of the credits or you take the average, so you don't have to pay back at harvest. It seems a very murky area, and farmers are conservative and they're not going to commit to something in 25 years' time when they don't fully understand what exactly the outcome is in 25 years' time. You're not going to collect credits, because succession is a big*

*thing in farming, so that your kids are left with a million dollar bill later on down the track because you did the wrong thing”.*

R2 has a limited understanding about the options for carbon. She farms in conjunction with her father, who has quite a lot of bush on other blocks as well. She believes they have a number of areas that could be registered but identifies there is an issue with farmers actually doing this. “*The how to, and the actually just doing it, and I guess the implications of what could happen. I could be completely wrong, my knowledge is so limited, but I would have thought it would be a win/win if you can register trees, if you have trees that you can register, particularly if they’re native and they’re not going to get cut down. Any blocks that is new mānuka, for example. No one’s got time to do it*”.

R3 has trees eligible for registration under the ETS and he has registered these: “*We’ve got both ... so we’ve gone to averaging*”. He considers “*there’s definitely an advantage for the carbon. For example, you could space plant poles like I’m doing ... so we can collect the carbon off that. We can still integrate that with our sheep and beef business*”. This is being spaced at no more than 15 metres so canopy would be sufficient. He explains “*The rules have changed, so you can still do that and that’s still covered off as a forest. There’s [an] advantage there with other species. It’s just a matter of working out what’s going to fit for you property. That’s probably the key thing, I suppose*”.

R4 has not registered his trees. He planted his 6 ha timber block “*pretty much exactly in 1990... It depends on who I’m talking to whether I want to claim them or not, I think*”. He believes they are not eligible: “*No, I haven’t registered any of them. Mainly because it’s a minimum size ... and they fall short*”. He is now considering planting another block and admits “*the whole carbon credit thing kind of puts a different perspective on it*”. However, *I’m loathe to plant purely for the carbon credit. I would prefer to harvest as well*”. There is also some uncertainty as to how much would be eligible because there was some cover on the block in 1989/90.

R5 has registered his trees for carbon and done well out of it. A small block was registered for pre-1989 exemption. The main planting from 1994 was all registered in the emissions trading scheme. The expectation was the area would remain in trees long term: “*we were planting over an old forest block originally, so it was no good for anything. The rest of the areas we planted have been pretty low quality grazing areas of the farm which were either dangerous for stock or not suitable really. The best thing*”. The idea was the emissions trading scheme would provide means to retire. “*That’s a funny thing, we actually cashed in some of the carbon credits to put a deposit on a house ... I thought ... at the time ... I’ll probably be ready to retire prior to these trees being ready [to harvest] because they’re about 25 years old, the main blocks now*”.

He used a forestry company to register in the emissions trading scheme because of the difficulty using the EUR website (Emissions Trading Register). As well as cashing in some credits, he has also traded credits on the advice of his accountant, exiting and buying back into the scheme using cheap European credits so has quite a number of credits now. As previously mentioned, about half the block he will harvest has to be replanted because of carbon credits and half is unencumbered but will also be planted.

He perceives a lack of fairness in the ETS. “*As far as I understand, because the credits have been claimed, which I still think is wrong because I think if we cut them down and start a new crop, you should be able to actually claim credits again. It’s those young trees that supposedly capture the carbon. The timber itself, if it’s actually harvested and used, the carbon is stored still in the build*”.

R1F investigated ways to offset the carbon emissions from their farming enterprises to become carbon neutral. Since she did not believe a block for planting pines would be a good investment locally, she

looked into buying a block in the BOP to provide timber income and offset the carbon from the sheep and beef enterprises. “*The reason that I went off that [idea] was because the government then said that farmers can't offset their methane emissions by tree planting, so that killed that dead because we were striving to be carbon neutral*”. They had also “*seriously considered giving up 10% of the land on the farm, and it would have always been to natives, never pines, to become carbon neutral and now we are totally disincentivised*”. She believes “*the main incentive ... for farmers to plant trees was to become carbon neutral and now we can't. I'd like that in capital letters. ... I would say that [for] most of the people [local farmers] that I've spoken to, that would have been the incentive to plant trees*”.

She also approached a large New Zealand forestry company with the intent to invest to offset carbon from farming and was disappointed to be told that “*no equity partnerships in forestry [were] available to New Zealanders because they [forestry company] found it so much easier to deal with individual overseas investors ... 'New Zealanders are just too fickle and won't commit'*”.

#### 4.1.2.8 Economics

The economics of trees was raised by all five businesses. In particular, the point was made that net returns from alternative enterprises such as trees need to compare favourably with sheep and beef to be considered. Currently, sheep and beef returns are high. Furthermore, the sheep and beef EFS for the Taihape interviewees properties are high (exceed average sheep and beef EFS) so trees planted for economic returns have to produce high returns to compete. To exacerbate this, as both R1F and R3 raised, costs associated with trees in this area are considered to be high, particularly for harvesting. R1F made the comparison: “*I just don't believe there is money in pine trees where we live, ... in my little foray on that [BOP] property of 180 ha there, the returns [from forestry], because of proximity to port (...40 minute drive to Tauranga Port)... the returns per hectare were in excess of sheep and beef income apparently. That was over the life, not just when you [harvest] them. Here, they were a third of that, so there was no way they could compete with sheep and beef farming. I did that [budgets] with [named farm consultant] and also [named tree consultant]*”.

Future expectations and uncertainty from sheep and beef returns, and from tree returns, will also impact decisions. As R4 mused, “*Of course, these last couple of years sheep and beef returns are pretty damn good. It's probably going to have to look fairly good to beat that ... six years ago, if I could've put that 50 ha [marginal block he is considering planting] into trees and ... [been allowed to] have the credits ... I would've jumped at it. Nowadays as I say with the returns from sheep and beef, it's worth me cutting that mānuka and trying to get it into pasture. The economics of sheep and beef farming [is] pretty strong at the moment... a few years ago and the sheep and beef were doing some pretty low [returns] and the carbon credits incentive was pretty high, then yeah it might have been a different situation*” Furthermore. In his view “*I'm saying these returns are going to stay now. .... For that reason, as I say in the medium term, I can't see anything stopping. Lowering the prices, I think there's just that much demand ... on the whole I'm very optimistic .... hence me buying another block of land*”. In contrast others did expect sheep and beef returns to drop again at some stage. For example, R3 believes “*These high commodity prices we're seeing at the moment, they won't be there forever. I'd like to think they would be but as soon as you seek high commodity prices, look what's happened to the price of lamb. That seems to be what happens. Maybe we need to be smarter, not bigger*” (R3).

Also, markets for non-radiata timber lack underlying infrastructure in this district which creates uncertainty about future trees feasibility and returns.

#### [4.1.2.9 Succession](#)

All interviewees were from intergenerational farms and tend to view their businesses accordingly i.e. similar to Māori in that strategies can be long term with future generations benefiting. Some tree species planted will not be harvested by the current generation demonstrating a long-term view of the family business that exceeds generations. Some already had succession in place and the expectation that the farm would pass to the next generation, either stated explicitly (R5), and / or as a clear expectation that the next generation would harvest the trees (R1, R5). R1F expressed concern re the possibility of leaving the next generation with a debt if carbon credits are taken up now. R5 has used some carbon income to put plans in place for his retirement, after which his son will take over fully. R2 is the successor generation in her family's farming business.

#### [4.1.2.10 Diversification](#)

Diversification was a driver for R3 who explained his views. *"Just looking at our business, if we were a bit more diversified, that's a good thing"*. He is interested in diversification opportunities and already has considerable tree plantings on his property. Land prices are increasing and *"we've got to be careful that if we wanted to expand our operation [by land purchase] and go that way, we'd be saddled with a lot of debt, unless we had a massive capital input somewhere. We'd [prefer to] look inside the business and how can we be smarter at what we do. Can we grow other more specialised crops? That RMPP thing we've been looking at, it had a higher yield per hectare. Also, within the business, identifying the parts of the farm that maybe aren't that suitable for sheep and beef farming, that might be steep. ... Just looking at all those little advantages where if we were to grow a crop of trees there, what could we put in? I guess that's why we started doing what we're doing. A crop of trees can help build resilience in a business."*

### [4.1.3 Farm Forestry Perceptions and Views](#)

As for incentives and barriers, interviewees perceptions and views have come through in the previous sections as they discussed their farm business activities and factors that influence these. Their views on four areas that are not directly related to their own activities are discussed further here. Two are areas of concern to R3 who considered themselves well informed on farm forestry and has grown a range of tree species.

#### [4.1.3.1 Radiata Plantations Solely for Carbon](#)

Anecdotally, many farmers are concerned regarding the government plans to plant one billion trees resulting in farms being purchased and planted for carbon only, often by foreign investment. R3 and R5, raised concerns regarding pine planting for carbon, questioning whether this meets the 'right tree, right place' maxim.

R3 summarises his concerns.

*"One of the things that scares me ... when I see the likes of [named Minister] saying, 'We're going to plant a billion pine trees.' If there's been learnings here, and I had some knowledge of it before we started, it's got to be the right tree for the right place. That's totally, totally critical". Since that [carbon credits] happened, there's been a massive change and a lot of offshore money coming in. Carbon forestry has hit the media a bit and farmland. It's well documented what's happened there, rightly or*

*wrongly. ... I don't think they thought that through that well. I think there's going to be a lot of offshore money, people that are going to make a lot of money at the detriment of landowners. They're going to be left with big blocks of radiata that are going to be unthinned, unpruned and no value. Major potential fire risk because you've got monocultures. You get a massive amount of needle build up ... they're a huge fire risk ... you can see it in our [trees] here. You're going to have absentee owners that'll live offshore. When those trees start falling through the boundary fence, who do [you] ring? I pity the landowners that live next to them. I can only see not good outcomes for them in that respect. They [pine blocks] will revert back into indigenous but it'll take hundreds of years because not all native will grow under them because of the acidity. When they break down, it'll take time but it will happen I suppose. ... in that respect, they would've been much smarter if they were going to be doing that, to have planted in native forest or mānuka, that could've developed into that and would've developed way quicker. I can't see the benefit for it for New Zealand through what's happened at all. That's my opinion of it anyway".*

R5 also raised concern regarding planting of pine trees for carbon with no intention to harvest. "*I've seen old pine trees, as they age, they stop growing and they fall over. ... Now, under this scheme, if they're not going to be harvested, they're going to fall over, so the carbon is going to be released as they rot. To me, they're better to actually be harvested and either the timber used in some way, whether it be real logs, construction timber, it's locked up. ... if you then plant a new forest, there's got to be a difference there because that new forest will then start capturing carbon. ... a tree in its first 30 years, supposedly that's when it actually grows and it is a source of carbon capture. After that, it's not. It actually is in a decline to the point where it falls over and starts rotting. ... These old pines, when we finally cut them down in 1993, they were approximately 100 to 120 years old. ... there would be 20 years, I reckon, where those trees never grew, never did anything. They stopped producing pinecones. They basically plateaued out, they didn't have a growing tip. They were just big old ugly trees and they got to the stage there where the roots couldn't hold them up and they fell. They were shocking things to try and clean up because they were so big. The simplest way to clean them up was to burn them because they burn like crazy".*

#### *4.1.3.2 Funding for Native Regeneration*

R1M and R1F on their second farm, have "*a lot of natives all over. It's got a lot of kōwhai and some [other] things. It's quite a pretty farm. ... Natural remnants of bush ... just haven't been chopped down*". This landscape is common in this region. However, RF1 points out that the kōwhai are dying. "*there's a bug. They're not long lived relatively but they are dying in significant numbers*".

She asks, "*Instead of planting the tree, how about we find out how to regenerate the existing ones?*". Planting or fencing to encourage trees such as this to regenerate is expensive, and she is not aware of any support or subsidies available from One Billion Trees or others, to address this.

*"It's just the cost though [planting natives]. ... [Farm 2] has little stands of bush ... and with the dying of the kōwhais, it'd be great to ring-fence some of the bigger bits but the cost of that is huge ... you would get regeneration of the kōwhais [if they were fenced off]"*. However, it was speculated that One Billion Trees would not subsidise this because of size limitations. The kōwhai naturally grow in small groups across the landscape and a number of groups would be needed to meet size limits. She suggests if a subsidy was available to fence off small groups of trees individually to regenerate, which together could make up the required area, this would be an incentive to do this and help restore the treed landscape. These views align closely with R2's opinion on the need for more flexibility described in the Future Tree Plans Section<sup>13</sup>.

#### 4.1.3.3 Long-term Planting Decisions

R3 is adamant that more consideration should be given to long-lived tree species. This long-term planting and harvesting viewpoint would increase the species types that could be considered for planting. As R3 says “*There’s no reason why we couldn’t be looking at indigenous forest. Why couldn’t we be growing totara on a 200-year rotation, for example? We’re thinking very short term. The problem is ... people want to plant something and ... see the return in their lifetime, whereas I think it becomes intergenerational, which a lot of overseas stuff [tree planting] is. Then, it makes a better fit, I think. It may be that I won’t see the benefit of what I’ve put in the ground, but I still get to enjoy it*” and “*You still hear of radiata, people talk of harvesting it at 25, which to me is far too young. If you look at Europe, they have 200-year rotations. I think that’s where we need to actually get our head in the game*”. “*As New Zealanders, we think very short-sightedly. That’s something that maybe we need to change. Over time, hopefully it will*”.

He suggests the quality of the timber harvested would also be better as a result. “*People have this expectation of planting ... something yesterday and harvest it two [figuratively speaking] years later. Unfortunately, if you do, that you’re going to end up with really small sticks that are good for bugger all to be quite honest. If we had that intergenerational thing, if you look at the Europeans, that system’s been going for a long time. If one generation has the benefit of harvesting what their forefathers planted ... they’ll plant what they’ve harvested, but that might have been four generations prior that they’re harvesting*”. Farm sale or asset transfer of multi-generational tree crops would need to consider ownership of extended forestry rights, carbon harvested and liabilities, and the impact on the value of the tree area. These factors may be less of a concern for properties remaining in the family.

#### 4.1.3.4 Future Tree Species, Harvesting and Higher Value Supply Chains

For the future, and to encourage integration of forestry blocks into farming, R3 believes New Zealand needs to be looking at much higher value trees which are then semi-processed, or processed, in New Zealand so more supply chain value is extracted in New Zealand. He believes it is necessary to look at other species for these higher value tree blocks to integrate with farming. “*In some respects, there hasn’t been the work, ... the FRI or the old forest service would have done. Most of their money and time is spent on radiata. Now, they’re looking at macrocarpa and Douglas fir. There’s been some good study stuff done. The New Zealand Redwood Company, they’ve started finally to look at other species. ... There’s no reason why we couldn’t be looking at indigenous forest. Why couldn’t we be growing totara on a 200 year rotation, for example?*” He describes totara as a durable wood with a light cedar quality.

He also thinks there needs to be a change in the industry to better facilitate harvesting of smaller blocks. Harvest costs may be higher, but if the trees were higher value this would be feasible. He suggests an increase in smaller blocks with high value trees would encourage the establishment of smaller harvest gangs with specialist equipment, which is lighter and easier to move and operate, and does not require the same infrastructure for access that larger harvesting equipment does. Currently, harvesting gangs need 20 ha or more to be interested in harvesting. Non-radiata species can also be hard to access and a two year wait may be needed to grow these for planting.

R4 is also disappointed that there is not the infrastructure for non-pine timbers, such as what he has grown [macrocarpa, C. lusitanica]: “*there is some market for them, there’s just not the infrastructure*”.

*Everything's geared towards [P.] radiata and there doesn't seem to be any infrastructure for marketing and processing of alternative species". R5 is also disappointed in the limited markets available for New Zealand timber: "when you go to Wellington and, Tauranga's the same up there, you see all those logs. They're just shipped offshore. Some of it's just beautiful timber. Scandinavians are known for their furniture, simply because they can grow pine trees and they wanted to figure out a way to utilise them".*

R5 also agreed that there was a need for smaller milling operations. "*I was actually really sad to see. We did have a sawmill in Taihape up until probably 20 years. It was run by a family ... for a couple of generations. I think there will come a time, I'm hoping there will, when someone will actually see an opportunity there. I've heard this before. [Name] said the same thing. She said, 'These small wood lots, the big ones, the big boys are not going to be interested.'* He added, "*at the same time, there are smaller contract gangs. It doesn't seem to take much. It was like that in the nineties. Suddenly, every Tom, Dick and Harry had a chainsaw and a tractor or something [and] was chopping down trees. It won't happen nowadays because of the occupational safety thing*".

#### 4.1.4 Farm Forestry Knowledge and Information

R1M never seeks information on trees, although he is aware of what is in the "freebie papers". However, R1F has been active in seeking information on trees and related topics (carbon) and considering tree options. Although R1F is not a farm business decision maker, she promotes ideas to R1M, provides information to support ideas, and has followed up on these. She identified a talk on carbon emissions by a tree consultant to their local RMPP group as being instrumental in investigating purchase of land for tree planting to offset their farms' carbon emissions: R3 also mentioned this talk as being helpful. A farm consultant provided R1F further advice regarding viability.

R1F also identified websites as a useful resource, primarily for writing submissions which "forces you to read a lot" e.g. response to the zero carbon bill and its forerunner (carbon aspects of tree planting). Useful sites are the Federated Farmers site which provides links to other useful sites such as MFE and MPI e.g. for carbon information. She also assesses the Beef & Lamb website as being useful for information on a range of topics and in providing links to other websites on topics of interest. R4 also specified the Beef & Lamb website as being particularly useful. Update emails from Federated Farmers (R1F) and Beef & Lamb (R4) were also mentioned.

R2 did not consider she was particularly well informed on trees other than what she has sourced from the media: "*farming press, networks and mainstream media, we're reasonably well engaged with the news and topical issues and what is going on*". "*The thinking that we have done on trees is probably just due to the media and also, there's always a lot about farmers that are planting*". However, she did identify internet as the source she uses to look for information if required.

R4 has also used internet to look for tree information. "*As we've gone on, Mr Google is always handy. ... again, I'm not sure who runs the sites ... but there's various sites* ". "*Actually, the nurseries are quite good at putting out the things to say - which sites and which climates and everything else various trees are suitable for*".

The local Farm Forestry Association and local experts were mentioned as relevant sources of information, particularly when deciding on what to plant. When R4 planted his timber tree block about 25 years ago, he "*was slightly involved with Farm Forestry Association, and I got a couple of their newsletters, booklets, whatever ... There's a local guy [named person], ... he's a bit of a local tree guru. It was him that advised me about that whole regime of the groups of three which it was an idea at the*

*time. That sort of thing".* R4 is interested in planting some marginal land and is uncertain as to best species, comparative returns, erosion impacts and carbon credits, and would "like to get a forestry report and find out". Hence, the information required to make and implement a decision (experts, professional advice) can differ from that used to explore options e.g. websites.

R3 and R5 differed from the others in that they came from family farms with a history of tree planting and learned about trees from the previous generations (fathers) as well as other sources. For example, R3 observes "*I guess that's why we started looking at other species [than pine] and a lot ... inside the garden here that dad had planted, you started seeing the benefit of those mature trees. ... they've stood the test of time because they can handle this environment and they've grown really well*".

Like R4, R3 also identified the local Farm Forestry Association and local experts as particularly useful sources of information, especially from a local context. He observed that: "*even some of the consultants, I'd suggest there's some pretty big gaps in knowledge, particularly really good strong local knowledge*". He strongly advises that "*If you wanted to get guys that have really, really good strong local knowledge, you'd go and look at the Farm and Forestry branches. Locally here, you'd find a guy, like [named person], who has done a massive amount of planting. He's got a massive amount of knowledge. Southern from here, [named person] at Bulls, he's on sand country, the same sort of thing. ... That would've been probably a really good place to start [for local farmers looking for information]*". In his planting decisions, a family member with "*really strong knowledge*" of trees contributed which is why Douglas fir, which fits their environment well, was chosen.

In contrast, R5 has never belonged to a farm forestry group. His initial information on trees was from his father. After that, when he planted in the 90s, he consulted with friends in forestry and with a local consultant and acknowledges in hindsight that he received "*really wise*" advice. He also read widely on forestry and attended seminars (there was general interest in farm forestry at the time). He currently accesses a "*lot of information online*". "*There's most things you can find online or you can find somebody who will talk to you, advise that way*". He also contacts experts for advice. "*I'll pick up the phone and ring somebody that knows. It's so easy. We use our Horizons rep a lot for advice on farm planting now that we're moving towards the natives and the riparian work. They're a great source of knowledge. They have a lot of printed material as well as far as species and types of plants to grow. Then again, ... you go to the suppliers and they're a great wealth of information. ... They're doing so much, and they know what will grow and how to grow it*".

Local Farm Forestry Associations and experts have been identified as being particularly useful sources of information and R3 raised concerns regarding the potential loss of the local knowledge often held by these NZFFA members. "*The young ones aren't coming through [to NZFFA]. It's possibly because now there's more consultants, so maybe farmers go direct to consultants. I'm guessing. Maybe now, as well with the internet, a lot more knowledge is gained from looking at other things, so people disconnected from that [NZFFA]. They could find the answers they thought needed from other sources of information*". Consequently, he suggests "*there's a massive knowledge hole that somehow needs to be bridged and integrated in through the regional councils. I know currently the Farm Forestry branches ... most of their members are really not young. ... There possibly wasn't that knowledge around in the earlier times when that generation started planting. They probably come through the era post-1950s and they came back to the land and farmed probably through not a bad period. Then, probably through the eighties they had a fairly tough period. I guess they were looking at diversification ... That was probably when a lot of it [farm forestry] started. ... it was really strong, stronger then than what it is now*". To capture and retain this knowledge for the future, R3 suggests "*if you're looking at doing something, then tap into some of that local knowledge of those guys ... that local knowledge is really key. ... The more knowledge you have at the beginning, the better. ... What grows well here is*

*not going to grow well in the Wairarapa. It is definitely a ‘horses for courses’ scenario, where if you’re going to be planting, you’ve got a pretty big capital outlay and you don’t want to get it wrong”.*

There were some concerns regarding access to information, ease of understanding and quality of information. Information on carbon, in particular, was difficult to find and understand. RF1 has made submissions on proposed carbon legislation and has done considerable reading in this area as a result. She also belongs to an RMPP group who had a forestry consultant talk to them regarding registration for carbon credits: “*the RMPP group ... was the only time that I’ve had [these] explained to me, so I kind of understand now, the significance of 89/90 terminology, but I still don’t know how to actually register for credits. I wouldn’t know how to do that*”. A couple of others also attended and better understand carbon credits now e.g. R2, R4. R5 also found the information on this difficult to find and access. He did register for carbon credits some years ago, however, he used forestry consultants to manage carbon registration for his trees. In general, he finds government sites difficult to find information on and is often not able to print this out for easy reading and reference. He would like an easily accessible document with the main points on what to do that he could print out.

RF1 also made the point that time is an issue in seeking information. “*Like anything, if you’ve done it once, it’ll be an absolute walk in the park. When you’re really busy and you’ve got 20 minutes and it’s taking you 20 minutes to find the right website, you just think, I can’t be bothered, so it doesn’t happen. I don’t think we’ve ever received an ABC [on carbon registration], ‘If you have trees do this, do this, do this’. They might have but they certainly haven’t repeated it ... it might have arrived the day I wasn’t interested. There’s a lot of talk about it, but how to actually do this ... I suppose people expect you to always go online and find out. Young people would sort it ... It’s probably an age thing.*” Nevertheless, it is typically not the young people who own the farming businesses.

RF1 would also like readily available information on funds for tree planting e.g. national and regional government. “*It is also about accessing the funds. Farmers don’t know. People have said, ‘You could’ve got funding for this, you could’ve got funding for that.’ That’s actually huge. The people that know use it and use it wisely, and the rest of us are just idiots and go and pay for it ourselves*”.

## 4.2 Bay of Plenty and Waikato Regions

### 4.2.1 Interviewee and Farm Business Description

Four of the interviews were in the Bay of Plenty: two sheep and beef farmers (B6 and B7) and two dairy farmers (B8 and B9). Waikato dairy farmers were also interviewed (W10). All those interviewed have a decision-making role in the farm business in their capacity as owners and managers. Some of the trees were owned by other family members for B9 and W10 (both dairy farmers). B6 was the 4<sup>th</sup> generation of the family with an interest in trees. His father purchased the property in 1972 and had been particularly active in tree planting and harvesting on the farm. B6 had an extensive tree operation, relatively speaking, which outperformed his sheep and beef operation on his marginal land. W10M had tended and managed tree blocks on a family farm during his childhood and was also knowledgeable about trees as a result. The farmers interviewed and their businesses are described in Table 2.

**Table 2:** Description of the BOP and Waikato interviewees and their farm businesses.

ID	Farm Business Description	Farmer Description
<b>B6</b>	<p>316.5 ha (145 ha effective) sheep and beef farm west of Rotorua. Mixed contour, most marginal steep country planted in <i>radiata</i> or in existing native. Good infrastructure, central race established from past logging.</p> <p>Soils are mostly Orthic Podzols with some Allophanic. 1100 breeding ewes, 300 hogget's, 150% lambing, 100 steers (R1, R2, and R3)</p> <p>L&amp;B in company, stock &amp; machinery in partnership which leases farm. Expect to sell when owner is 60 (in 5 years) and pay out siblings.</p> <p>Environmental focus past 2 generations.</p> <p><i>92 ha in plantation forest, various size woodlots aged 2 to 28 years. Mostly Pinus radiata. All pruned and thinned. Operator's late father started planting trees soon after the farm was purchased in 1972. Operator has a 60 year forestry right except for 17 ha. 75 ha fenced native bush.</i></p> <p><i>All trees post 1990 are registered in ETS.</i></p>	<p>Ag Sci degree, year off, then returned to home farm.</p> <p>60% owner in company and partnership. Supports Mother (Partner). Managing director, sole operator and decision maker.</p> <p>Intends to 'climb mountains' and do something he enjoys after 60.</p> <p>Involved in community groups / activities. Member of Fed Farmers and Lake Rotorua Primary Producers Collective. Past member NZFFA.</p>
<b>B7</b>	<p>64 effective ha sheep and beef farm north of Rotorua. 2 streams through property (fenced 35 years).</p> <p>Orthic Podzol soils which overlay rhyolite rock.</p> <p>100 breeding ewes, lambs to works. 30 MA cows and 10 heifers, surplus heifer calves sold as weaners, bulls sold as yearlings. Operates a simple, low cost operation.</p> <p><i>Third of the farm retired 35 years ago (blackwoods, Douglas fir, native – rimu, kahikatea). Small patch of redwoods. About 5 ha unpruned pines to harvest.</i></p>	<p>Business owner and trustee.</p> <p>Member and strong involvement with Fed Farmers. Also member of Lake Rotorua Primary Producers Collective.</p>

B8	<p>308 ha dairy farm north-west of Rotorua  Sandy loam soils (podzols), high rainfall/summer safe.  Mostly flat to rolling, some steep gullies and rhyolite mounds.</p> <p>Ephemeral flow paths through property (significant flow in heavy rain), permanent water areas fenced off.  279 ha pasture, 27 ha native bush, 2.5 ha non-productive.</p> <p>Winters 770 crossbred cow, 750 milked at peak, total milk production of 260,000 kg MS. Employ 3 FTE.</p> <p><i>Fencing off some of the native tree blocks.  Planted 3000 pines as shelter belts.  Plan to retire 25 to 60 ha of steeper contoured land (gullies and rhyolite mounds) to forestry to reduce nutrient loss, provide carbon offset and improve farm aesthetics.  5 to 6 ha of native have been planted into riparian in the last 2 years. Further areas are planned with funding and advice sought from BOPRC.</i></p>	<p>In 2017 B8 combined capital with his parents to purchase the 308ha dairy farmin Mamaku. Previously, B8 had been sharemilking in Tirohanga while B8's parents owned a small kiwifruit orchard in Te Puke.</p> <p>Partner is involved with office side of the business. Parents are retired and living on farm.</p> <p>Member of Fed Farmers and the Lake Rotorua Primary Produces Collective</p>
B9	<p>423 ha dairy farm south of Te Puke.  173 ha dairy platform, 54 ha replacement grazing, rest (196 ha) in native bush, some radiata pine, non-productive. Flowing waterways in gullies (in native and pine).</p> <p>Dairy shed located at 265m elevation. Pasture area 65% flat to rolling, 35% steep, 15% gullies.</p> <p>Short growing season and wet winter.  135,000 kg MS, 430 crossbred cows. System 3.  3 FTE – manager, 2 farm assistants.  3.6 ha recently converted to gold kiwifruit.</p> <p><i>20 ha of Pinus radiata (4 blocks, 0.8ha to 14.6ha) harvested last year, currently in cutover, some to be planted in native (around 5 ha) with the balance back in Pinus radiata.  21.8ha of 3-4 year old pine, 4 blocks ranging from 1.6 to 13.8ha, plan to prune and thin.  3.5 ha of mānuka and kānuka planted in small pockets which will likely regenerate to native.  2 ha of 24 year old <i>Iusitanica</i> planted in small blocks (e.g. 0.5ha). Pruned but not thinned.</i></p>	<p>Owner operator. Also own and operate a coffee and tea business with Wife located in Te Puke.  Brother had a forestry right on previously harvested pine trees. Current trees are B9s.</p> <p>Has a strong focus on good science, guides strategic and tactical decisions.</p> <p>Member of Fed Farmers. Current and past governance roles in primary sector organisations. A member of one of the PC12 catchment community groups.</p>

<b>W10</b>	<p>Dairy farm in South Waikato. 445 effective ha. Springs on farm that dry up (no waterways) Average annual rainfall of 1418mm. Soils are mostly Allophanic (344 ha) with balance Pumice (110 ha). 28.8 ha flat, 84.3 ha rolling, 87.3 ha easy hill and 253.6 ha steep.</p> <p>Farm operated with manager + 2 farm assistants. Milking 682 cows. 175 heifers on farm. System 3. Lease block 143 ha. Has been used to grow maize.</p> <p><i>Three 2 ha blocks of 24 to 26 year old radiata belonging to W10F's father (located on lease property which is owned by W10F's parents).</i></p> <p><i>10 year old pines on farm when the dairy farm was purchased.</i></p>	<p>Owner operators. W10M from BOP. Growing up had responsibility for managing and tending his own forestry blocks on family farm.</p> <p>W10F from city.</p> <p>W10M and W10F purchased their first farm in BOP. They later purchased land in South Waikato with family support, which was sold to purchase the current dairy farm.</p>
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#### 4.2.2 Farm Forestry Practices and associated Drivers and Barriers

##### 4.2.2.1 Future Tree Planting Plans

B6 will not plant any more trees. The farm is likely to be sold in 5 years. He is not allowed to borrow against the property and the infrastructure is good so he will not invest in capital expenditure given the timeframe. *"I just do the basics really, so reasonably short term thinking but that will all change if the sisters ... decide they don't want to sell the property, we'll have to start everything again".*

B7 has about 5 ha of pines to harvest eventually and these will be replanted but will not be going back into pine. He is currently planting mānuka and kānuka with rimu and kahikatea: the mānuka and kānuka grow faster and act like a cover crop to help keep the weeds down.

B8 has planted 5 to 6 ha into natives and has a further 6 to 8 ha to plant this year. Reasons for planting trees are largely environmental: carbon, reduction of sediment run-off, and retirement of gullies that are not productive. *"There's actually no cost to us. There's no effect on the dairying ... If anything, it might be positive because it will help with shelter".* The gully he plans to plant this year only grows about 6 t/ha/year, is a high risk paddock for stock and is only grazed once a year: *"it's not doing a hell of lot for the dairying business, so you might as well try and utilise it some other way".*

B8 has 50 to 60 ha of other grazing areas that could potentially be planted. Ephemeral water flow areas (some gullies and hill faces) could be suited to pines, whereas the bottom of the gullies are better suited to natives because of likely sediment loss when trees are harvested. Three reasons that prevent him doing greater planting are: the minimum 1 ha size required for the ETS which for smaller blocks means *"there's no point actually planting them if you don't get any credit for them"; the impact on nitrogen available; and relative returns to dairy".* In respect to nitrogen he points out *"how it looks in overseer, ... while that land's in grass, it's in my dairying area. That increases how much nitrogen I have available. If that's going to be detrimental taking that area out, because essentially that means I'm more intensive on the land that's left over ... then why would I do it? At the end of the day, we're a dairy farming business, we're not in pine trees"*. However, he also agreed that if returns from trees

were similar to dairy “you can take your rubbish bit of land that’s a nuisance to you as a dairy farmer and get it producing financially … as much as the rest of the farm, then heck yeah, you’d be into it”.

B9 is still waiting for an analysis which will identify other potential areas for trees on the farm. He is interested in options to reduce his potential carbon liability, understanding where GHG regulations are likely to end up, and best benefit for the farm before making a decision. To plant trees, he would consider “*contour and what we are likely getting off it at the moment, and now what income we could get via the ETS from it*” He would want similar returns to what he is currently getting and would like it to be self-funding. It appears he is considering carbon credits to do this “*it would be nice if it covered the cost of planting and pruning, even if that came off at the end as far as carbon credits went. Self-funded basically. Don’t expect to get rich off it by carbon credits*”. He is not expecting a “*big payout at the end. That would lower its value in a sale situation. ... with the volatility of dairy you don’t want to be carrying too much from the forestry. Especially until we get the orchards [recently planted kiwifruit] up and going*”. He states “*If financials wasn’t a concern I could plant some native species on some steeper sidelings if I could do it financially. I think I’ve got the deer numbers down enough that I could do mixed species. I would have to do all mānuka. They will still do the damage, but we have the damage down*”.

W10 owners are considering planting trees on 80 ha of steep area, well suited to trees, which could be planted if subsidies were available. W10M says “*Would you be making \$600/ha [per annum] off the land at the moment, I don’t know ... It’s really hard to tell that number but I reckon the trees would return better per hectare off the worse ground than dairy*”. Drivers for considering planting are long term investment, losing stock on these steep areas (W10M), and they [the regional council] are “*hassling us about our slopes and not putting animals on the slopes*” (W10F). W10F also identified that staff would not then be needed for those areas but adds “*that’s not good for a community, is it*”. The only grants to support forestry planting that they are aware of is the stream retirement fund for fencing and planting wetlands. They are unaware of subsidies for tree planting. When prompted, they agreed they “*have heard about the [Billion Trees] program but don’t know of any subsidy for it. It’s probably only popped up in the last 6 months on TV and that’s all we have heard*”.

#### 4.2.2.2 Tree Management

When B6’s father purchased the property in 1972, there were few trees so he did extensive planting: “*It’s really all Dad’s doing, the forestry. It’s got nothing to do with me, I just carried it on*”. The father died 4 years ago but harvested much of what he planted. The sheep and beef farm is marginal economically and B6 believes his father realised “*that being this close to Rotorua, ... there wasn’t going to be a decent farming operation*”. Trees were planted on the slopes “*apart from a couple of paddocks, they’re all steep, both north and south facing*” and he believes the tree planting “*probably hasn’t really detracted from the profitability of the farm as sheep and beef solely*”. The farm is marginal “*... there’s no way you can make a living. If it wasn’t for the pine trees, we wouldn’t be here. I would have sold it, given up and gone and work in [named rural supply company]*”.

They did all the planting and pruning themselves in the early years until it got too much. In the last 10 to 15 years, [named forestry company] have been contracted to manage this. “*We’ve had people in ([named forestry company] usually come in and do it) and they’ve been good. Trees were harvested in the late nineties, in 2003/2004, about 2011/12, and about every second year after that. Now only small blocks remain*”. He intends to harvest some this year. As trees are cut down they are replanted, and similarly, pruning is ongoing with 17 ha pruned this year, mostly pine. He is cutting down and replanting the same areas his father planted. He does not access grants for planting because they are

already long term established plantings. “*You don’t get it for replants - do you? Even with the Forestation Grant Scheme, that existed, ... I still don’t think that was any use to the old man*”.

B6 has been contracting [named forestry company] for silviculture for about 15 years, although he does not use them for harvesting. He relies on their advice and what variety to plant. “*I pay them to make that decision. It’s moved on from when we used to do it ourselves*”. Years ago they had an issue with 3 to 4 year old trees lodging, resulting in them having to spend months propping trees up with bamboo poles. “*That [lodging] was really my main [concern] and otherwise, I just leave it up to [named forestry company] to decide what trees to get and trust their decision, but I say, ‘If they blow over, you’ll be standing them up.’*” Once trees are harvested, B6 phones [named forestry company] and asks “*Can we get it in [planted]? It depends how clean it was, and it’s usually pretty clean because the sheep have been running through it, ...[if] it’s all blackberry, it needs a helicopter, so ... usually has to be left a year for the blackberry to regrow and then they hit [spray] it. Most of the time, we manage to get it in that year. Within eight months, it’s planted again*”.

Then, seven years later, B6 phones the [named forestry company] manager and says “*It’s time to prune these trees’. He comes out to have a look and says yes or no. It’s actually really easy*”. [named forestry company] then get their preferred pruners to do the job. He is uncertain whether he should be pruning trees or not. “*I don’t know whether I should not bother at all. It’s too hard a decision to make, so I’m just pruning them. It’ll cost a lot of money to get them pruned because when I got [named forestry company], he [advisor] says, ‘A lot of people aren’t bothering pruning them, they just plant them and they’ll look at the carbon. Then, when they cut them down, they’re still good timber that goes overseas. You just don’t get the clear wood’... I just went with a gut feeling really. We’ve always pruned them, so we’ll just keep pruning them and it might turn out to be the wrong decision...*”. He explains the rationale for not pruning. “[named forestry company] stopped doing a lot of pruning and with the genetic growth of the trees, they have the inch and a half between the internode. They just cut the branches out and finger join it off with that clear wood now. They don’t need great big long planks of clear wood. ... It could turn out to be a waste of money pruning all these trees”.

Apart from a bad experience with planting last year when a different manager and contract gang was sent, he says “*Usually they’re [named forestry company] fantastic. I pretty much trust if [named manager he usually deals with] comes up. I rang him a month ago and said, ‘We’ve got pruning to do and he says, ‘Yeah, we’ll be in touch.’ He had a good handle on what needed doing*”. Last year one block was planted not too badly but the second day “*they just started randomly. They hadn’t lined it out, no little ribbons or anything. The trees, I think, had been in the trailer too long and half dead*”. [named forestry company] rectified the problem and covered the cost, but the trees are a year behind. “*It wasn’t ideal, but I think it will be all right, apart from being behind a year, the growth, but in the scheme of things, that’s not important*”.

Forestry and farming work well on the B6’s property, but they do not integrate.: “*... Agri-forestry ... was an idea, but you plant a forest and the sheep don’t really go in there*”. “*... you can take out all your difficult hillsides ... they’ve got to be bigger than a hectare*”. “*There’s nowhere else to go in [to trees] really. There’s this paddock here but it’s got pylons in it and is steep. There’s two other paddocks up the top, which we wanted but it’s got pylons across it, so we can’t. Everywhere else, it’s just too nice, flat paddocks. We’d stuff up the flow of the farm now if I put trees on some of these odd paddocks*”. The trees do help with shelter but “*you spend a lot of time cutting trees off fences, so it’s not that simple, but definitely for shelter it’s been good*”.

B7 has a mix of tree species on the property planted 35 years ago. He does not like pines so the area retired was planted in blackwoods [*Acacia melanoxylon*], a few Douglas fir and the rest in natives. The Douglas firs may eventually be harvested but that will not be for another 45 to 50 years. The natives

are mainly rimu and kahikatea. B7 remembers that access and cost of natives was high 30 years ago when these were planted. But now he sees new kahikatea seedlings coming through, so the bush is regenerating. He also planted a small patch of redwoods which he does not particularly like because nothing seems to grow underneath them and will not plant these again in future. Even with the small block of pines he has noticed native punga come through. His preference is natives which grow reasonably well.

B7 has 5 ha of pine trees. This pine tree area had been replanted in natives, redwoods and Douglas fir, but seedlings from the pines came through and took over. So last year these were thinned and will be harvested in time. He harvested an area of pines (1 ha) last summer which was planted back into natives. With natives he found that the area needed ongoing management for the first 10 years to make sure weeds do not smother the natives. Now he plants mānuka and kānuka with the rimu and kahikatea, so the mānuka and kānuka can provide cover for the other trees. *"Hopefully the mānuka and kānuka grow a bit faster and keep the weeds down. ...as long as you control the blackberry and stuff, the natives seem to handle the grass alright"*. He is aware of the One Billion Tree grants but does not know how much funding is provided: *"I didn't bother applying when I planted that area back into native, so I don't really know"*.

B8 has 27 ha of mature native bush which is being fenced off over time to restrict stock access, and he observes these are ineligible for carbon credits. He has also planted 3,000 pines this year for shelter belts. They did this themselves over winter with expertise in planting provided by an employee who used to work in forestry. B8 has also previously explored doing 15 ha mānuka in partnership with a neighbour for [named honey company] but the amount of clover nearby made this infeasible and contour meant it could not be harvested for oil.

As mentioned, B8 has planted 5 ha to 6 ha in natives with a further 6-8 hectare of gullies to do in the next few years. The bottom of the gullies are not suited to pines because of sediment losses at harvest which would contaminate Lake Rotorua. He considers taking these blocks out as beneficial to the business *"because you're always worried about putting stock in those areas anyway. There's shelter for the stock ... The carbon credits from it could be quite lucrative going forward"*. Benefits are primarily environmental. He will likely apply for regional council funding to support this planting: *"The regional council, they'll pay for half of it but the problem is it's only up to \$36,000. ... our size property, we're going to get there pretty damn quick. It should be on a per hectare basis, not a per title basis. We're paying half of that anyway"*. There are some areas of the farm where pines may be planted.

B8 has a good relationship with [named person] at the Regional Council who advises on the riparian planting. Information is provided on what to do, what areas to plant, and this is mapped by GPS. Riparian areas planted so far are one to two year old native trees. The purpose is to slow water down and capture nutrients before they leave the farm. Trees for timber will be planted on the slopes but the bottom of the gully areas, where the main water flow is, will be planted in permanent native to filter the water and remove sediment. His concern is when trees are harvested, they release *"just as much sediment as what you save during the whole 25 years of the life of the tree"*. Hence, *"I thought maybe we do natives at the bottom of the gullies [on the lower slopes], just [put] a strip through and leave those permanently, so that when we harvest those trees [on the upper slopes], they're not going to affect the water quality downstream further. I can imagine trying to get a consent to harvest those trees in 25 years. It's going to be damn difficult ... because of the contour that we're talking about. The rules will change between now and then, I believe"*. He adds *"It might be worth just leaving them in the ground and not doing anything with them. It depends what trees are going to be worth in 25 years"*. However, he also believes there will be better technology by then to get trees out with less impact on the environment.

When B8 plants the trees, he will “*first of all, make sure the weeds are cleaned up. You want it sorted to start with*”. He will look into getting it done by a contractor (8 ha) but if it costs too much and they have time they will do it themselves. On the dairy farm, “*generally winter time's when you do your planting and that's our quiet time. We've got paid guys here on farm, so they need jobs to do*”. He explains tree planting and management. “*It's about 900 trees a hectare or something like that. ... just do it ourselves and save the cost. You're talking 50 cents a tree to put it in and soon as your employ someone, they'd probably want two bucks a tree to put them in the ground and then the management cost and then you've got other people coming in. As far as maintenance goes on them, I'm pretty sure it's just put them in the ground and they look after themselves. They're a weed, just about. Making sure there's not other weeds in there amongst them, like your blackberry and gorse*”.

He had a contractor in to look at the job and was unimpressed with the response, which contributed to the thought that he will do it himself. “*we've had one guy come in and he just wanted to plant pine trees. He didn't talk about the eight hectares we had ... He was talking about the whole farm. He wanted me to shut down dairy, sell the nitrogen and do it properly. He [had] no interest in doing little blocks at all. ... They want big blocks to do, ... he didn't realise how much debt we had to sort out. I said at the end of the day, we've still got debt and trees aren't going to fix that. Only cows are going to fix that. Straightaway, the value of the land goes down, so your capital value's gone as well. You might get a bit for your nitrogen to offset it but it wasn't going to come close, not even touch the sides. He was in for himself and you can see that. Hundred hectare blocks is what he was thinking*”.

B9 accesses trees from a local nursery and to date has just been replacing trees as needed. The process is he books the trees in advance and the planter comes in May or June and does the planting, later coming back and releasing the trees. He is self-employed and does this as casual work (i.e. paid wages) so there is no management fee. He later comes back and prunes as required, with the timing of this left up to him to determine. B9 does not know the specifics of any grants available. “*The regional council has a grant I think. The government for planting things like mānuka. Don't know specifics*”. ...[I'm] aware that the money will run out and do you get in first if you want to do it before everyone else does”.

W10 has 6 ha of 24 to 26 year old trees on a lease property belonging to W10F’s father (3 blocks of 2ha). They are due to be harvested in the next few years. They had intended to harvest these this year but the price dropped. As well as these trees, they also have a few other blocks of pines about 10 years old, planted before they came so it is difficult to tell their age. These trees have never been pruned and are planted fairly close together. The trees on the lease block have all been high pruned. W10 will manage the trees on the lease block for W10F’s parents. After harvest one block which is a spring watershed area for farm water will be fenced and possibly replanted. The other block would make a nice house site and will not be replanted.

They used to purchase trees in 50 or 100 bags of trees from a local plantation in Rotorua. If planting, they would buy 200 trees for a block. They would contact a local they are aware of who plants trees to get the planting done. W10M described the tree management regime he learnt from planting trees on his family farm growing up. “*Initially we planted them at 2x2 spacing to get tree density and get good clear wood. We did our first prune at 2 and our second at 8*”. “*We also had a lot of problems with wind catching the 2 year old trees because they were un-pruned and they had a big canopy, so a lot of the time we had to go out a little bit earlier so they wouldn't catch in the wind. You might prune harder and earlier to reduce the area so the wind wouldn't blow them all over*”. “*But by the time they hit 15 we had to thin them out because we wanted to get [thick] tree trunk size which we wouldn't get if you left them that is. So you planted them thick initially to control branch size and reduce the amount of pruning and as they start to mature you want big trunks and up they go. It worked good and we*

*planted them all ourselves. We sprayed them all ourselves: weed spraying is pretty crucial. We spot sprayed every single tree although I think they do it by helicopter now. Tree management is so important. You can't just plant them and leave them".*

#### 4.2.2.3 Species Selection and Availability

B6's trees are almost all *Pinus radiata*, with a few macrocarpa trees. His father experimented with a few other species and mixed plantings as advised by FRI at the time, such as planting eucalyptus amongst pine trees. "*The eucalyptus just ruined the pine tree[s]. They just grew massive and they suck all the moisture out. What do you get? It just all goes as pulp ... They were huge trees and the pine trees growing around them were like this [smaller]. Thank God it was only done with one block. It is about four or five hectares*". "*We did plant some macrocarpas but they just get canker and the same thing really happens. ... mix the planting but there's always a species that dominates the other. The pines were dominating the macrocarpas now*". The majority of plantings have been in pine: "*I think if Dad thought it was worthwhile, he would have [had a mix of species] .... That's [decision to opt for pine] probably proved to be correct with the price of the timber and the whole carbon thing*". In term of the decision to plant, he believes "*I think it was good decision of the old man to plant trees*".

As mentioned, quite a long time ago they had a problem with lodging in a variant of pines they planted. B6 does not "*even know how they run the genetic system now*". [Named forestry company] advisors now select the pine variants and B6 has confidence in their decision. These trees "*would have the tiniest little roots on them and just a massive Christmas tree at the top. No wonder the damn things are going blow over*". Current tree forms are better: "*I see they are a lot better. I think they have a bigger root system and they're just not quite as dense ... they're a lot thinner at the top*".

B7 has a mix of tree species on the property. These trees were planted under the local catchment scheme back in the 70s to reduce P in the lake with fencing subsidised. Radiata pine was recommended, however, he does not like pines and planted these other species instead which have remained stable. He observed that others who planted pines are now having challenges as they are not worth harvesting and are falling over. The blackwoods are too bushy and he now thinks they should have planted in conjunction with eucalyptus so they grew towards the light. He observes that natives are coming up through them now and hopefully the blackwoods will eventually be replaced with the native coming through.

B7 remembers that access and cost of natives was high 30 years ago when these were planted. But now he sees new Kahikatea seedlings coming through, so the bush is regenerating. His 30 year old rimu are 30 to 40 feet now, and the kahikatea are the same height or slightly higher. "*The one thing that I found after 30 years is that the bird life, even wood pigeons, are nesting here now. So I've got a couple pairs of wood pigeons which is good to see ... seeing a lot more native birdlife*". He also has 5 ha of unpruned pine trees which were self-sown about 15 years ago.

B8 has been planting mixed natives for riparian but did not specify the species. He has planted pine for shelterbelts and is considering planting some slopes and gullies in pine at some stage. He has thought about redwoods but has not pursued this further because of other pressing issues. He is not sure where he would access information on species: possibly a council contact, advisor, or someone who has planted trees. He had difficulty sourcing pine trees for shelterbelts, and furthermore, found that others do not know where to source these either. "*It's quite funny because since I've said I've got pine trees and found out where they are, I've told a few mates and they've all said, 'Where did you get those? I'll get some too' ... People wouldn't know where to get them*". A contact helped him find some. "*When we bought our trees, I didn't even know where to buy pine trees from. ... Even in your*

*Google search for pine trees, you can't find [any] anywhere in Rotorua, there should be heaps of them. It was only through my father-in-law's mate, who comes up here ... and buys trees from the place on the other side of the lake there, he gave me the guy's number ... I can buy the trees now". When he googled for information, he could not find anything and assumed this is because it is the big companies, "they do it to order, I guess. They're not like native nurseries that sell to the public".*

B9 has some small blocks of *C. lusitanica* (about 2 ha in total) with most pruned i.e. any good ones are pruned. Most trees on the farm are likely to be pines. B9 says "*My perception is *Pinus radiata* is still well ahead of anything else. But it's not something that I keep up with either*". Financials is a big driver. He considered putting some of the back country in pine trees years ago but "*financially it was pretty tough*" and "*It would be thirty years ago now, I think I mainly went off articles and rates of return and sat down and did it [an analysis] myself*".

B9 has also planted mānuka and kānuka to encourage natural regeneration of natives: "*It's cheap and it will grow fast with good survival rates. You can put it in with a T, you don't have to dig a hole. 24,000 at 1,000 per ha [were planted] so there's 24 ha with none of it registered. Some of those trees were free off [named honey company]. ... Putting the mānuka and kānuka in will help the natives come up through. Planting natives can be difficult because of the deer but [we are] starting to get on top of them and [they are] pretty easy to shoot. We put gricillias in, but the deer absolutely hammered them. Whereas the rewarewa and manuka were fine. There's a different rate for mānuka and mixed so if we put rewarewa in there the deer don't seem to eat that. So I think we can find species that are partly resistant to deer". Other species that could work are *lusitanicas*, gums. ... I've been impressed with how fast the rimu grows. But that's just a thought. Don't know what the market is for that. Maybe an option in the future. But whether you can harvest them is another thing*".

W10 is considering planting steep slopes as previously discussed, with a species that gives the "*fastest, quickest dollar back.... That's the driver. ... You want to chop them down as soon as they are mature. 20 years is long enough*" (W10M). They also want a subsidy to assist with this. Pine is likely to be the preferred crop. Growing up, W10M saw his brother make less money out of an alternative slower growing variety (*A. melanoxylon*) than they made out of pine: "*he worked really hard but at the end of the day it was worth stuff all. And it was so much work. So slow to mature [and] the pine tree block produced better returns per hectare*". Redwood was identified as a viable alternative "*Grows straight, small branches, fast growing. We have harvested red wood trees in Te Puke and they got good money*" but would not grow this now because "*It's all about the dollars. Pine tree is the fastest growing tree in the world*". They would not plant permanent trees such as natives: "*so far there is nothing out there to encourage that. It's all great for the birds and the feel good, but so far I haven't seen anything or there's nothing been presented to farmers as an idea. We like plantings but it has to make money*" (W10M). W10F adds: "*If it's not steep graze it, if it's steep plant it. You're only going to plant it if you're going to get money out of it*".

#### 4.2.2.4 Harvesting

B6's harvesting practice has changed over time. Pre-2013, everything was just sold stumps: "*We just got a consultant in and cut it down. We did the roading and everything*". Then, they had a large 17 ha block at the back of the farm to harvest. "*We put it up for tender because we didn't want to pay for the road. I don't know how much they spent on the road, but now we've got really good road all the way up the farm. That was the main reason for doing that. I wasn't particularly happy with the manager ... he could have tried a bit harder. Basically, we just left it to them*". The second time they went to tender, the tender was much higher.

For harvesting, they now “*just use [named forester]. I think he’s great. ... He just sells timber. He used to work for [named forestry company] and now he’s got a company*”. He heard about this firm from contacts. Since his harvest work is small-scale compared to some of [named forestry company’s] clients, he thought they would not mind missing out. This forester will “*... organise all your harvesting and sells it for you. ... You get someone like him and he’s totally reliable. ... He’s up there all the time, checking any issues*”. The situation is also simpler: “*Now that most of the roading’s in, we don’t have to worry*”.

Harvesting occurs over summer. “*I just leave it up to him [forester], have a meeting every now and again to see what tracks have to go in. They usually organise that and then [I] just leave him to it. I’ll go down and have a bit of a meeting and they’ll say, ‘We’ll move this fence, move that fence’ and I did all the fencing*”. He states the importance of trusting the contractor to do the job and staying out of it, which can be hard for some people. “*Keep out of it, I reckon is a good thing. You’ve just got to trust if you employ someone to do it and you hope like hell they’re honest. ... and trust that they’re selling it correctly and doing the correct job*”. “*You look at what I pay someone like [named forester]. It’s bugger all. When the final cheque comes in, you don’t even notice he’s taken his cut. That takes stress off you*”. He is confident the contractors he uses are honest. “[Named forestry company] aren’t going to screw you, I wouldn’t think or I’d hope not. ... Once you get a relationship with somebody, you want to stick with them. I’d probably never use anyone but [named forester] now”.

His harvesting experiences have been largely positive. “*You’ve got one chance, ... I think we’ve been pretty lucky with it. The last big job, ... we put it up for tender, so that was the deal. I didn’t get to choose the crew, they just got them. I mean, how do you know if you got ripped off or not? You just don’t know... I was quite happy with the money we were getting for it*”. “*We’ve had some really good crews in here. The guy from Te Puke was really good. We had the local people here. He’s really good. The last two lots we’ve done here, they wouldn’t screw you at all. I mean, they can just not put a docket in and they just brush it off. I’m sure that goes on all the time and the odd load goes out and goes the wrong way over to the wood yard, the firewood guy and they get hundred bucks, that sort of thing*”.

He observes that “*You hear lots of forestry efforts, they [owner] see what’s going on, not getting enough for that, and they take over. I’ve heard that a few times ... You’re [owner] taking photos of this stack and you’re taking photos of that stack, and has it been sitting there too long? They said, ‘No, the market for that’s no good. We had to send it further away’... All those sorts of things go on. To a point, ignore it. Just give it to someone else to deal with. It’s all you can do. Some of those crews, you don’t want to deal with them*”. But he also observed that there may be more to some rumours of dishonesty than is out there: forestry income can be low or negligible if trees are poor or difficult to access: “*I don’t know what the story is. I’d never really listened to it*”.

It can be hard to ignore the potential for dishonesty “*It’s bloody hard and some of them are crooks*” or are not professionals foresters “*There’s a lot those crews, a lot of those guys that when the business takes a downturn, they go and do something else. Then, they’ll come back if things take off. ... they go and get a crew and then they just really clip [the ticket], sell it on to someone like [named export company] ... who do all the exporting*”. A lawyer friend recommended paying attention to the forestry contract and specifying that all saleable timber must be removed and sold, defining this. Saleable timber “*has to be a length. That’s one thing I’ve learned. You’ve got to say anything 3m longer has to leave the property and you have to be paid for [it]. ... they can turn around and say, ‘They didn’t want to buy it today, so it’s not saleable timber. ... When I put ours up for tender ... it had everything over 3m has to leave the property*”.

When B7 harvested his 1 ha block of pines, a local was contracted to do this. B7 specified that he wanted this done in summer. “*What I find in this area is everyone seems to be harvesting them in the winter. All the harvesting that went on last year in the valley was done in the winter which I think in this high rainfall and pumice country is ridiculous*”. Even with the trees being harvested in the summer, the mess that was created and the damage that was created by harvesting them did not sit well with me. And I’m not saying they did anything wrong, that’s just what happens”. His pines had quite a bit of native growing up through them. Access was reasonable: there was a flat area at the bottom of the site and a track going up through the pine trees. A hauler was required to harvest the trees. They were good size 30 year old trees: “*good money, no complaints about the money from that small block at the end of it*”.

However, B7 was concerned about the environmental aspects of *the job they did over the time they were grown* as well as the harvest operation: “*just pulling those logs off the hills and just processing them I just was not happy about. ... it doesn’t align with my values*”. There was no damage to the pastoral areas, but there was a lot of damage to the pine area although he concedes that this is probably because the trees were planted on a steeper part of the farm. However, they did not stabilise the slope as much as he thought they would. Quite a few trees tipped over and undermined and washed out a big area of land. In terms of harvesting, he observes “*It’s well-known that any environmental gains you make regarding pine trees, as far as sediment and phosphate is concerned, are negated in the first 7 years after harvest. So I don’t know what is environmentally sustainable about that. Instead of getting sediment runoff over 20 years you get a hit especially over the first two years into a catchment*”. At the Farm Forestry conference he was surprised at the lack of focus on the environment: “*it was all about carbon credits and how much money you could make off pine trees and there wasn’t one consideration for the environment, for what it does to the environment and biodiversity and that was really disappointing. ... you just have to look at what happened in the east coast with all that slash to actually know that what they are doing is not sustainable*”.

B8 knows little about harvesting or the returns from trees. The more certain return may be the carbon. “*The carbon could be a good thing, you get the benefit ... we may never harvest them, they may just stay in the ground*”.

Feedback from B8’s friends suggests returns from forestry are low. “*... from talking to other farmers, next to nothing, because the contractors turn up and say, ‘You’re going [to] get 50 or 100 grand for it, I’ll write you out a cheque at the end of it.’ ... They don’t harvest when you want it because they’re doing all the big blocks and they turn up when the prices are down. They come and knock out all your trees and at the end of it, they say ‘This is what you made but this is what it’s cost you to get rid of [them]’. They’re only little blocks that we’re generally doing on farms, I’ve heard it plenty of times that you don’t make much money out of it and you’re left with a big bloody mess in the paddock to sort out as well. That’s why we haven’t planted now. There’s no real point to it really*”. “*Like I said, they’d be happy just to leave them in the ground as shelter belts. There would be some value but because of the size of the blocks, the returns just diminish*”.

B9’s brother, who is responsible for logging decisions, has received advice from an ex-logger who lives in the BOP. They rely on this logger to advise which harvesters to employ. “*You have got to ask other people. You got to ask ‘where was your last farm job’. And the job they did. And also, if they say they are going to have a buck rake, you have got to see it on site. If it doesn’t turn up on site after a couple weeks you just stop the logging and say we need that buck rake*”. B9 observed that the first harvester was good “*he had a buck rake, he used it ... none of the others did even though they promised to*”. The second crew “*didn’t have a buck rake so all the slash they were pushing was being done with a bulldozer which was removing several inches of topsoil*”. There was a bad accident when this crew

worked on the property. He observes that “*The last crew were probably the best. They cleaned up nicely after themselves. They [harvesters] still do stuff like leave wire ropes in a paddock for your mower to find. But they still do stuff like that because they don’t think like we think. They don’t think what’s this going to do*”. The final crew also helped clear some pines from near the orchard: “*They had the gear we wanted and he talked to me the whole time. They had a forwarder .... only does a little bit of damage but nothing like a skidder where we couldn’t get the logging trucks. Amazing piece of equipment and quite quick*”. Clean up is important to B9: “*you got to say stop, at times, that nothing goes out until you get the cleanup done properly*”. For health and safety, processes are discussed with forestry workers before work starts. The returns from the trees harvested did not go to B9, but to his brother who had a forestry right over the first rotation and who primarily negotiates with harvesters. B9’s main input is to “*make sure they don’t leave a mess, coordinating where stock are, and doing the fencing*”. The brother that gets the income pays for fencing and replanting.

On W10’s current block there are two blocks of trees ready to be harvested [on the lease farm which is owned by W10F’s father], so there is more forestry involvement coming up. In selecting a harvester, they will talk to local tree harvesters they know (W10F) and/or ask the person who did the job next door which looked well done (W10M). W10M has harvested 3 major block of trees in his lifetime, of which 2 have gone badly wrong. His view is “*for the tree owner the returns are terrible really. You can see the potential there but the systems are not right. It’s pretty poor really*”. He explains that the system “*I only know of the system where they put the contract in front of you and you take it or leave it. But I have never seen any negotiation around that*”. He would prefer “*We should find someone that wanted to buy our trees, they give us the price, and we hired the people to harvest them and get them out*”. He explains this rationale based on his experience.

Their first harvesting experience was a 5ha block. There were problems getting the trees up to the road which incurred considerable cost and made the operation more complex i.e. “*he harvested all the trees to a skid site, he limbs and logged everything for what orders he had from the mills, and he loads the trucks and they dragged the trucks out with dozers onto the roadside*”. That cost more than was quoted. Consequently, as W10M explains “*his slice was a lot bigger, and the argument was that he was over charging and not paying enough for the trees. But that deal was already done. That’s the hardest thing, once they start, you don’t see the tree money, it goes to the harvester and he pays you what’s left. It should be the other way around because you are hiring him, he should be invoicing you, but it doesn’t work like that*”.

The second experience was similar. This was a 25 ha tree block. “*Those trees were pre-purchased and he [the buyer] took all the trees away, he didn’t pay the contractor, the contractor went broke. He [the buyer] kept the trees and the final payments because he said the trees weren’t as good as they thought they were so they got less tons than he thought they would get, so he said ‘I’m out of the pocket so I [am] getting the rest of it’. ‘But you signed a contract here buddy’. Why does [the] money go to him, it should go to the landowner. It’s a common problem, the landowner should be paying these [contractor] bills*”. “*He’s just a ratbag. Has a whole lot of assets and you can’t get a lawyer to pin him down because he knows how to shut down that company and start a new company. He starts trading under his wife’s name or someone else*”.

The third block was some shelter belts and some trees around the farm. W10M explains “*Shelter belt trees are not good trees ... they are basically pulp. That was the problem, the logs are worth stuff all and ... cost a lot to get out of the ground. You end up with a hell of a mess on your paddocks but basically you get your paddocks back, the trees are all stacked up and the logs are gone ... there is no return but you have got the job done. Basically you cover the cost of that. ... It was worthwhile because the trees were enormous and were affecting the grass so they had to go and the mess was tidied up*”.

#### 4.2.2.5 Availability of Labour and Markets

[Named forestry company] manages planting and pruning for B6 which works reasonably well, as previously explained. As mentioned, there has been a recent problem with the quality of the planting and the management of planting by the contractor. *"I had a bit of an issue here. They just sent some idiots up to plant them and they were just hopeless. They had to come back and redo it. They just missed half the paddock. Half of them died"*. This is not the norm and has not happened when the manager he normally deals with at [named forestry company] is available. This manager was away on a larger job, and he speculates that the contractor may also have lost some of their better planting staff. However, he added that *"They have rectified it"*.

B6 does have some concerns about availability of labour for pruning. *"Just maybe trying to get them pruned, if there's the labour out there to do it. I won't be happy until these are all pruned. I'm thinking, are they going to come? Have they got the labour to do it? Do they really care about coming to do mine?"* This is now organised for him by [named forestry company] who have people available at that time *"they're looking for pruning just to keep them hanging around for planting. They've just got to keep them here until May until they start. Keep them in the job. I haven't seen them yet, so they must be pruning somewhere"*. B6 gets the impression that contractors *"struggle to get people to do it [prune]"*.

In terms of harvesting, B6 has tendered the work in the past and now contracts someone to do this as previously discussed. There are few issues getting trees harvested and these were minor and manageable: *"Wind, rough weather at harvesting time and just the moisture. Dodgy workers but that's not a real big problem. Once you get a [good] relationship with somebody, you want to stick with them"*.

The pines B7 harvested went to Mount Maunganui for export. He is not familiar with log markets and *"left that up to the contractor to sort out. ... I didn't like them and I just wanted them gone so I could plant the area back in native in the autumn"*. The contractor harvesting the trees was local: *"I was just talking to him at the time and I mentioned I had some trees I wanted to take out so I could replant the area. ... We had a meeting at the site and had a discussion of what he would do and how it would work". He was positive about his experience harvesting trees"*.

As for harvesting, B8 also has little knowledge of markets and processing. A local person may take trees for posts but needs a specific size, and his business may also be under threat as plastic posts gain popularity. *"The rest of it, I think, just goes to the wharf in Tauranga, gets loaded up and goes to China - doesn't it?"* As mentioned, he may never harvest so is unlikely to be planning ahead for this. *"There is also uncertainty in the future market for wood". "Who knows, in 25 years there may be better products than wood and its long term. ... it's probably going to be synthetic products that are better than wood. It's a long- term investment"*.

B9 is not familiar with log markets or forestry returns: *"I know about the grades and different markets but it's not something I watch"*. There is a mill locally that takes small lots and they like them pruned. He thinks there is a pulp mill still going. The wharf is nearby so transport for logs is cheap.

W10 identified local log processors and marketers as the mill down at Rotorua, we know a few mills. In Tokoroa there's Kinleith which is a pulp and paper, plywood and timber mill. As an aside, W10F expressed frustration that Kinleith is *"pumping all their waste into our river! And we are getting slammed for polluting the river while they are getting fines every year. And they just received a 25 year consent from regional council ... to carry on polluting it. ... If you read the regional council report on the*

*mills resource consent application you will see all the list of what's going in there. It's pretty bad stuff. It's all consented and it's all ticked off*". They are located relatively close to market for logs with good road access but poor rail access and relatively low cost. However, they are of the view that "NZ shouldn't be exporting logs. We should be processing all the logs and selling the timber processed. The government here is not interested in process logs, that's the problem" (W10F).

#### 4.2.2.6 Carbon

B6 has registered all trees planted after 1990 in the ETS. He has an exemption for those pre-1990 because of the size of the block: "... because there was 48.5 hectares, I get an exemption". However, he is likely to replant "*I mean the land is not worth anything else. It was the rough land that was planted*". In terms of understanding carbon credits and the ETS, he says "*I get a little bit lost in the detail because they changed a few things. I still haven't quite got this averaging thing sorted out*" He knows the change is to "*make it more appealing because people didn't like the idea of having to pay all that money back in one big lump sum. If I did anything further with my carbon credits ... I'd have to get proper advice. I wouldn't just make a decision*". Similarly, he has not traded any carbon and would seek advice. "*No, I'd never do that [trade carbon]. Now, the system's changed, I could look at it. I don't understand the implications totally, so I'd get some advice about what I would do if I sold some of my credits. I can safely sell a third of them or something – can't I? It's something like that*".

B7's plantings are all registered in the ETS. He is not familiar with how to trade these: "*I set up that account ten years ago and I haven't looked at it since. I don't have an intention of selling them and will just leave them there*". He admits he does not know much about the ETS and carbon, although he is aware he can get these for natives as well as timber species and states that "*if you plant pine trees you can start claiming the credits after 7 or 9 years, but .. when you cut them down you have to replant or repay those carbon credits*".

None of B8's trees are registered under the ETS. "*We've got mature native trees and apparently, they're not worth anything because ... they've already done their carbon story ... we can't do anything with that*". He has some understanding of how carbon credits and trading works and is interested in registering new plantings under the ETS. "*The carbon credits ... could be quite lucrative going forward. I really don't know a heck of a lot about it but essentially, it could be worth leaving those trees standing there as carbon credits rather than cutting them down*". "*It would be good to be neutral. I don't want to have to pay anyone anything. If we can grow a tree and it offsets what we're doing in theory and we can make some money out of it, then it's the only way to go*". He looked into doing this through regional council. "... *that was just on that billion trees thing. They wanted the regional council to map it and plot it for them and then send in and apply for it. You can apply to get carbon credits for it and then you had the choice of selling them or just keeping them as a credit for yourself. I'd just leave them there*". He is aware of the One Billion Trees fund but would prefer to retain any credits. "...*there's more [funding] with the government billion trees fund. ... They'll pay for the trees and the planting, but I think that's it. I didn't really look into it. They were just going to keep the first six years of carbon credits as well ... from the pines, I think. ... it's only a small portion of our farm. I'd rather actually not let them have anything over it, ... I'd rather keep the credits for ourselves because ... we want something to offset it. I wouldn't give it away, I'd rather go and plant them ourselves and put them in the ground for 50 cents each and then register them and then get the credits ourselves*". He explains further "*I understand as far as carbon goes, if we were in the ETS ... we can't use it to offset what we do on farm, but essentially we can trade it*".

B9 says the trees on the farm are not registered in the ETS because his brother has limited knowledge of how carbon credits work. B9 is aware there are “*a couple options, you can claim them directly as the trees grow, but it tends to be tens of years on or I think you can get something from the government where they get the carbon credits and you get something from them to help fund planting the trees*” and “*I did look at ... a scheme where it has to be a minimum area which I might be over now with 25 ha ... I can't remember*”. They are aware there have been recent changes but are not familiar with these “*I think you can offset methane now, I think they changed that one, it was something they were talking about not allowing it as an offset but I don't think that one went through*”. He knows carbon credits are considerably less for natives.

W10M thinks the two blocks on the farm are registered in the ETS. However, he thinks when W10F’s father purchased the lease block, they paid out of the ETS scheme. W10F states that they are not interested in carbon “*I don't know anything about it and I'm not very interested*”. Their frustration with the ETS is that they “*already sequester a lot of carbon with our soils which we are not credited for, yet they want to charge us a carbon tax. They want to take it but they are not going to give it. Once again you are getting forced into a position*”. And “*the system is designed for one purpose, to balance NZ carbon pool. We have got a massive dairy sector that has a huge carbon footprint. But to me all you are doing is robbing Peter to pay Paul. Unless you're reducing [carbon] the ... footprint trading isn't really doing anything is it. Someone else somewhere else is buying carbon to offset the pollution*”.

#### 4.2.2.7 Economics

B6 has achieved returns of \$45,000 to \$60,000 a hectare gross from forestry for large trees over 30 years old. Growing conditions can affect quality for market, and therefore, returns. “*They weren't dense enough for plywood, even at that age, ... they'd come and tested them. The [buyer] kept coming over, going, 'They're big trees' and thought they'd be good, but we just didn't quite make it. He said, 'It's just too good growing conditions for the pine trees. They need to be somewhere where it's harder'. ... half the size but the same age and the wood's dense. He said, 'It's just too soft for plywood'*”. He explained that was also “*partly to do with the quality of their [buyer] machines for making plywood. ... If they had modern machines, they'd be able to use them*”.

His analysis for the local farm discussion group showed returns from forestry considerably exceeded sheep and beef returns. However, he admitted “*I don't really push the sheep and beef side of things. If I had bulls and went hard out at bulls and was a farmer like [name] ... there's times where it might catch up. It might be reasonably similar [some] years*”. However, “*You do [farm] the whole farm and it's hard. You've really got to take out the hillside. ... If you look at some of the hillsides I've planted, there's no way you're making money off them anyway*”. Trees also require limited time and cost “*You pay a little bit of money to get them pruned and things and then you don't worry about them*”.

B8s primary focus is on planting poorer areas of the farm unsuited to dairy for environmental reasons: “*In terms of financial its [wood] small compared to the milk so not a big focus, more focussed on environmental benefits ... definitely, that'd be the only driver. I mean there is a financial return from carbon credits but we're talking about a very small percentage of our farm. It's hardly worth worrying about. Dairy is the main enterprise*”. “*That's why we're here, that's the one that pays the bills and everything else is driven by that. It's got the cashflow to pay for planting trees and doing everything else. If that's not working, then nothing else works. Even planting trees, you've got all the cost upfront, putting them in and the carbon credits are down the road, and then you've got to prune them. You*

*don't really get a lot back from it in the meantime. You're talking years before returns. In dairy, you put milk in the vat, you're paid that next month".*

W10 is considering planting more trees, with financial returns being a strong incentive. They want a tree that gives the “*fastest, quickest dollar back.... That's the driver. You don't want to be planting a hard wood and it be 40 or 60 years away. You want to chop them down as soon as they are mature. 20 years is long enough*” (W10M). For cash flow reasons “*you want some sort of cash flow in the short-term. That's where the subsidy is important. It's going to need to be enough to make you want to do it but not enough that you have got to pay a heap back*”.

#### 4.2.2.8 Succession

B6 is on an economically marginal property with a mix of forestry and sheep and beef which has both contributed to succession and has implications for succession. A succession plan will be implemented in 5 years' time when he is 60 with the current plan being that the farm will be sold. He will receive 60%, his sisters 40%. He also owns 60 year forestry rights for two rotations on 75 ha of the 92 ha of the trees on the property “*the forestry right, we set that up when we did the succession, which must have been 15 years ago*”. It had 60 years to run. The farm is marginal and “*that was our succession plan because there's no way I could have bought them out*”. The value of the forestry is insufficient to be able to pay his sisters out even if he harvested it: “*I still wouldn't be able to do that and then at 60, where does that leave me? No trees and a [marginal] property ... I'm quite happy to retire at 60 ... Dad, all he did was hang round here when he was elderly. He did his hobbies. I want to do more than that, go climb some mountains or something*”.

However, this succession plan is not definitive. “*My nephews and sisters' kids and grandkids, you know what it's like having a property to come to. They might say, 'Let's keep this bit through here down to the river'. ... it's not going to be a for sale sign straightaway, there's going to be a lot of discussion about it but I've been expecting it*”.

The trees on the farm complicate the sale and value of the farm for succession. “*I've realised I'm going to have to start cutting trees down. I'm thinking about when we sell it ... what trees have to be cut down because I don't want to devalue the price. I don't know how it's going to work. If someone sees the forestry right on the property thing, they go, 'It's worth less'. If they see I'm coming in every year with trucks, flattening everything and harvesting, they mightn't be happy, so I'm debating whether to cut all the trees down that are near harvest and then just leave the property completely, or just try and establish the relationship with someone who buys it and see if they mind [me] coming in and having logging trucks going through the property. They'll start charging me and I just don't want that stress*”.

#### 4.2.3 Farm Forestry Perceptions and View

Interviewees perceptions and views have been incorporated in the previous sections as they discussed their farm business activities and factors that influence these. Their views on tree planting and environmental issues that have not come through in previous sections are presented here.

##### 4.2.3.1 Tree Planting and Environmental Management Initiatives

B6 is pro-trees and has planted a relatively large part of his farm in trees and is getting good returns. He perceives a strong prejudice against tree planting by other farmers and farmer organisations. “*There’s always been a bias against it*”. “*People just dislike the pine trees with a passion. You go down and hear [local well-respected farmer] talking about it at the Collective meetings and he’s ‘They want the whole place planted in pine trees’*”. “*To overcome their prejudices, I don’t know how you deal with it. ... I think it’s just going to be time. You can tell. I don’t like telling the next door neighbours ‘I just cut that block of trees down and I got a cheque for \$60,000’. They don’t want to know that. I never tell anyone how good the trees have been. I just go on how s\*\*\* the price of wool is*”.

B6’s positive attitude toward trees can cause some conflict of interest for him with organisations he belongs to. “*I think it’s important to belong but it’s a bit of a conflict of interest because having all the trees, most of those Collectives are dairy farmers and they hate trees with a passion, whereas what they’re advocating for is against what I stand for with the trees*”. Similarly, with respect to Federated Farmers, he pays his subscription but does not agree with some of their views and actions e.g. local regional court case re nitrogen allocation, 50 shades of green. He listens to spokespeople from Te Uru Rākau and points out that “*when they do the math with the facts, there’s not actually a big chunk being cut but it is in one area, so the school’s going to close down. I feel sorry for that but ultimately, it’s probably going to happen anyway maybe. I don’t know. How are you supposed to feel about something like that?*”

B6 believes farmers are missing out on opportunities because of their attitude to trees on farm. “*None of them really want to do it. ... ‘We’re not planting bloody pine trees’. That’s still the same. That’s still runs through. It’s not like the school’s going to close down. It’s probably just an ignorance maybe. There’s two sides to everything. The school might close but then it’s a good opportunity for people*”. He questions “*Why do these people sell their farm in the first place? They’ve got offered huge money for it. They see it as an opportunity to get out of farming. Probably [other] people are a little bit selfish, I think, some of them, considering how much land it really is*”.

B9 is supportive of forestry and states “*my perception is Pinus radiata is still well ahead of anything else*”. In his view “*Some country that is really steep it’s beneficial to put into pines. For farming it does spread the risk a bit. Climate change wise it’s a good thing to harvest that carbon because a lot of it doesn’t go back into the atmosphere when it’s harvested, it goes into housing or whatever and stays out for a long time. And I think it also offers a different environment for bird species around the place. It’s not perfect and it’s not native, but at least birds can use it as a stepping-stone from one place to another*”.

He belongs to Federated Farmers and supports their work even though he rarely goes to meetings. He believes they have done a great job around the climate change, hopefully will have an effect on clean waterway legislation, but thinks they [government] have completely ignored the fact that there was not meant to be a drop in food production in the greenhouse gas policy. “*My view is most of the damage humans have done is habitat destruction. That’s why things like the idea of going to less intensive agriculture is a stupid idea because it just means more bush felled to feed the same amount*

*of people. So, what we need to do is intensify and manage that intensity, manage the nutrient loss, and put steeper country back into native bush. It seems like the logical thing to me and it helps with the carbon credits too. But they're all about de-intensifying because there is too much intensification".*

When asked about views on rural communities, B9 identified that it can be particularly devastating in places like the east coast where it might all go into pine trees. *"It will kill places like Tolaga Bay. There would be hardly any people living there".* However locally, this is more complex. *"It depends on the extent because it's all tied up with the freshwater thing. ... because of the two issues with the two estuaries down here, it's going to affect everything including forestry. Maketu and Little Waihi estuaries are 60% overloaded with N and 30% overloaded with phosphate so that's really going to affect the ability to be able to harvest because of the sediment. ... Just need to look at Matatā to see what happens when it goes wrong. There's a lot of work to be done around mitigating the logging effects on estuaries as well as farming too".*

B8 is a member of Federated Farmers. In his view they *"are fairly general in what they do". "Sometimes push things further than they want so they can settle in the middle". They're on the political scene all the time, so they've got to make a lot of noise and they probably stir up people too much"*. They have not influenced his views on trees: *"Obviously, if we were a 100% forestry then it probably would but ... It's only a small percentage of our business"*.

All his friends are doing some riparian or tree planting, *"a lot of guys [are] doing it without council [funding] because they're only doing little pieces and it's hardly worth the effort of trying to get the funding"*. B8 finds there are quite a few people who are disinterested in planting, or negative towards plantings as well. *"As far as riparian planting goes, there's a lot actually doing it, now that I think about it. People want to do the right thing"*.

The level of tree planting he does will have limited impact on the community. But generally speaking, he believes converting livestock production farms into trees is *"a huge negative ... it's going to affect communities big time. There'd be less people in those areas and less work"*. He observes that *"from what I understand, it's overseas companies buying those lands to offset what they're doing overseas, ... I just don't get that at all. How can someone pollute overseas, then buy land overseas [New Zealand] and plant trees on it and say they're being good? ... It should be kept for New Zealand as a whole. You're stopping a lot of farms being purchased. They're the cheaper farms, but then that's what younger New Zealanders or first-time farmers buy to get in there. You're going to take all those away, just can't compete"*.

W10M and W10F believe they *"have to have an open mind [about trees and forestry] ... because we don't have a flat farm. ... we have seen some pretty nasty stuff from river damage they [local mill] have done with waterways but we [dairy farmers] seem to be the ones that get hammered. I'd sooner see cows out there than trees. You can't milk a tree. We are going to ruin communities across New Zealand by putting trees everywhere. But there's areas in New Zealand where trees could go. Like the Hawkes Bay, a classic place to put them. Why should the Waikato basin be planting trees?"* When asked about media influence, they said it did not influence them, explaining *"you can't really trust anything that they say because they only tell you what they want you to hear. The problem is that it's unreliable ... [what] I'm saying is you need a trusted source like council to say here we want to plant a billion trees and here is a program"*.

B7 would like to see the One Billion Trees initiative focus more on establishing natives where the landowner does not benefit from an income: *"So if you weigh up the public-private benefit, the environmental, the biodiversity side of things, the government and the public need to contribute more to it and maintain it. ... just looking at the costs of maintaining my fences here, I think its 100% funding*

*as far as I'm concerned with natives". He is against whole farms going into pine trees: "I think you saw it in Taupō with the rules for the Taupō Lake where whole communities were cut off because whole farms were planted in pine trees and the same thing is going to happen with the billion tree program. Communities are going to be run down and people are going to be leaving ... I think it's a shocking idea". However, a more targeted approach, planting marginal land and leaving the rest in pasture is acceptable.*

#### 4.2.4 Farm Forestry Knowledge and Information

B6 has a good knowledge of forestry, sufficient for the forestry operation on his property, so he has not needed to access other resources much. When he was at Massey University he did a component on agro-forestry, but has found "*It doesn't really work. You just plant your trees and you've got a forest. There's nothing in between*". He has been a member of the Farm Forestry Association and used to go to field days about ten years ago but says "*We weren't learning a lot. Everyone had their ideas and we just got on with it really, or Dad got on with this. It was more his era*". He is a member of Federated Farmers but does not agree with their perspective and does not read their emails.

To seek information or advice he believes, "*you've just got to go and talk to someone that's doing it. There must be a few people around but I don't [know] who they are*". He selectively reads articles in the farming press. "*There's that [named farm forester] guy down Manawatu. ... I just glance at articles, but I actually read his. ... [named farm forester]*". He used to belong to a farmer discussion group which ended and is a non-active member of a Catchment Collective: "*I've just had enough. I really don't have a big discussion with other farmers now. I still keep abreast of stuff, like what's going on with the Collective. I read the e-mails all the time and see what they're up to.*"

*"If I wanted carbon things, I'd go to [named forestry company] because they do the carbon for [named New Zealand companies]. They do all the carbon trading for them". He identified websites as a possible source of information "*The Ministry of Forestry and MPI. All the ETS is done through the MPI website. That's where you start and then you move to the other one. Te Uru Rākau ... do they have their own website up and running?*" "*A place like [named forestry company] would be the best place to start if you wanted to do it [go into forestry]. Just go to one of those forestry management companies*". He suggests "*they probably need more field days but don't ask me to one or run one. I'm just not interested in that sort of thing*".*

If B7 needs information, he googles this, although he considers "*It's not that easy. It would probably be good if there is a place that I can go. It's a bit of trial and error I suppose*". However, he considers "*farmers are pretty practical people and you can get a handle of whether it is practical and if it will likely work or not*". He would like to see "*better guidelines around harvesting and the slash. Because basically the guys are under the pump ... they just go in and harvest the trees and leave. And I think there needs to be consideration of what happens after that*".

As far as trees are concerned, B8 has "*very limited knowledge, people [dairy farmers] don't really know*". As a dairy farmer, he points out "*our core business is milking cows, so that's what we're worried about*". Trees are not really a key major concern. Environment legislations concerns such as Plan Change 10 and ETS are taking priority in what dairy farmers are facing. "*Everyone's in a holding pattern really, waiting to see what happens, where it lands and what they have to do*".

B8's primary source of information on trees is other people, particularly "*my father-in-law's mate. He's got a forestry company ... so we've talked to him quite a bit*". A contact at the Regional Council has ideas and will find out information for him, particularly with respect to advice on riparian and

native plantings. Advisors are other possible sources and people who have done something similar. He considers the internet is not always a useful source as described previously in the pine seedling example where he could not find companies that sell these on the internet. B8 believes “*There’s probably not a lot of information out there really*”.

B9 also relies on the internet for information but does not consider it easy to find information on trees and related topics. “*Put the right search in. However, you don’t know what you don’t know. Around the ETS, I got the information but it wasn’t easy though, it wasn’t set out well. Farm forestry association had some calculators but they were quite complex. Downloadable spreadsheet with macros ... was a complete start to finish but it wasn’t what I was after. There was some information required that I didn’t have around log grading that I didn’t know enough about*”. He relies on others to calculate the grading side, percentages and values. When asked where they would find information on carbon credits and the ETS he identified MPI and an alternative site he saw 18 months ago which may have been One Billion Trees from the description “*it was someone paying you or some private scheme where they pay you and take the carbon credits*”. B9 observes “*It takes a lot of searching to muck around to find it, it’s not laid out simply ... That’s what we need, sit down, this is what you can do, here’s a calculator. That’s what farmers need, something simple and easy*”.

W10 identify the internet as where they would go for information but suggest it could be improved but is getting better. “*It’s got to be a trusted source. It can’t be a competitive or private organizations*”. Nevertheless, they identify a forestry consultancy firm as a trusted source: “*You want someone independent, so they’re not conflicted, like a farm consultants’ company. [Company name] have a crew but they also have scientists and they have people doing all stages of the job. They have done work for us in the past and been quite trustworthy. They are probably the only ones that would stand up now and I would give them a shot. But they are probably the only trustworthy company I could name. Anything that I have had to do with them has been solid*”.

Their views differed on the regional council which could reflect the roles of the people they deal with there. “*They are just the ones that have to tell us what we have to do. They have got no clue*” (W10F). “*At least there are no ratbags there. You have got to get solid information, a solid product that is for all New Zealanders*” (W10M). As dairy farmers W10 are looking for information on options from the regional council which could include trees. “*we are basically getting pressured to take the cows off slopes ... and not have soil erosion. So they need to provide some options. At the moment we get nothing from them at all. I know its early stages but why isn’t there some council input into it out on farm? Why aren’t we consulted or talking to them? There’s farmland that might be steep but it still has a return per hectare. Why aren’t they putting trees up and saying you could do as well or if not better and avoid all of this soil erosion. Do they really know that much? There’s probably not enough research been done but if you go another ten, or five years even, it should have been done by then. They should be able to put up those options for us. We own a lot of steep land that should be retired I reckon but we don’t hear anything from the council. Where is the subsidy to change the land use?*”. However, they were unsure as to how this information would be best provided but assert that farmers would be interested. “*If we have that knowledge and there’s more information available, we would soak it up. There’s going to be a push for more farmers to have more trees on their farms, so they are going to need to upskill on all that*”.

## 5 Phone Interview Results

### 5.1 Interviewee and Farm Business Description

Of the 50 phone interviews conducted, 16 were classified as dairy enterprises and 34 were classified as sheep and beef enterprises. Respondents who identified as owning dairy and dairy support land in combination were classified as dairy farmers, while respondents who only owned dairy support land were classified as sheep and beef farmers. In the single case where both dairy and sheep and beef operations were run within one farming enterprise, then they were classified as a dairy farm on the basis that the dairy operation was larger.

All 16 dairy enterprises were located in the Waikato and Bay of Plenty (BOP) region, while the 34 sheep and beef enterprises were split with 14 in the Waikato/BOP and 20 in the Rangitikei. It was considered that the sheep and beef enterprises in Waikato/BOP and Rangitikei were significantly different primarily due to contour, climatic and distance to market, and so for the purpose of this analysis were treated as two distinct groups.

The number of properties owned per farm enterprise was greatest for Waikato/BOP dairy and sheep and beef farmers with an average of two properties per farm business, although this ranged from one to six properties. Rangitikei sheep and beef farmers, on the other hand, owned an average of one property per farm enterprise with a range of one to five properties (Table 3).

Total farm enterprise area was in line with the number of properties owned with Waikato/BOP dairy and sheep and beef farmers owning the greatest average total area of 754 and 692 ha, respectively. Rangitikei sheep and beef farmers owned 641 ha on average. There was a wide range in the total farm enterprise area reported with the smallest area (57 ha) reported by a Waikato dairy support farmer and the largest area (2400 ha) reported by a Māori Trust in the Bay of Plenty.

Rangitikei sheep and beef farmers had the hardest contour land with an average of 72% of the effective farm enterprise area classified as hill country (easy hill to steep topography). In comparison, Waikato/BOP sheep and beef farmers and dairy farmers classified 38% and 13% of their effective area as easy hill to steep, respectively.

**Table 3:** Average farm enterprise details from Waikato/BOP and Rangitikei dairy and sheep and beef farmers. Numbers in brackets indicate the range in responses received.

	Waikato/BOP Dairy	Waikato/BOP Sheep & Beef	Rangitikei Sheep & Beef
Number of properties per farm business	2 (1-6)	2 (1-4)	1 (1-5)
Total farm enterprise area (ha)	692 (116-2400)	754 (57-2980)	641 (180-2000)
Effective farm enterprise area (ha)	495 (68-1553)	551 (20-2510)	573 (165-1700)
Hill country area (% of effective area)	13% (0-27%)	38% (6-68%)	72% (30-100%)

\*Waikato/BOP dairy n=16; Waikato/BOP sheep and beef n=14; Rangitikei sheep and beef n=20.

## 5.2 Current and Planned Farm Tree Plantings

### 5.2.1 Current timber plantings

Of the 50 landowners interviewed, 41 landowners stated they had timber trees on farm and owned a total of 1,912 ha of timber woodlot. The remaining nine respondents who did not have timber plantations were all in the Waikato/BOP. For dairy enterprises, 75% had planted timber trees and for sheep and beef enterprises in the region 64% had planted timber trees. The average woodlot size for these groups as a proportion of the total farm enterprise area was 5% and 17%, respectively (Table 4). A large 800 ha pine stand within this group contributed to the high average plantation area for the Waikato/BOP sheep and beef farmers. In comparison, 100% of Rangitikei sheep and beef farmers had timber stands on farm with the average woodlot area equating to 3% of the total farm enterprise.

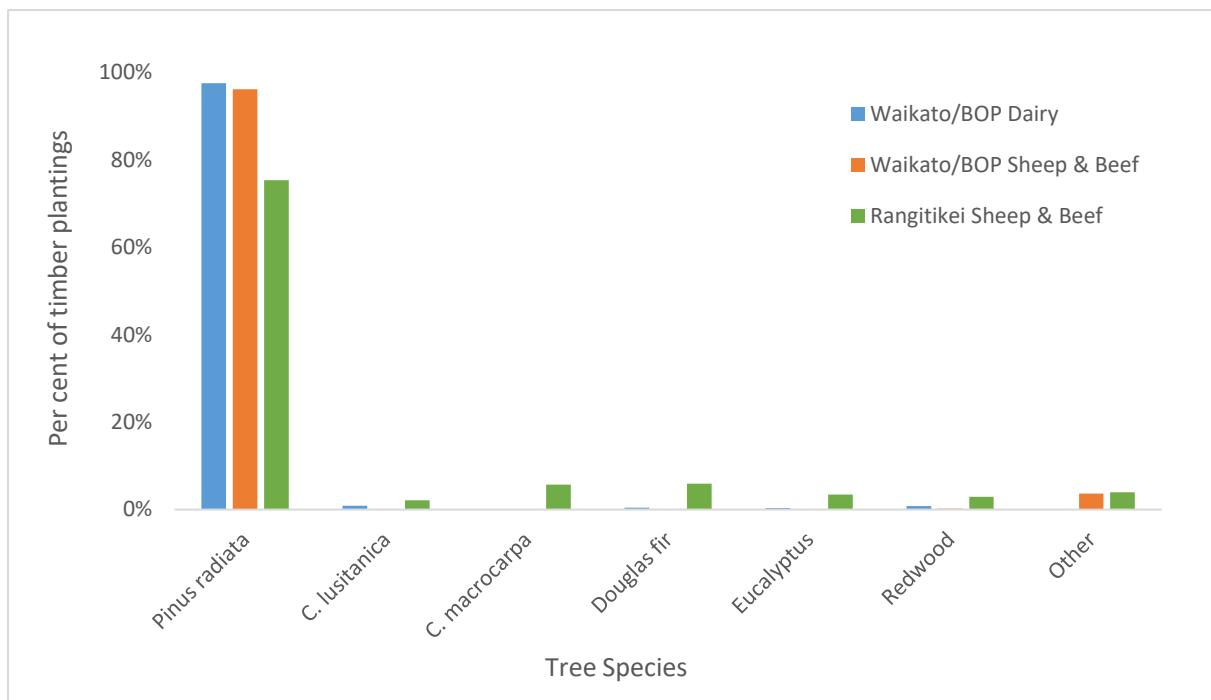
**Table 4:** Timber plantation areas on Waikato/BOP and Rangitikei dairy and sheep and beef farms.  
Numbers in brackets indicate range in responses received.

	Waikato/BOP Dairy	Waikato/BOP Sheep & Beef	Rangitikei Sheep & Beef
Per cent of enterprises with timber trees	75%	64%	100%
Mean stand size (% of farm enterprise)	5% (1-26%)	17% (1-60%)	3% (1-11%)
Mean stand size (ha)	38 (3-129)	120 (3-800)	19 (3-90)

\*Waikato/BOP dairy n=16; Waikato/BOP sheep and beef n=14; Rangitikei sheep and beef n=20. For mean stand size data  
Waikato/BOP dairy n=12; Waikato/BOP sheep and beef n=9; Rangitikei sheep and beef n=20

*Pinus radiata* was the most commonly planted tree species across all regions and farm enterprise types. On both Waikato/BOP dairy and sheep and beef farms, *P. radiata* was the major species accounting for 98% and 96% of all timber species planted, respectively. In Rangitikei, timber plantations were more varied with *P. radiata* contributing 75% to the total planted area. The remaining area was planted in *Pseudotsuga menziesii* (Douglas fir) (6%), *Cupressus macrocarpa* (6%), *Eucalyptus* (3%), *Sequoia sempervirens* (redwood) (3%), *Cupressus lusitanica* (2%) and other timber species (4%) including cedar, *Acacia* sp. and alternative cypress species (Figure 1).

Climatic conditions in the Rangitikei appears to be the main reason for the variety of timber species grown with farmers commenting: “[I] will plant 50 ha macrocarpa, lusitanica because of reasonably high altitude 400 – 600 m and also reasonably dry 800-1000 mm, so a matter of matching species to climate and soils - not keen to put radiata on hill country - low value commodity product that has a lot of tonnes and is expensive”, and “one of the reasons for planting quite a lot of redwoods is because of the concern of snow damage on pines. Redwoods are far more stable, less likely to blow over. Once you've felled pines, this can destabilise land because stumps rot fairly quickly”.



**Figure 1:** Timber species planted as a percent of the total for Waikato/BOP and Rangitikei dairy and sheep and beef enterprises

Landowners were also asked the age of timber plantations, whether any silviculture had been completed or was planned to be undertaken and whether or not trees had been registered in the Emissions Trading Scheme (ETS) (**Table 5**). Approximately half of farm enterprises had single age plantings and another half had mixed age plantings, regardless of region or farm enterprise type. However, when compared with enterprise area, enterprises with mixed age tree plantings tended to have a larger average effective area (700 ha) compared to those with only single age tree plantings (456 ha). This suggests that larger farms had a greater scope to reduce market risk by staggering planting dates and allowing trees to reach maturity at different times.

The majority of respondents stated that they had pruned all of the timber trees planted on farm, however there appeared to be a regional difference with an average of 77% of Waikato/Bay of Plenty farmers undertaking pruning on all timber trees compared to only 60% in the Rangitikei (**Table 5**). This may be a reflection of the larger variety of species planted in the Rangitikei as well as contour challenges which may limit the ability to complete silviculture work.

There was a wide variation in responses from landowners when asked whether they had registered trees in the Emissions Trading Scheme. In general, the majority of respondents had not entered into the ETS (47%) and a similar number of respondents had either entered only some of their timber plantations (24%) or all of their timber plantings (22%). Many of the farmers mentioned they did not understand the process and/or found the ETS too confusing and difficult. These factors restricted the registration of many woodlots that met the ETS requirements. Despite this, 63% of farmers who intended on planting trees in the future thought they would enter these in the ETS. However, having time to upskill and being able to understand the ETS will help determine whether many of these farmers implement this.

**Table 5:** Age class, silviculture completed or planned, and ETS registration for timber trees on Waikato/BOP and Rangitikei dairy and sheep and beef enterprises.

		Waikato/BOP Dairy	Waikato/BOP Sheep & Beef	Rangitikei Sheep & Beef
Age Class	Single	50%	44%	45%
	Mixed	50%	56%	55%
Silviculture	None	8%	11%	20%
	Partial	25%	0%	20%
ETS	All	67%	89%	60%
	None	42%	22%	55%
	Partial	25%	44%	20%
	All	33%	22%	15%
	Unsure	0%	11%	10%

\*Waikato/BOP dairy n=12; Waikato/BOP sheep and beef n=9; Rangitikei sheep and beef n=20.

Thirty-two of the participants interviewed had harvested trees from their property in the past, whether for timber or to bring down large, hazardous trees. The majority of respondents who had harvested trees, scored it as a positive experience particularly from the Waikato/BOP dairy enterprise group (Table 6) and this was attributed to the income received. An equal number of Waikato sheep and beef farmers that rated the experience as positive (44%) also described the harvesting process as negative (44%) due to low log prices and the mess left behind after harvest, while a number of Waikato/BOP dairy (22%) and Rangitikei sheep and beef farmers (31%) had a mixed opinion of the harvesting process. This was accompanied by comments that while the income generated was valued “*this came with significant negatives of damaging the farms infrastructure, contributing high contaminant loss to the environment, and leaving a mess behind*”. In other instances the mixed opinion was formed as a result of tree maturity being the reason for harvest with comments including, “*they needed to come out, trying to get them processed, sawn and used (on farm), I probably lost money out of all that and that's excluding my own time*”.

**Table 6:** Harvesting experience of Waikato/BOP and Rangitikei dairy and sheep and beef farmers.

	Waikato/BOP Dairy	Waikato/BOP Sheep & Beef	Rangitikei Sheep & Beef
Positive	67%	44%	46%
Mixed	11%	11%	31%
Negative	22%	44%	23%

\*Waikato/BOP dairy n=9; Waikato/BOP sheep and beef n=9; Rangitikei sheep and beef n=13.

## 5.2.2 Current non-timber environmental and native plantings

In addition to timber species, the majority of farm enterprises had planted or looked after non-timber plantings that were used to provide environmental (soil and water conservation, biodiversity, nutrient management) and/or farm enterprise (stock shade, shelter, fodder, added value) and aesthetic benefits. The per cent of enterprises with non-timber plantings was similar across groups ranging from 85% on Rangitikei sheep and beef enterprises to 93% on Waikato/BOP sheep and beef enterprises (Table 7).

The total areas of planting varied between the groups with only 7% of the farm enterprise area covered in non-timber plantings in Rangitikei compared to 11% on Waikato/BOP sheep and beef enterprises and 23% on Waikato/BOP dairy enterprises. A large 1000 ha area of existing natives on a Bay of Plenty dairy farm contributed to the higher average area for the group.

A number of Rangitikei sheep and beef farmers stated that they had numerous pockets of native bush scattered around their farms which they found difficult to quantify in terms of size and were not captured in the interview. Similarly, large areas of poplars were planted in the Rangitikei but many farmers were unable to estimate the size of these plantings. It is likely that these omissions will have caused the area of plantings in the Rangitikei to be underestimated.

**Table 7:** Areas of non-timber plantings on Waikato/BOP and Rangitikei dairy and sheep and beef farms. Numbers in brackets indicate the range in responses received.

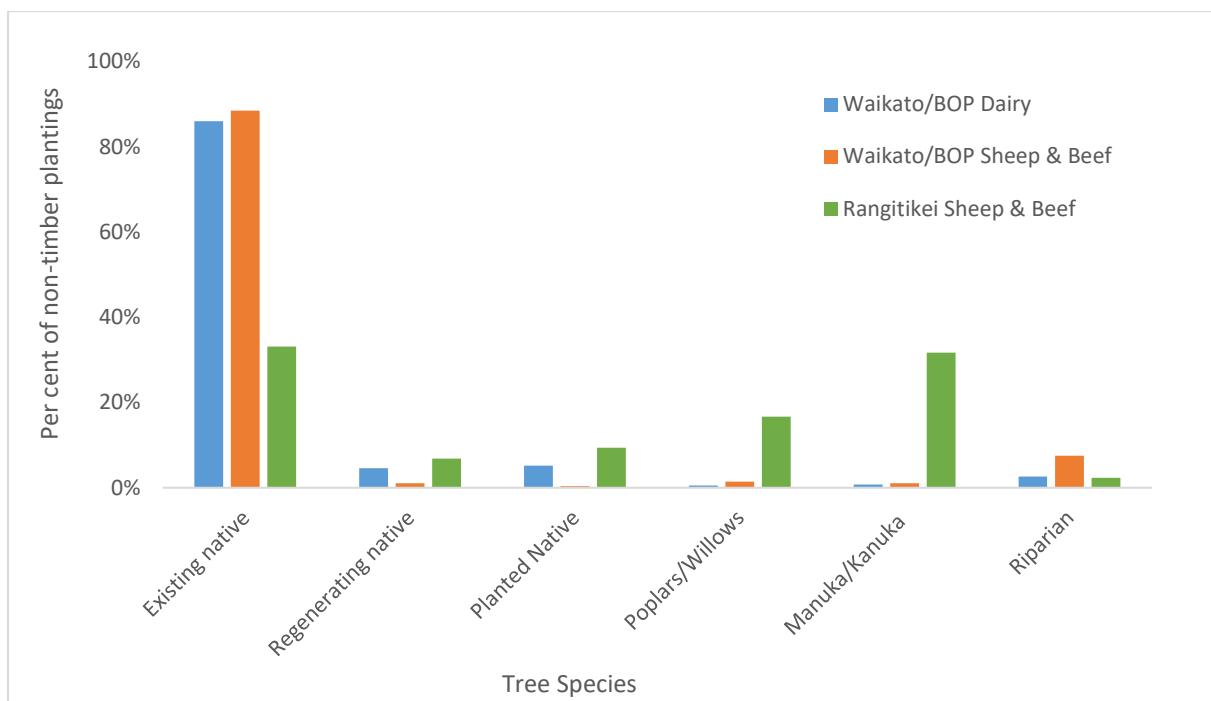
	Waikato/BOP Dairy	Waikato/BOP Sheep & Beef	Rangitikei Sheep & Beef
Per cent of enterprises with non-timber plantings	88%	93%	85%
Mean area (% of farm enterprise)	22% (0-64%)	15% (0-23%)	8% (0-24%)
Mean area (ha)	157 (1-1000)	114 (2-520)	46 (1-250)

\*Waikato/BOP dairy n=16; Waikato/BOP sheep and beef n=14; Rangitikei sheep and beef n=20. For mean area data Waikato/BOP dairy n=15; Waikato/BOP sheep and beef n=13; Rangitikei sheep and beef n=17

Existing mixed native species were the most common non-timber planting present on farm for all regions and enterprises, however there was large variation in this figure across the regions (**Figure 2**). In the Rangitikei, existing natives accounted for 33% of all non-timber plantings compared to 86% and 88% for Waikato/BOP dairy and Waikato/BOP sheep and beef enterprises, respectively. Other key plantings for the Rangitikei region were Manuka (33%), poplars (17%), planted natives (9%) and regenerating natives (7%). A single 200 ha Manuka planting on a Rangitikei property will have contributed to Manuka having a high average area on these enterprises. Only one other Rangitikei farmer had planted Manuka.

In comparison, riparian plantings were high in Waikato sheep and beef farms (8%), and planted (5%) and regenerating natives (5%) were also common on Waikato/Bay of Plenty dairy farms. It is likely that farmers may have miscategorised some of the native plantings on farm that were actually used for riparian areas as opposed to natives planted away from waterways.

When analysed by the percent of respondents who had planted non-timber species, existing native plantings remained the highest for Waikato/BOP dairy and sheep and beef farmers with 71% and 92% of respondents stating these were present on farm (Table 8). This was followed by riparian plantings for Waikato/BOP dairy farmers (43%) and poplars/willows for Waikato/BOP sheep and beef farmers (38%). In contrast, poplars/willows were the most common tree plantings on Rangitikei sheep and beef enterprises with 82% of respondents with trees stating they had planted the tree on farm. This was followed by existing native plantings with 71% of people confirming these were present on farm.



**Figure 2:** Non-timber plantings as a per cent of the total on Waikato/BOP and Rangitikei dairy and sheep and beef farms.

**Table 8:** Number of Waikato/BOP and Rangitikei dairy and sheep beef farmers with non-timber plantings on farm.

	Waikato/BOP Dairy	Waikato/BOP Sheep & Beef	Rangitikei Sheep & Beef
Existing native	71%	92%	71%
Regenerating native	21%	15%	24%
Planted native	36%	8%	29%
Poplars/willows	7%	38%	82%
Mānuka/Kānuka	14%	8%	12%
Riparian	43%	23%	29%

\*Waikato/BOP dairy n=14; Waikato/BOP sheep and beef n=13; Rangitikei sheep and beef n=17.

### 5.2.3 Future plantings

The majority (86%) of land owners plan to plant trees in the future. The decision driven by strong values regarding land stewardship for future generations and wanting to do what is good for the farm and environment. These values, well encapsulated by the concept of kaitiakitanga, were particularly important to Māori landowners. Participants were asked an open-ended question on the main objective for future plantings. Overall, environmental reasons received the highest number of responses followed by scenic beauty and riparian margin plantings. However, this varied across regions and groups.

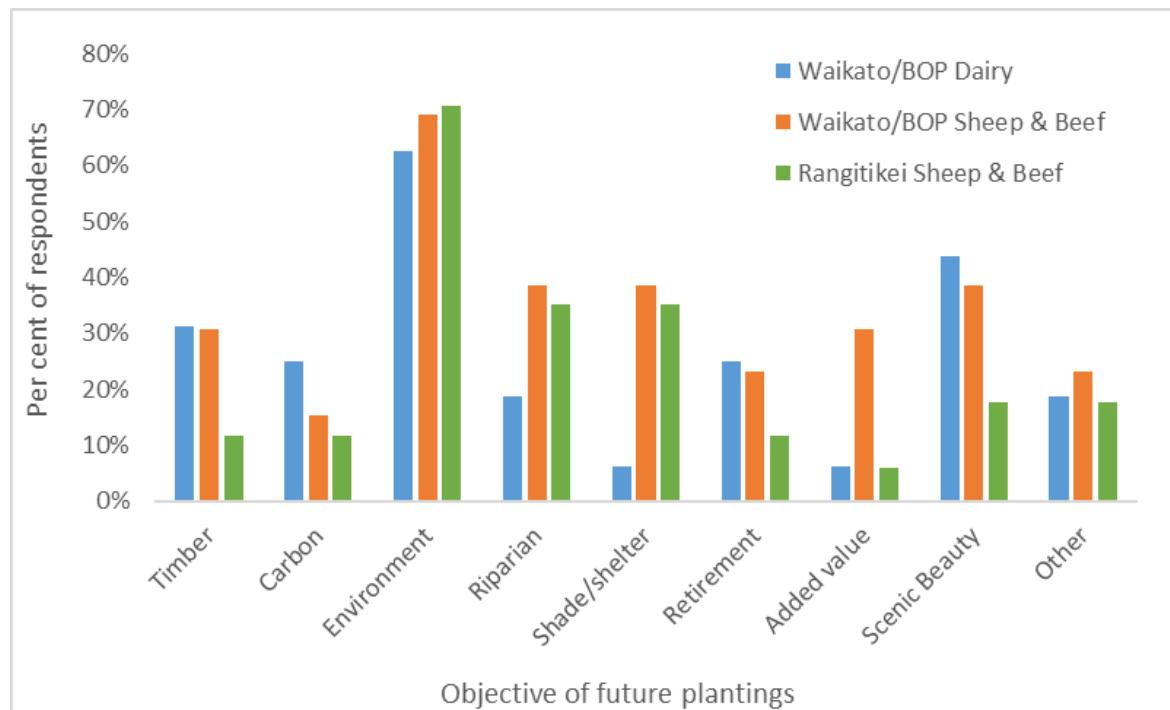
**Table 9: Intentions for future tree plantings on farm for Waikato/BOP and Rangitikei dairy and sheep and beef farmers.**

	Waikato/BOP Dairy	Waikato/BOP Sheep & Beef	Rangitikei Sheep & Beef
Intend to plant more trees in the future	87%	93%	80%
Unsure	13%	0%	5%
Do not intend to plant more trees	0%	7%	15%

For Waikato/BOP dairy enterprises, where all of the farmers interviewed either intended or were still considering future plantings, the environment remained the highest mentioned objective for planting future trees with 63% of participants identifying this as a reason (Figure 3). This was followed by scenic beauty (44%), timber income (31%), carbon revenue (25%) and retirement of marginal land (25%).

For Waikato/BOP sheep and beef enterprises, the environment (69%) was equally followed by shade and shelter for stock (38%), planting riparian margins (38%) and scenic beauty (38%). Added value trees (31%) and timber income (31%) were also commonly mentioned by farmers as key objectives for future tree plantings.

Similar to Waikato/BOP sheep and beef, Rangitikei sheep and beef enterprises also listed the environment (71%), shade and shelter for stock (35%) and planting riparian margins (35%) as the top three objectives for future plantings. Timber (12%) and carbon revenue (12%) were not mentioned as often by Rangitikei respondents compared to Waikato respondents.



**Figure 3: Objective for future tree plantings from Waikato/BOP and Rangitikei dairy and sheep and beef farmers that intended or were still unsure about future plantings (n=46)**

### 5.3 Farm Forestry Motivators and Barriers

In order to identify the reasons for non-adoption of tree plantings on farm, participants were asked to list any barriers they had when planting and incorporating trees on farm. The ten most commonly described factors are given in Table 10. Financial constraints were the most commonly stated barrier across all groups with 50% of farmers describing this as an impediment to planting. A lack of time and the maintenance involved with tree plantings was also a key adoption barrier for Waikato/BOP dairy farmers (38%) and Rangitikei sheep and beef farmers (37%). However, for Waikato/BOP sheep and beef farmers, the uncertainty around government policies and changing rules (29%) was considered a larger barrier than a lack of time (7%).

**Table 10:** Key barriers to planting trees on farm for Waikato/BOP and Rangitikei dairy and sheep and beef farmers.

	Waikato/BOP Dairy	Waikato/BOP Sheep & Beef	Rangitikei Sheep & Beef
Financial constraints	44%	50%	58%
Lack of time/maintenance involved	38%	7%	37%
Lack of/confusing information	25%	21%	26%
Uncertainty of policies and/or changing rules	13%	29%	16%
Profitable existing land use	6%	21%	5%
Uncertainty of returns	0%	7%	21%
Impact on land values/balance sheet	6%	14%	5%
Permanent loss of land to trees	6%	7%	11%
Environmental impacts from harvesting	0%	7%	11%
Long term returns	6%	7%	0%

\*Waikato/BOP dairy n=16; Waikato/BOP sheep and beef n=14; Rangitikei sheep and beef n=19. Mean responses per person  
Waikato/BOP dairy =1.4 responses; Waikato/BOP sheep and beef =1.7 responses; Rangitikei sheep and beef =1.9 responses.

In addition to these barriers, a number of comments from farmers also highlighted other issues they felt needed to be addressed in order for large areas of on-farm tree plantings to occur. For Rangitikei in particular, this included local infrastructure (i.e. roading) and the availability of skilled personnel for tending and harvesting. In addition, management of *Clematis vitalba* (Old man's beard) was a key issue that required resolving for many Rangitikei farmers before tree plantings could occur. On many farms, the invasive weed had already smothered and killed large numbers of major trees and as such farmers were reluctant to plant: "...won't plant any natives until it's under control". Across the regions and enterprises, risks including fire, disease due to lack of genetic diversity (especially in *P. radiata*), environmental impacts (e.g. harvesting mess, sediment and weed spread from forestry) and changing environmental legislation were all factors that impacted on the decision to plant trees on farm.

Along with adoption barriers, farmers were also asked an open-ended question on what factors motivated them to plant trees on farm. Despite financial constraints being the most common adoption barrier mentioned, grants and funding available was only mentioned by 7% and 10% of Waikato/BOP and Rangitikei sheep and beef farmers, respectively, and not mentioned at all by Waikato dairy farmers (Table 11). This may be as a result of the current funding available not being a major motivator either because they are unaware of the details for grants available, or do not believe the current funding options are suitable to be a strong motivator for planting.

In contrast, aesthetics was the most common motivating factor for Waikato/BOP dairy farmers, while environmental benefits were the most common for Waikato/BOP sheep and beef farmers. In the Rangitikei, sheep and beef farmers equally mentioned aesthetics and environmental benefits as the main motivators for planting trees on farm. Stock shade and shelter along with land utilisation also ranked highly across the groups. While timber and/or carbon returns were a common motivator for Waikato farmers, there were no Rangitikei sheep and beef farmers that mentioned this as being a key motivator for planting trees. Quite a few respondents also observed that they like trees, and this was a primary driver. *"Really enjoy trees, horticulturalist and forester by nature, like looking at them and really appreciate them, add to landscape. Can leave a legacy for next generation that is really meaningful. To own a big tree that is older than you - there is a sense of awe that goes with that kind of thing. Whole ecosystem".*

**Table 11:** Key motivators to planting trees on farm for Waikato/BOP and Rangitikei dairy and sheep and beef farmers.

	Waikato/BOP Dairy	Waikato/BOP Sheep & Beef	Rangitikei Sheep & Beef
Aesthetics	53%	21%	55%
Steep or poor-quality land utilisation	47%	7%	35%
Timber and/or carbon returns	33%	21%	0%
Environmental benefits	20%	43%	55%
Income diversification	14%	7%	15%
Stock shade & shelter	27%	14%	40%
Future generations & succession	14%	14%	15%
Offset carbon emissions	6%	29%	10%
Compliance/social licence to farm	20%	7%	5%
Grants and funding available	0%	7%	10%

\*Waikato/BOP dairy n=15; Waikato/BOP sheep and beef n=14; Rangitikei sheep and beef n=20. Mean responses per person  
Waikato/BOP dairy =2.3 responses; Waikato/BOP sheep and beef =1.7 responses; Rangitikei sheep and beef =2.4 responses.

#### 5.4 Farm Forestry Perceptions and Views

In general, farmers had a very positive view of farm tree plantings, believed trees were integral to good land stewardship, and valued the intrinsic environmental and aesthetic benefits of trees highly. Similar to a previous study of New Zealand forest owners by Rodenberg and Manley (2011), farmers were asked to score on a scale of 1 to 7 how important different factors were to them when planting trees on farm (Table 12). For Waikato/BOP dairy respondents, planting trees to keep for future generations scored highest out of all the ownership objectives with an average of 6.3. In contrast, environmental reasons (6.3) and scenic beauty (5.7) scored highest for Waikato/BOP and Rangitikei sheep and beef farmers, respectively. Income from carbon scored lowest amongst all three groups (2.8 – 4.6) followed by land investment (3.5 – 4.7).

Interestingly, the distribution in responses for income from carbon differed considerably between groups (Figure 4F). For instance, Waikato/BOP sheep and beef farmers were split in their responses with almost half (47%) scoring 1-3 and the remaining 53% scoring in the 5-7 range. In contrast,

Rangitikei sheep and beef farmers were heavily skewed with 80% scoring in the 1-3 range, while Waikato/BOP dairy farms were spread relatively evenly across the scale.

Income from timber also showed quite a variation in the distribution of responses (Figure 4A). Rangitikei sheep and beef farmers were spread across the entire scale but with a larger number scoring at the extremities with 35% scoring 1-2 and 40% scoring 6-7. In contrast, Waikato/BOP dairy farmers appeared to have a greater reliance on timber income from tree plantings with 88% scoring in the 5-7 range.

Analysis of environmental reasons showed that Waikato farmers placed a greater importance on the environment as an ownership objective with 88% and 100% of dairy and sheep and beef farmers, respectively, scoring in the 5-7 range (Figure 4B). Whereas only 60% of Rangitikei farmers scored environmental reasons in the 5-7 range. This variation may be due to the greater awareness of Waikato farmers, through current environmental rules and regulations, which have resulted in this group of respondents placing a greater importance on the environment compared to the Rangitikei.

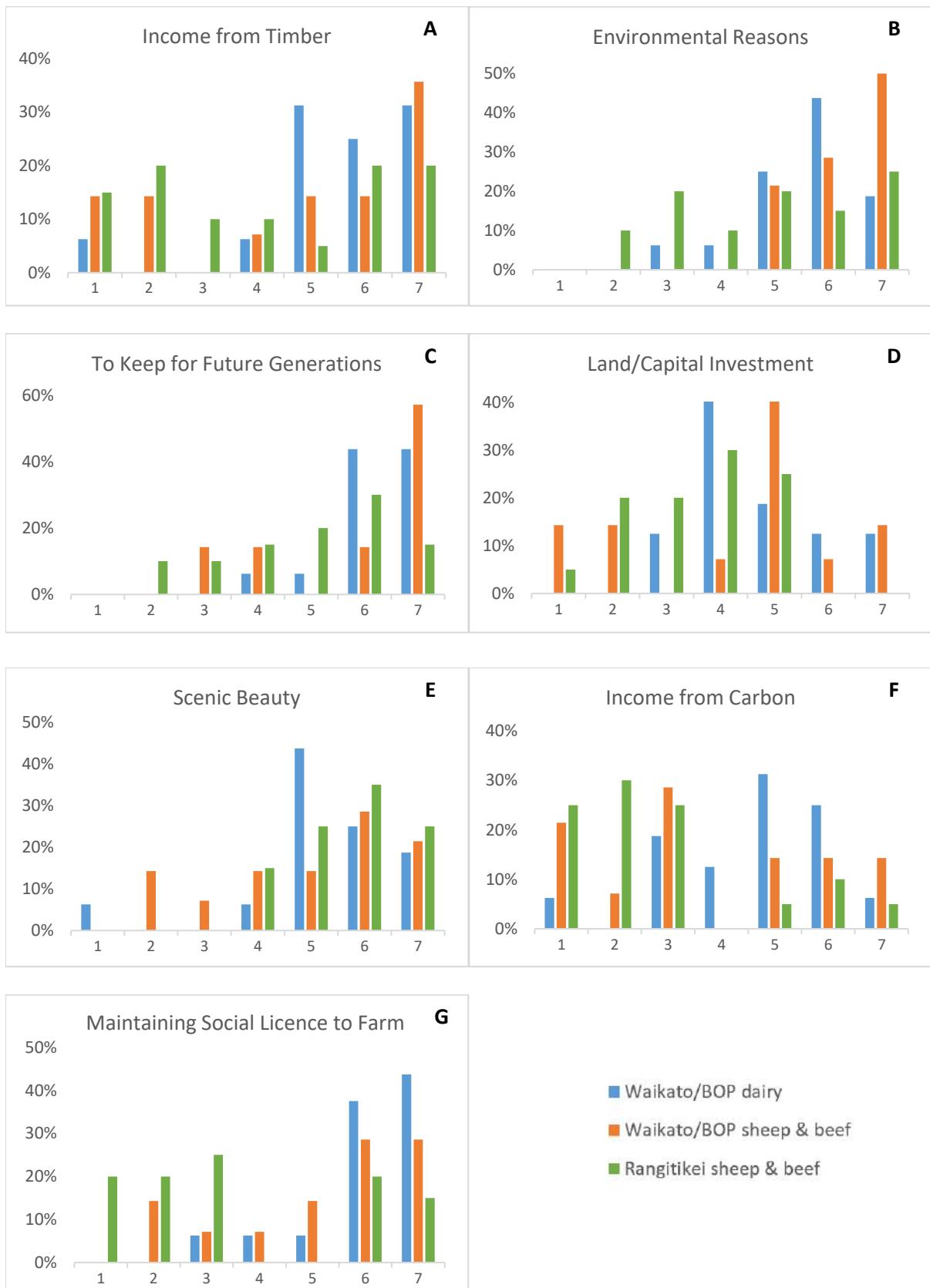
Responses to planting trees for future generations was heavily divided amongst Waikato/BOP sheep and beef farmers with 71% scoring 6-7 and 29% scoring 3-4. In comparison, Rangitikei sheep and beef farmers were fairly evenly spread across the scale (Figure 4C).

Overall, the responses to ownership objectives from trees highlighted farmer connection to the land, a multi-generational focus and an overall drive for land stewardship and that these areas were valued more highly than financial benefits.

**Table 12:** Ownership objectives of farm tree plantings on a scale of 1 -7 (1 = very unimportant; 7 = very important).

	Waikato/BOP Dairy	Waikato/BOP Sheep & Beef	Rangitikei Sheep & Beef
Income from timber	5.6	4.8	4.1
Environmental reasons	5.6	6.3	4.9
To keep for future generations	6.3	5.9	5.0
Land/capital investment	4.7	4.3	3.5
Scenic beauty	5.3	5.0	5.7
Income from carbon	4.6	3.8	2.8
Maintaining social licence to farm	6.1	5.2	3.6

\*Waikato/BOP dairy n=16; Waikato/BOP sheep and beef n=14; Rangitikei sheep and beef n=20.



**Figure 4:** Importance of income from timber (A), environmental reasons (B), to keep for future generations (C), scenic beauty (E), carbon income (F) and maintaining social licence to farm (G) for Waikato/Bay of Plenty and Rangitikei dairy and sheep and beef farmers when planting trees on farm on a scale of 1-7 (1 = very unimportant; 7 = very important).

To understand farmer perceptions of specific topics relating to farm forestry, participants were given a number of statements and asked for their agreeance on a Likert scale of 1 -7 (Table 13). Responses from these statements showed farmers had a neutral opinion of *P. radiata* with an average score of 4.2 when asked whether they thought it was the best tree crop for timber stands in New Zealand. Interestingly, Rangitikei sheep and beef farmers agreed the least with the statement scoring on average a 3.8 compared to 4.7 and 4.1 for Waikato/BOP dairy and Waikato/BOP sheep and beef farmers. This may reflect the challenges with growing radiata in the Rangitikei given the colder climate and topography.

A number of comments accompanied this statement including "*not necessarily the best, maybe best for pines, best for getting returns in short period whereas other trees you'd be adding another 15-20 years. Marketing is really easy with radiata because infrastructure is well developed.*" Another farmer commented "*a very good crop for growing a high tonnage and there is a very well developed market for it*" but this was countered by "*but it's a commodity product, it has relatively poor mechanical properties and very poor durability which makes it a rather inflexible wood product for a farmer. On the plus side, it will harvest an awful lot of carbon*". One farmer expressed concern that New Zealand could be at high risk of a disease incursion [affecting radiata pine], as has happened overseas, which could potentially leave New Zealand with a large ETS debt if forests die.

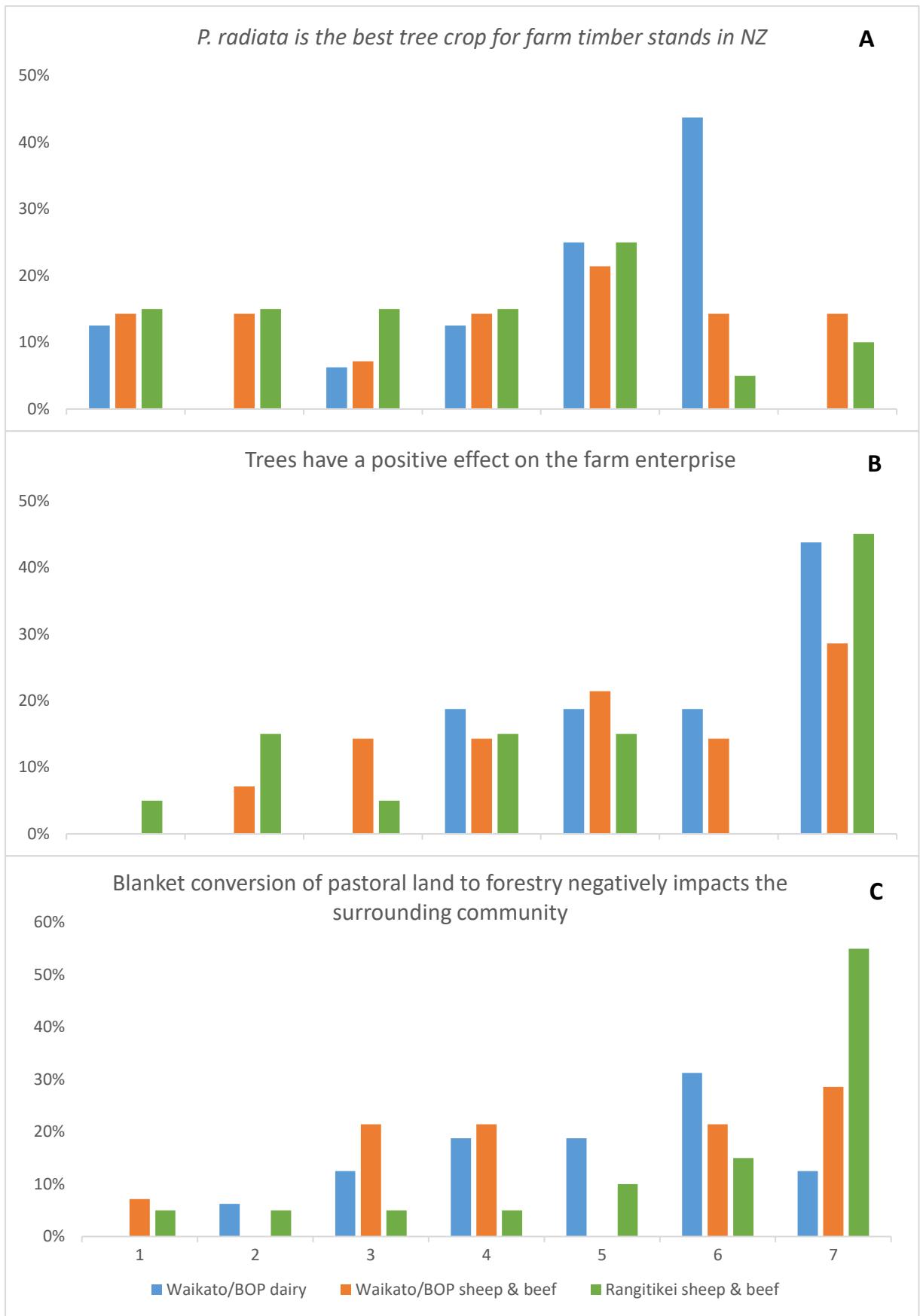
Overall, farmers agreed that having trees on farm has a positive impact on the farming enterprise with an average score of 5.3 out of 7.0. Waikato/BOP dairy farmers more strongly agreed with the statement with 100% scoring 4 or above compared to only 79% and 75% of Waikato/BOP and Rangitikei sheep and beef farmers, respectively (Figure 5B). Many farmers commented that there was a lot of cost involved with having trees on farms particularly shelterbelts which need regular maintenance, however, animal health benefits and the aesthetic value of the trees often outweighed these costs. This was accompanied by a farmer statement - "*it's not until you've witnessed the benefits of shelter for lambing ewes in really bad weather that you get it. Used to have intensive high stocking rate on flat land with shelter and without, pretty easy to see why some survived in one paddock and not the others*".

In terms of blanket conversion to forestry, the overall response was that farmers agreed it had a negative impact on the surrounding community with an average score of 5.2 out of 7.0. Rangitikei farmers in particular were most opposed to blanket conversion with 55% scoring a 7 compared to 13% and 29% of Waikato/BOP dairy and sheep and beef farmers, respectively (Figure 5C). The general view that came across from participant comments was that farmers were mostly supportive of small- scale plantings which improved land stewardship, management of the environment, and utilisation of less productive land. However, almost all were against wholesale farm conversions and their negative impact on the surrounding community. "*Fine for right tree in right place, I love trees but in the right place, not for blanket planting*". A Waikato/BOP farmer commented "*I'm concerned about the amount of established farms that are being put into trees for carbon. We are pleased to do our bit with planting trees and establishing wetlands. Recent carbon plantings don't do a lot for the community or add a lot to silviculture and employment. You need to remember when you leave the town boundary every 100 hectares [figuratively speaking] there's a family business and it's all in private ownerships, and private ownership spills into owners of the communities which doesn't happen with the large forestry outfits*".

**Table 13:** Farmer perceptions of *P. radiata*, trees within the farm enterprise and blanket conversion of farmland to trees on a scale of 1 - 7 (1 = strongly disagree; 7 = strongly agree).

	Waikato/BOP Dairy	Waikato /BOP Sheep & Beef	Rangitikei Sheep & Beef
Radiata is the best tree crop for farm timber stands in NZ	4.7	4.1	3.8
Trees have a positive effect on the farm enterprise	5.8	5.1	5.0
Blanket conversion of pastoral land to forestry negatively impacts surrounding community	4.9	4.9	5.8

\*Waikato/BOP dairy n=16; Waikato/BOP sheep and beef n=14; Rangitikei sheep and beef n=20.



**Figure 5:** Farmer perceptions of farm forestry topics (A-C) on a scale of 1-7 (1 = strongly disagree; 7 = strongly agree).

Participants were also asked to state whether they had a positive, negative or neutral view of farm timber stands on the environment. The majority (70%) of respondents viewed trees as having a positive impact on the farm system and environment (Table 14) and believed that “*trees are an integral part of land use and land care*”. A Rangitikei sheep and beef farmer mentioned they were highly offended that “*there’s this assumption that we don’t care. Only reason so much native bush is because my father cared and he put a lot of money into looking after it. Not something we’ve asked any kind of recognition for and certainly no funding, historically*”.

Farmers were also asked of their opinion on the Emissions Trading Scheme. Waikato/BOP and Rangitikei sheep and beef farmers had mostly negative viewpoints of the ETS with 50% and 75% of participants, respectively, rating their opinion of the ETS as negative. In contrast, only 13% of Waikato/BOP dairy farmers had a negative opinion with the majority having a neutral viewpoint (63%). A lot of farmers felt they didn’t understand the ETS, how it worked, how it was managed, the fairness of the scheme, how well it had been thought out in terms of impact, and the way it keeps changing which drove some of the negativity that was captured in the interviews. This is supported by one farmer comment: “*don’t understand it, why do they [Government] keep changing it, they need to understand what are the problems and what are the objectives then come up with a strategy, they’re just rushing from one thing to the other.*” However other reasons for the negative viewpoint were also given by farmers including; “*I think it’s [the ETS] creating perverse behaviour. The ETS has effectively been put into place to create change but the change in behaviour needed is that of the emitters but what the ETS is effectively doing is allowing them to keep emitting and buy their way out of jail. So currently the carbon price is not high enough to create behaviour change which makes it very easy for people to put off the bad day. With the way our investment, especially offshore investment, is structured for tree planting we run the risk of the value of captured carbon being accrued overseas and not being captured in New Zealand*”.

Furthermore farmers were disappointed that small plantings were not recognised by the ETS for carbon credits, and recognition for these plantings would be appreciated: “[I] would like to see each individual tree to be accounted for in the ETS, we should have the technology and they all offset carbon. Negative perception of ETS comes from not being able to claim lots of the small woodlots that are on the farm and methane not being able to be offset. And [the ETS] is very confusing so each time you look at it you get confused.”

**Table 14:** Farmer viewpoints on the Emissions Trading Scheme (ETS) and impact of farm woodlots on the environment.

		Waikato/BOP Dairy	Waikato/BOP Sheep & Beef	Rangitikei Sheep & Beef
Impact of farm timber woodlots on the environment	Positive	88%	64%	60%
	Neutral	13%	29%	30%
	Negative	0%	7%	10%
Opinion of ETS	Positive	25%	29%	10%
	Neutral	63%	21%	15%
	Negative	13%	50%	75%

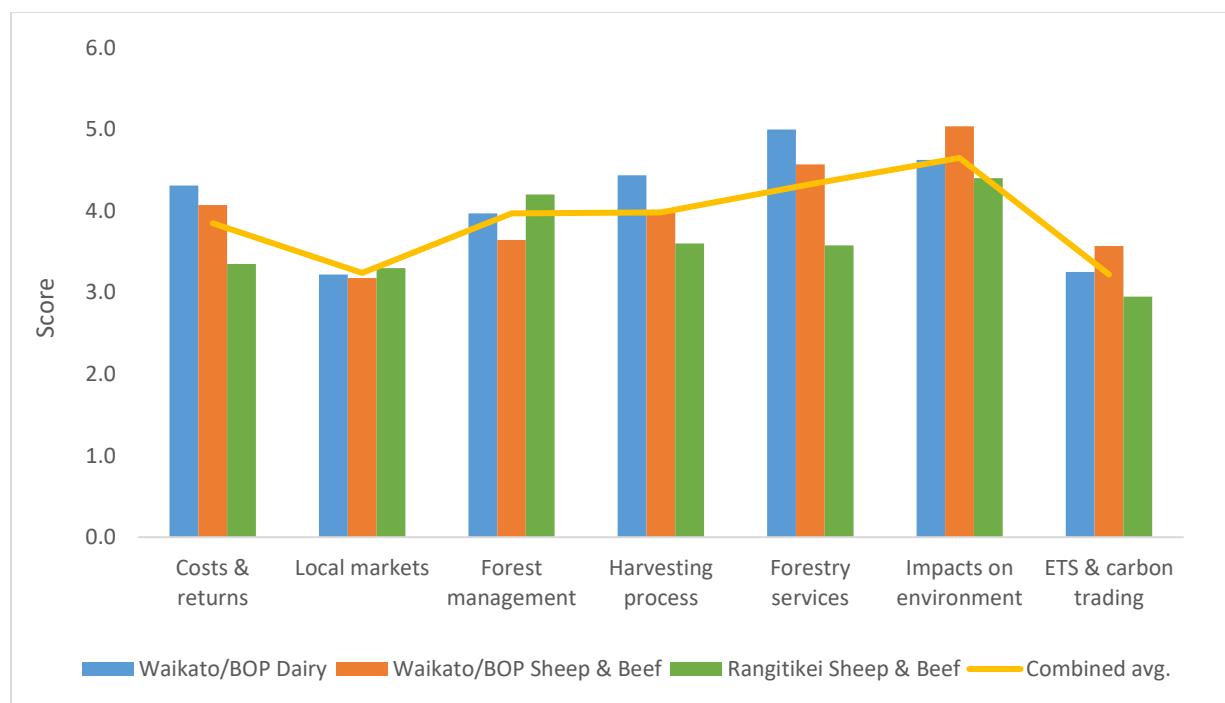
\*Waikato/BOP dairy n=16; Waikato/BOP sheep and beef n=14; Rangitikei sheep and beef n=20.

Many of the farmers interviewed wanted to express their opinion on the One Billion Tree's "right tree, right place, right purpose" initiative. Overall, farmers were supportive of the "right tree, right place" idea but some did not consider it was necessarily being implemented well. *"Exotic forestry on steep hill country is not the right answer, they need permanent non-harvested trees on them. Policy at the moment [is] not necessarily benefiting planting the right tree in the right place". "Still need our communities and towns. Mass plantings is not the answer. It's a combination. Retiring the steeper less productive ground and fencing off waterways is a good thing". "If we plant non-native woodlots they negatively change the landscape of the environment". "Right tree, right place, right time, for right reason - not planting because it's a fad. A lot of farmland [is] ideally suited to stock farming and that shouldn't change. And [the] timber market is a very long chase".*

## 5.5 Farm Forestry Knowledge and Information

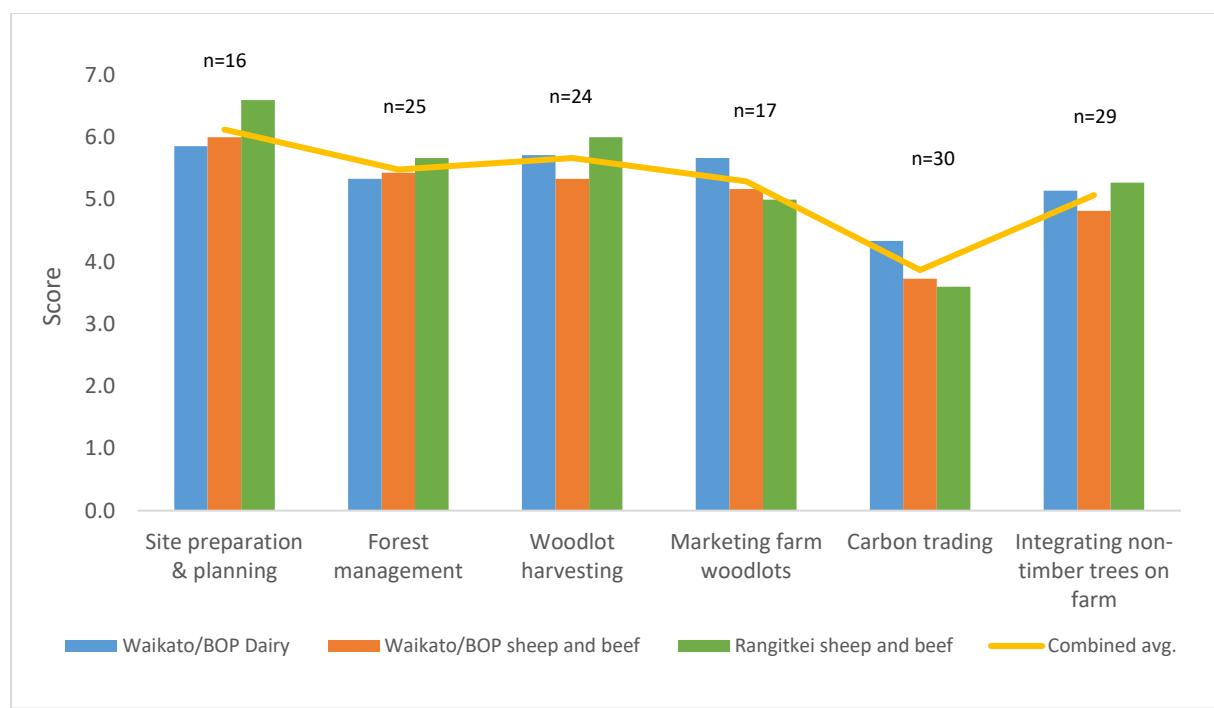
Participants were asked to score their knowledge on a Likert scale of 1-7 for a range of farm woodlot topics. Local markets for wood products and the ETS requirements and carbon trading consistently scored the lowest in terms of farmer knowledge with a combined average across all groups of 3.2 for each (Figure 6). The impact of farm woodlots on the environment scored the highest for both Waikato and Rangitikei sheep and beef farmers with a score of 5.0 and 4.4, respectively. Waikato dairy farmers, on the other hand, scored highest for forestry services available with an average of 5.0.

In general, Rangitikei sheep and beef farmers considered they had the lowest understanding of the supplied woodlot topics self-scoring the lowest for all categories, with the exception of forest management and local markets. Farmers that had harvested trees in the past rated their knowledge of forestry topics marginally higher than those who had not at an average of 4.1 compared to 3.5.



**Figure 6:** Farmer knowledge and understanding of farm forestry topics on a 1-7 scale (1 = very poor; 7 = very good).

Participants were given a list of topics relating to farm forestry and trees on farm and asked whether they had attempted to find information for each of them in the past year. If so, they were then asked to score on a Likert scale from 1-7 how easy it was to find that information, with the scores only based on responses by people who looked for each topic. In general, all topics scored very similar at approximately 5.5 with the exception of carbon trading. For all regions and farm enterprise types, carbon trading consistently scored lowest with a combined average of 3.9 (Figure 7). The total number of participants which looked for each information source is also included in Figure 7. This was accompanied by farmer comments stating that the information relating to carbon trading was difficult to understand and hard to find good concise information. Site preparation and planning, on the other hand, scored highest for ease of understanding across all three groups. Some farmers also noted that while much of the information can be found easily, evaluating options can be challenging: “*finding information, [it] depends what type of depth, if you're trying to put numbers on or evaluate options it gets a bit harder*”. “[The] difficulty with information is there is a lot of data out there, but how do we evaluate it given we have very intermittent involvement with economic decisions in that area. Once in 30 years [decision]. Although information is out there, how useful is it in day to day situations ... so how to make good decisions around all that is the part I find challenging”.



**Figure 7: Ease of finding farm forestry information as scored by farmers on a 1-7 scale (1 = very easy; 7 = very difficult).**

\*Number of participants that provided at least one response Waikato/BOP dairy n=15; Waikato/BOP sheep and beef n=13; Rangitikei sheep and beef n=17.

Websites and advisors were the most commonly used information source by respondents in the interview, however when asked what their preferred information channel was, 70% said advisors compared to only 28% who said websites and 21% who said other farmers. The New Zealand Farm Forestry Association (NZFFA) and NZFFA members were often mentioned as a trusted information source by farmers. Farmers valued face-to-face information although some were not confident that they were getting advice that best met their needs from advisors, who they considered could be conflicted. Some farmers who used the internet as an information source noted that they found the One Billion Trees website difficult to navigate and source information from.

Respondents noted that information was less available for less common species compared to radiata  
*“... for uncommon tree types such as eucalypts - boutique information ... need to know who to talk to. Often forestry consultants can't be bothered. But there are very good boutique processors ... will pay good money for them if you know who to go to”.*

All participants were aware of funding available for planting trees on farm with the exception of one Bay of Plenty sheep and beef farmer. Seventy per cent of respondents were able to name the One Billion Trees funding programme, and 80% were aware of local council funding (Table 15). Sixteen per cent also listed other funding including from the Waikato River Authority, Trees that Count and QEII grants. Overall, Waikato/BOP sheep and beef farmers seemed to be more aware of funding than any other group with consistently more participants able to list funding providers and programmes. Despite the fact that most farmers were aware of the One Billion Trees Fund and local regional council funding, the understanding of specific details or sometimes even knowing where to go to get further information, particularly for One Billion Trees funding, was very limited.

**Table 15:** Respondents aware of funding programmes and providers for planting trees on farm.

	<b>Waikato/BOP Dairy</b>	<b>Waikato/BOP Sheep &amp; Beef</b>	<b>Rangitikei Sheep &amp; Beef</b>
One Billion Trees	69%	92%	55%
Other government	6%	15%	15%
Local council	75%	92%	75%
Other	13%	38%	5%

\*Waikato/BOP dairy n=16; Waikato/BOP sheep and beef n=14; Rangitikei sheep and beef n=20.

## 6 Discussion

Information gathered in this stage of the project will inform planning for the case studies in the next stage of this project. That is, understanding prevailing farm forestry practices, the reasons for these choices (barriers, opportunities and preferences), farmer views based on perceptions and experiences which need to be considered, and areas where knowledge and access to information are limited will help determine the range of appropriate tree enterprises to model, performance indicators to report on and knowledge gaps to address. Regional and enterprise diversity of the case farms will ensure a wide range of farmers will be able to relate directly to reports for these properties. Policy makers and researchers will also be able to draw on the findings.

The survey revealed distinct differences between regions in tree species and their purposes, drivers for planting trees, and farmer perceptions and knowledge. Some of these differences are associated with the natural, business and regulatory environment the farms operate within. This means a mix of generic and district/regional advice needs to be made available to farmers rather than a ‘one size fits all’ approach.

Farmers in regions with a well-established forest industry were less concerned about harvesting of logs and markets for logs than regions where forestry infrastructure and services were less developed. In particular, farmers in the BOP were relatively easily able to access the contractors and advice for the harvest, process and export of pine logs and timber. Waikato/BOP harvesting and transport costs relative to Rangitikei are considerably lower and returns from *P. radiata* relatively high. Regulatory controls for nutrient and sediment management into waterways are more demanding in the Waikato and BOP than in the Rangitikei and influence the choice and role of trees. Fewer farmers had given consideration to alternative timber species in the Waikato/BOP than the Rangitikei region. As well, radiata pine is a comparatively fast-growing species meaning some of the farmers were able to complete a number of rotations within their lifetime and receive the returns; and thereby build their experience in forestry.

The Waikato/BOP dairy farmers interviewed face to face were selected because they had land that was not ideal for the dairy operation but was suitable for forestry. Care needs to be exercised therefore in extrapolating their circumstances to dairy farmers who have fewer options to change land use. For them, the option to syndicate with other farmers/investors or buy land suitable for forestry will likely be more relevant case exemplars to learn from.

The Rangitikei region is higher in altitude, and climatically colder and drier than the Waikato/BOP region; and dominated by sheep and beef cattle hill country properties (Table 3). Winter snow, with significant falls every few years, is sufficient to damage young radiata pines with soft leaders. Frosts occur about nine months of the year but can occur out of season as well. Consequently, a wide range of timber tree species is grown in the Rangitikei with Douglas fir, macrocarpa and eucalypts being grown. These are all slower growing species than radiata pine and this means those who plant these trees often do not harvest them. However, it is common in Rangitikei for farms to be multi-generational with an expectation of the next generation being on the farm to harvest (all five face-to-face interviews were with family businesses who had settled three to four generations previously). The Taihape hill country farmers commented on the low returns they had received from timber trees (mainly from radiata pine) with limited infrastructure and long distance to port increasing harvesting and transport costs. Despite this, the phone survey results (Figure 1) indicated that radiata is still the predominant timber crop in Rangitikei. The two experienced agro-foresters interviewed had both grown pine and experienced some snow damage: one had grown a lower GF species to slow growth

to reduce snow damage potential. Both commented on local farmers who had planted radiata and had had considerable damage, or who were likely to, given where they planted. They questioned whether people were getting the right advice, how well-informed advisors were with respect to regional limitations, or whether people even sought advice or just planted radiata because it is the species primarily promoted. They suggested local growers are best placed to provide the knowledge on species suited to the region and it would be beneficial to capture this knowledge and ensure it is readily available. In terms of regulation, this area is not a sensitive catchment although the regional council (Horizons) is active in the region and is working with farmers to help with farm environmental plans and offer incentives for tree planting.

Most farms had timber and non-timber plantings (Table 4 and Table 7, phone survey results), although non-timber plantings are less well-captured because they are spatially rather block planted. For example, trees tend to be planted across the landscape for erosion control (poplar in particular), shade and shelter, and small blocks of natives can be scattered across the farm.

The majority of timber trees were pruned (Table 5), despite their being some suggestion that non-pruned regimes are now being promoted. All those interviewed in person pruned their timber trees. Pruning ages for species may have affected results: pruning can be later for some alternative species which were more predominant in the Rangitikei. Less than half of all interviewees had registered their trees in the ETS for a variety of reasons that will be expanded on later.

## 6.1 Reasons for planting trees

Reasons for deciding whether to plant trees are diverse and collated below. These reasons and their relative importance differed between regions and interview types<sup>1</sup>.

Factors influencing the decision as to whether to plant trees

- Timber income or use (e.g. farm buildings, firewood) for current or future generations
- Retiring steep, rough, erosion-prone or catchment areas of the farm
- Environmental concerns e.g. erosion control, riparian and water quality, regeneration of natives in landscape, biodiversity and habitat creation
- Land stewardship and kaitiakitanga (from phone interviews but implicit in face to face interviews)
- Shade and shelter e.g. animal welfare reasons, shelter after shearing
- Potential to offset carbon, or nitrogen (particularly Bay of Plenty and Waikato) or to get income from carbon or nitrogen
- Need to replant if carbon credits received i.e. lock in land use
- Personal preference i.e. like trees on the farm, appreciates trees, not interested in trees
- Economic comparability with alternative enterprises, including timing of costs and returns
- Cost (administrative and operational)
- Financial support available e.g. Council and Government planting incentives
- Potential market for timber trees if applicable
- Market uncertainty, especially harvesting of small tree blocks and markets for non-radiata species

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<sup>1</sup> The data quantitative results in Section 5 also present data that provide similar insights into: the key objectives for future planting intent (Figure 3, Question 13), the importance of specified factors in planting trees (Table 12 and Figure 4, Question 22), and barriers and motivators to planting trees on farm (Table 10 and 11, based on coded data from open-ended Questions 30 and 31). Some similarity between groups in the answers to some of these questions might be expected

- Harvestability of timber e.g. small blocks, farm tracks and accessibility
- Local infrastructure e.g. suitability of roads for forestry trucks, local mills
- Government legislation and regulation expectations e.g. carbon and environment
- Uncertainty of future government legislation and regulation
- Background and previous experience e.g. from properties with intergenerational tree plantings
- Personal knowledge
- Advice available to support the decision and quality of advice provided
- Availability of understandable, relevant and accessible information
- Encouragement by local authorities e.g. catchment board, regional councils re poplar, riparian
- Succession, long term perspective of farm business planning and future generations
- Retirement planning
- Time available i.e. own, staff or contractors for sourcing information, carbon registration, tree planting and ongoing maintenance, harvesting and clean up
- Labour available i.e. personal, farm staff, casual, contractors
- Diversification opportunities
- Public perception / pressure, social licence to operate (from phone interviews)

Economic reasons, such as timber and carbon income, (Figure 3, Table 11, Table 12, Figure 4) were less important as objectives and motivators for tree planting than non-economic drivers, such as environmental protection, riparian planting and shade/shelter. Rangitikei farmers, in particular, rated financial motivators and objectives low (Figure 3 and Figure 4), particularly carbon (Table 11) where no one (0%) identified this as a motivator in Rangitikei compared to 33% and 21% for dairy, and sheep and beef cattle farmers, respectively in the Waikato/ Bay of Plenty. Waikato/ Bay of Plenty dairy farmers ranked economic reasons highest (Figure 3, Table 11, Table 12and Figure 4): 33% identified timber and carbon returns as a key motivator in open questioning compared to 21% for Waikato/Bay of Plenty and 0% for Rangitikei sheep and beef farmers (Table 11).

Neither were grants and funding a strong motivator for establishing trees (Table 11) even though this is at odds to the financial constraint many of them identified to tree planting. Uncertainty of returns was a barrier to planting trees for 20% of Rangitikei phone interviewees (Table 10) but of low importance to Waikato/ Bay of Plenty farmers. This aligns with face to face interviews where the ability to harvest small lots when they wanted, high harvest costs and uncertain markets and returns, especially for alternative species, was a concern. The Rangitikei farmers interviewed face-to face all suggested forestry returns were lower than those for sheep and beef cattle, particularly at the moment so there was no economic incentive to plant trees.

Non-economic reasons such as environmental and riparian reasons (e.g. water quality) were important to all groups. Shade and shelter rated highly in Rangitikei which could be expected given the harsher winter climate. This also rated high as an objective for Waikato/BOP farmers (Figure 3) and was an important motivator for 27% of dairy farmers (Table 10). Aesthetics/scenic beauty was top equal motivator for planting in Rangitikei (Table 11, Table 12) although scenic beauty scored lower as a planting objective *per se* (Figure 3) suggesting aesthetics is more likely to influence species choice than planting choice. This aligns with the face to face comments that some farmers selected species simply because they liked them. Aesthetics and scenic beauty were among the top three motivators for Waikato/Bay of Plenty farmers.

Utilisation of poor-quality land rated relatively highly as a motivator for planting by Rangitikei farmers and dairy farmers (35% and 47%, respectively, Table 11) but not Waikato/BOP sheep and beef cattle farmers (7%). Face to face interviews suggest dairy farmers are using forestry to retire steeper land

not suited to their primary dairy operation which can be risky to livestock, harder to manage, create health and safety issues, and prone to erosion. Overall, the Rangitikei farmers have steeper land and use trees to retire erosion prone and poorer-performing faces. Profitable existing land use was a barrier to planting for 29% of Waikato sheep and beef farmers raised (Table 10) but only 6% of dairy farmers (6%) and 5% of Rangitikei farmers. Again, the latter two groups are considering trees for areas they would not use for their primary enterprise, or they are planting shade, shelter and erosion trees on areas grazed by their primary enterprise, so the farm and forestry business work together.

While comparatively low ranking, compliance and social licence to farm was a higher motivator for dairy farmers (19%) compared to sheep and beef cattle farmers (7% and 5% for Waikato/BOP and Rangitikei, respectively). However, as an ownership objective, maintaining social licence to farm on its own was of high to moderate importance to Waikato/BOP farmers (Table 12) but low for Rangitikei farmers (score of 3.6. out of 7 (Table 12)). However, uncertainty of policies and changing rules was rated by 29% of Waikato/ Bay of Plenty sheep and beef cattle farmers as being an important barrier but only 13% and 15% for dairy and Rangitikei farmers, respectively (Table 10)..

Waikato/BOP farmers were more likely to plant trees for as a source of income for retirement, whereas this was rated relatively low in Rangitikei (Figure 3).

The largest barriers to tree planting were financial constraints, lack of time and maintenance involved, and lack of or confusing information (Table 10). With one exception, these were all in the top three barriers to planting trees. The exception was lack of time which was not a barrier for most Waikato/BOP sheep and beef cattle farmers (only 7% raised this as a barrier).

## 6.2 Factors influencing choice of tree species

Factors affecting the choice of tree species or species mix for planting or regeneration included:

- End use e.g. timber, riparian, land retirement, regeneration, erosion control
- Markets, processing and port facilities available for timber species
- Multiple-use e.g. R2 wants timber and shade, shelter or carbon benefits
- Suitability e.g. R3 and R1F consider pines unsuited for climatic and economic reasons, Douglas fir better suited to the area, Old poplar hybrids unsuited.
- Tree performance and genetics e.g. R3 wants species provenance, R5 used older pine variety
- Likely success of tree plantings e.g. Old man's beard killing natives in Rangitikei.
- Personal preferences e.g. R1M and R4 dislike pines, R4 likes macrocarpa, R2 prefers natives and natural landscape trees, R1M has little interest in trees
- Aesthetics e.g.R5, also linked to personal preference
- Alignment with natural environment historically e.g. mentioned by R2, R3, R5. R1F
- Integration with farming enterprises e.g. shade and shelter, impact on stock movement, trees for bees including natural landscape trees e.g. R2
- Timing of harvest for timber species (tree maturity time) e.g. self or intergenerational perspective
- Economic comparability, costs, markets for timber species
- Funding to assist with planting e.g. may be more accessible with natives or riparian
- Potential to offset carbon, amount and timeframe. Alternatively, to get carbon income.
- Labour available for planting, management and harvest i.e. contractors, personal, farm staff
- Tradition and local recommendations e.g. promotion of poplars for land stabilisation

- Availability and quality of advice available or sought e.g. NZFFA, other farmers, experts, less informed advisors, council, default option e.g. planted pines because others were doing this
- Availability of information and ability to source information on less common species

*Pinus radiata* was the most popular timber species (Figure 1), particularly in the Waikato/Bay of Plenty. Most farmers in this region had trees for timber purposes (Table 4) and all farmers intend to plant trees in the future (Table 9) with almost 30% intending to plant for trees to sequester carbon. These will likely also be radiata pine. In contrast, although all Rangitikei farmers had timber plantings, less than 10% intended to plant timber species in future (Figure 3). As previously discussed, timber and carbon returns were not an important driver to tree planting for them. Timber species grown in the Rangitikei included Douglas fir (6%), *Cupressus macrocarpa* (6%), *Eucalyptus* (3%), *Sequoia sempervirens* (redwood) (3%), *Cupressus lusitanica* (2%) and other timber species (4%) including cedar, *Acacia sp.* and alternative cypress species (Figure 1). These alternative species are sometimes grown in a mix: R3 described growing three alternative species in a block with the hardiest variety at the top and less hardy further down. The lack of selection for alternative species compared to pine can result in inconsistent growth between trees as in the example B4 provided. Uncertainty of markets for alternative species, and the ability to harvest and market these trees which tend to be grown in small blocks and small numbers, was a concern. This also impacted on decisions to plant alternative timber species where uncertainty of returns was a barrier to planting (Table 10). Given these concerns, the greater age of the trees at harvest, and the often high-quality of their timber, there was interest in the development of high-value supply chains and infrastructure for these alternative species.

About 90% of farmers already had non-timber species (Table 7). Natives were the most predominant species identified on-farm (Table 8), with most phone interviewees responding), particularly existing natives, but also planted and regenerating natives. About a quarter of farms in Rangitikei, and 36% of dairy farms had planted natives. Some farmers in Rangitikei would like to plant natives but will not do so until the old man's beard in the area is under control, although initiatives to get this under control are not effective and the problem persists.

Mānuka and kānuka plantings are also similarly becoming popular (8% to 14% of farms): planting for bees and honey production as an alternative income are encouraging plantings. These also make good nurse trees for native species regeneration. Riparian plantings were for a common reason for planting for dairy farmers (43%): regulatory pressure to fence and plant stream banks will likely have contributed to this. About 25% of sheep and beef cattle farmers also had riparian plantings, and regional council initiatives such as SLUI are likely to have contributed to some of these, especially in Rangitikei.

Trees for shade, shelter and erosion control are important, especially in hill country farms. Radiata pine is a timber tree but can be used in shelterbelts as B8 has recently done, or a few in a shelterbelt mix as R4 did. However, for these purposes, non-radiata species are more likely to be used. Aesthetic reasons are very important to all farmers. Native species, such as cabbage trees and kowhai, and poplars, are common in the Rangitikei landscape with these native species existing or regenerating. Retaining the 'natural' landscape was important to the farmers interviewed in this region, with preference for naturally occurring trees and concern about the ill health and loss of kowhai. Poplars have been traditionally planted for shade and erosion control and are almost deemed to be a natural landscape tree now. However, poor advice by the past catchment board on the choice of poplar species has resulted in many Rangitikei farmers having problems with old hybrid poplars, emphasising the importance of well-informed advice on 'right tree'. This has put some farmers off poplars.

## 6.3 Factors affect the timing of harvesting

Factors affecting decisions on time of harvest included:

- Current timber markets (returns, market demand and supply to market)
- Contractors available for harvest which is associated with demand for their services and size of tree block (contractors less interested in small blocks when there is high demand for their services)
- Personal reasons such as R5 preferring to leave trees for his son to harvest and deal with the mess, harvest before property sold (B6).
- Availability of trees of harvestable age e.g. W10 chose to harvest as soon as possible.
- Ability to defer the decision e.g. harvestable trees young enough to keep on growing and accumulating tonnage (R3, R4), old trees that reach a point where harvest can no longer be deferred (R5).

Availability of trees and market signals (price) are key determinants of harvesting decisions, and probably more important in Waikato/Bay of Plenty where the primary species is pine. Those with small blocks can have problems getting their trees harvested when they want, or at all. Farmers find they are low priority for harvesting contractors who may show up once the big blocks are done by which time the price may have dropped. Some Rangitikei farmers choose to grow their trees longer to increase the tonnage sold when the tree is harvested. Finding market information, or even markets, for alternative species can be difficult.

Views on harvesting experiences were mixed. Only about 22% of farmers were negative (Table 6), although this was 44% for Waikato/Bay of Plenty farmers, and the integrity and post-harvest site “cleanliness” of the harvesting crews operating in that area may have influenced this. Unrealistic farmer expectations and poor forestry blocks can also lead to disappointment in returns. Key concerns were the mess left after harvesting, environmental impact, and the harvest process. While some Waikato/Bay of Plenty farmers interviewed had concerns about the integrity of the foresters they dealt with, others were more positive or pragmatic.

## 6.4 How trees are viewed generally

Most farmers were positive that trees had a positive effect on the environment with a few, mainly sheep and beef cattle farmers, being ambivalent or negative (Table 13, Figure 5). Views on pine as a species were neutral with dairy farmers being most positive (average score 4.7 out of 7) with a fairly flat distribution indicating a range of views. In interviews, the point was made by a number of respondents that it was a case of “right tree, right place”. A few simply did not like pine, partly because of aesthetic reasons.

However, most farmers believed blanket planting of farms impacted the community, particularly in the Rangitikei (average score 5.8 out of 7 against this). Some farmers were strongly against the blanket planting of farms for carbon locking in the land forever. Furthermore, some of the face to face interviewees explained why they felt pine was not the appropriate species for blanket planting, and that natives would be better long term for carbon. These views are described in Sections 4.1.3.1 and 4.2.3.1. as well as Section 5.4. for the phone interviewees

## 6.5 Views on the ETS

Farmers were asked for their opinions of the ETS in the phone interviews (Table 14). The majority of sheep and beef cattle farmers were negative (50% of Waikato/BOP and 75% of Rangitikei farmers): only 29% and 10% of these farmers were positive. Dairy farmers were more positive, with 25% positive and 63% neutral, and only 13% were negative. Over half (58%) of dairy farmers had registered some or all of their trees in the ETS, as had 33% of Waikato/BOP sheep and beef cattle farmers. In contrast only 15% of Rangitikei farmers had done so. The remainder had not or were unsure. Of the 10 face to face interviews, 4 had registered for the ETS. Of these, one had got advisors to do this on his behalf and had traded some carbon units. Another had a reasonable knowledge. Two who had admitted they had limited knowledge, with one saying he would take advice if he did anything with his units. Three did not have trees that were eligible: block size was one factor affecting registration. Farmers are disappointed small areas of plantings, which can be typical on farms with steeper or less productive areas, are ineligible, arguing that they often have significant planting when all of the areas are aggregated. A lack of knowledge on the implications of registering and how to do this was instrumental in three people not registering. Table 4 showed that carbon was not a major objective for tree planting (about 25% of dairy farmers and 10% of sheep and beef farmers (Figure 3) 29% of Waikato/Bay of Plenty sheep and beef cattle farmers were interested in offsetting emissions: this was 10% or fewer for the other groups (Table 11). As mentioned earlier, carbon income was not a strong tree planting objective for Rangitikei farmers, and for sheep and beef cattle farmers in general (Table 12, Figure 4). 63% of phone interviewees thought they would register with the ETS in future: time to do this, and information and advice to support them with this will be key factors in whether this is implemented.

## 6.6 Knowledge and understanding of forestry

Differences between regions in self-assessed farmer knowledge and understanding of farm forestry topics was similar between regions, with the exception of forestry services and costs and returns where Rangitikei was lower (Figure 6). Interviewees scored their knowledge out of 7, with a middle value of 4. This average score indicated a modest knowledge level for: costs and returns, forest management, forestry services and impacts on the environment. Knowledge of local markets and the ETS and carbon trading was below average (about 3) indicating knowledge on these topics is low. Face to face interview findings were similar. Generally, knowledge of carbon and trading is low. With markets, farmers often leave it to their contractors to sell the logs so a knowledge of markets per se is not critical to a well-run farm forestry enterprise. If they do look into this, it is only likely to be when they have trees suitable for harvest.

Phone interviewees were also asked to assess how easy it was to find information, evaluating this only if they had searched for information on this. Assessments were similar across groups. On-farm forestry management topics ranked reasonably well with an average of 5 or above (Figure 7) on: site preparation and planning, forest management, woodlot harvesting, marketing farm woodlots, and integrating non-timber trees on farm. However, carbon trading averaged just under 4. This was the most searched for topic (30 of the 50 people interviewed), closely followed by integrating tress on farm with 29 people seeking information on this.

Time required (37% of dairy farmers and Rangitikei farmers) and confusing information (25% of farmers) were barriers to tree planting (Table 10). This includes time required to find information and upskill. Knowledge and information is covered in Sections 4.1.4, 4.2.4 and 5.5. The internet was a commonly used source of information. Trusted informants (other farmers, some advisors, some regional council employees for riparian planting), and the NZFFA and its members, were recognised as useful sources of information. There was considerable feedback on accessing information on carbon and the ETS, with farmers finding the government websites difficult to navigate and source information from. It would be helpful if there was a single readily understandable (and printable) document on this subject, rather than a series of links to other pages. Farmers also found information on how to evaluate forestry enterprises difficult to find and had difficulty assessing the reliability of forestry data given this was not their core farming enterprise.

Some funding for tree planting is available from regional councils and most farmers were aware of this (92% of Waikato/Bay of Plenty sheep and beef cattle farmers, 75% of farmers in the other groups) as shown in Table 15. Most (92%) of Waikato/Bay of Plenty sheep and beef cattle farmers were also aware of One Billion Tree funding. The high values in this group may be due to a proactive industry or council advisor working with this farmer group: if so, this is obviously an effective way to help farmers access funds. In contrast, only 55% of Rangitikei farmers and 69% of dairy farmers were aware of One Billion Tree funding.

## 7 Conclusions

Farmers highly value trees, often for non-economic reasons, with most farmers interviewed having already engaged in tree planting of some sort, and many intending to do so in the future. Their incentive for planting trees is often personally driven: aesthetic and environmental reasons play a part or dominant role in the decision. Such plantings are often self-funded. They noted that these efforts, undertaken as stewards of the land, are often not appreciated/recognised outside the farming community. Acknowledgement and recognition for the tree planting already undertaken by farmers would be well received.

Time and cost are key constraints to the level of tree planting farmers can engage in. A lack of understanding can also limit tree planting. Hence, initiatives that can assist farmers financially, or through access to more concise and easily accessible information presented in a style that is relevant and easily adopted by farmers would be beneficial e.g. information on One Billion trees grants and the ETS. Trusted informants are an important source of advice (e.g. NZFFA farmers), and accordingly initiatives that support information sharing by well-informed, trusted connections within farming communities would also increase understanding and, other things being equal, encourage tree planting. Furthermore, since finance is a barrier for some farmers, “non-bureaucratic” (in farmers’ eyes) access to funding, such as that provided by the One Billion Trees fund, could help mitigate cash constraints and motivate more trees being planted and/or planted sooner.

Regional differences (climate, topography, forestry related capability and servicing infrastructure) clearly confirmed the need to consider “right tree, right place” in tree planting. Preferred species differed between the regions: *Pinus radiata* was less favoured in the Rangitikei whereas poplars were commonly planted for environmental reasons and shelter. Otherwise, species planted across the regions were similar.

This highlights the fact that while *P. radiata* has a place as a fast-growing timber suited to many areas in New Zealand, there is a place for other species. Interviewees believed a more varied species mix would also reduce New Zealand’s risk from exposure to a species monoculture (disease, fire). Farmers would like to have access to information on a range of species. Past research in New Zealand has largely focussed on plantation-scale *P. radiata* and enhancing its productivity, while propagation and information on other species has tended to be supported by independent plant breeders and industry organisations (NZFFA) and land-owner research initiatives (e.g. Northland Totara group, Ian McKean Pinetum in Taihape). Some of these other species offer high value timber attributes that could be explored for future markets. There is potential for natives such as totara as timber. Packaging information and financial support for growing these alternative species would help facilitate increased plantings of “right tree, right place”. For natives grown as timber, some certainty that regulation would permit these to be harvested could be required to incentivise planting.

Farmers expressed a universal dislike of blanket planting and land conversion. This was viewed as damaging rural communities and the aesthetics of the landscape. Rather, farmers believed there was a place for increasing tree plantings on-farm as smaller woodlots, increasing diversity, enhancing the landscape, and providing environmental, erosion control and shade benefits. These trees may, or may not, be harvestable. This could require a rethink on how tree plantings on farms could be managed and harvested (possibly from the back of farms or steep areas) in an integrated way to provide scale and logistical efficiencies, processed and accounted for in the ETS. In the study regions harvesting is largely geared to *P. radiata* and undertaken by contractors with heavy machinery and integrated with a well-developed supply. Developing parallel viable low volume, high (margin) value supply chains for

other species remains a significant challenge, and more so in districts with less well-developed processing and/or port infrastructure. Advice to farmers for minor species needs to make this context and commercial risk clear.

## 7.1 Implications for case study selection

The data collected in this interview research is needed to inform case study selection and scenarios in the next stage of the project, and ensure project outputs meet the information gaps and knowledge requirements of interest to farmers, we make the following recommendations for the ten case studies:

- (i) Detail the process for selecting and planting ‘the right tree in the right place to get the right outcome’. Communicate the planning required and build appreciation of the value of doing this process well. Communicate real examples of learnings from what has not worked in the past in order to illustrate and reinforce why tree species, site selection and silvicultural regimen are critical success factors for farm forestry.
- (ii) Provide farm specific information on the ETS, how carbon trading works (or could work where ETS registration is yet to occur) for the case farm, illustrate how differences in species carbon sequestration contribute to financial outcomes (and maybe inform a change from the farmers’ originally preferred species), demonstrate how requirements for ETS eligibility can be met, and cross-reference to existing Te Uru Rakua information on how to register. Illustrate the financial benefits and risks of registering plantings within the ETS.
- (iii) Provide robust financial and environmental analysis demonstrating the potential returns, impact on environmental externalities, and the overall performance of the farm system. This will be compared against the existing land use (i.e. with minus without trees) and clearly demonstrate (via KPIs such as Economic Farm Surplus, farm GHG net emissions, kg N leached) the value proposition to the land owner.
- (iv) Provide information and a detailed process for selecting wood harvesters and setting up wood harvesting agreements (such as PF Olsen’s proven guidelines). Also, define what is required by each party to ensure the farmer is not left with a ‘mess’ post-harvest.
- (v) Cross-link to the Project Literature Review to provide farmers and industry people reading the case studies with links to further information, help and support.
- (vi) Tailor best practice information regarding tree management and harvest process to the case farm, indicating how environmental externalities can be mitigated through good planning and harvest management in order to alleviate farmers concerns about securing resource consent and minimising the environmental impact at harvest.
- (vii) Illustrate for the case farm how natives could be established to provide integrated ‘best land-use’ and the various options available (direct planting, cover crop, natural regeneration).

## 7.2 Further recommendations for Te Uru Rākau and industry to consider

As a result of this research, we believe there are a number of key opportunities for Te Uru Rākau and the wider industry to consider.

(ii) **Provide a knowledge centre for farmers/land-owners** that ‘packages’ current information into everyday language which is concise and easy to understand. This resource should be developed with the end user in mind, being careful to avoid acronyms or overly technical information that is difficult for most farmers (who are ‘time poor’) to readily grasp and contextualise to their property/ies. The literature review generated for the Project provides a good starting point for this. Other points to consider include:

- a. **Develop a ‘right tree, right place, right purpose’ tool/resource.** This should allow farmers to select information from a menu which provides potential species options that are best suited for their farm (an analogue is the pasture species selection tool developed by DairyNZ – see <https://www.dairynz.co.nz/feed/pasture-renewal/select-pasture-species/>). Farmers should be made aware of the Forest Forecaster tool, available from the NZ Farm Forestry Association and FGLT websites, which provides information for radiata pine that includes site location (climate being pre-populated), altitude, soil type, tree planting purpose (including income from timber, carbon sequestration, environmental reasons). Other websites, such as Tanes Tree Trust provide information on native tree species. Nevertheless, as described in the Literature Review, there are gaps in the range of decision support tools for farmers to identify suitable trees, where to get further information (fact sheets) and what is needed to achieve the outcomes they require. The survey confirmed that farmers need better and easier access to information on the establishment, growth and returns of both mainstream and alternative species.
- b. **Add other sources of funding to the Te Uru Rakau One Billion Tree site**, including those provided by regional government. Alternatively, develop a tool where farmers can select their region and automatically have information provided on what funding might be available to them. That is, a ‘one stop shop approach’.
- c. **Develop user friendly fact sheets** that provide the essence of what farmers need to know on one page that is easy to find, read, understand and print out.

A particular need is a fact sheet on the ETS and carbon trading. Understanding of carbon trading and the ETS scored lowest amongst farmers when questioned about their knowledge of forestry. Most farmers found it difficult to find the information they needed and/or the information was, from their perspective, overly technical and difficult to understand which resulted in many giving up registering mid-process. Almost half of the respondents (47%) had not registered woodlots/small forests that qualified for the ETS with lack of knowledge on the ETS and lack of time being significant barriers. Despite this, 63% of the farmers who plan to plant trees in the future intend to register them in the ETS showing there is an interest in doing so.

A fact sheet would help build farmers’ knowledge of the ETS, alleviate any misconceptions and help overcome the barriers listed above. It would also support trees that qualify but currently sit outside of the ETS being registered, helping meet NZ’s 2030 Paris Agreement GHG emissions reduction target.

Other fact sheets should prioritise areas where there are significant need or knowledge gaps such as the decision to prune or not, and the planning process with respect to obtaining resource consent for harvest (what to know and where to go).

- (iii) The majority (65%) of sheep and beef cattle farmers had a negative opinion on the Emissions Trading Scheme and most (63%) dairy farmers had a neutral viewpoint. This is likely to be influenced by most farmers acknowledging they did not understand the ETS, how it worked, how it was managed and the fairness of the scheme. **A multi-media communication approach by Te Uru Rakau (and MfE) with a website, rural media hard copy publications, downloadable fact sheets and field days (such as for the case farms near the end of this Project) is required** to overcome these knowledge gaps and misconceptions, and to keep farmers current with legislative changes and their implications.
- (iv) Farmers also held strong negative views on blanket conversion of farms to forestry due to the negative impact on the surrounding community. This reinforces the need to **communicate the aims of the One Billion Tree Programme to achieve best land-use, including through efficient integration with livestock farming**. The case farms provide an important means to illustrate how this can be attained in an emerging era where farming needs to operate within tighter environmental limits.
- (v) Some farmers have had negative experiences with harvesting trees relating to low returns, having a high impact on the physical environment (roading, lack of riparian margins), and post-harvesting residues/trash left on the farm.

The low returns predominantly related to some land owners being incorrectly advised (i.e. “burnt”) by log buyers or having not planted the right tree in the right place in the past. **A log buyer registration scheme is recommended** to weed-out ‘rogue buyers’ and to provide a minimum standard of professional forestry service that gives farmers’ confidence in the quality of the service they purchase. Furthermore, as forestry is a specialist knowledge area, farmers with limited or no prior experience in farm forestry should be encouraged to seek advice from professional and knowledgeable advisors. Some farmers commented during the survey that they rely on their trusted farming networks who may not have the experience or required knowledge to support ‘right tree, right place, right outcome’. **Consideration could be given to developing a list of recommended forestry advisors for each district** to address this farmer need.

There is a need for **further extension efforts to relay information to farmers regarding the overall environmental impact of forestry and how externalities can be mitigated** through implementing best practice and interventions such as riparian buffer strips and harvest process.

Waikato/BOP dairy farmers scored highest for forestry services available with an average score of 5.0 out of 7. These farmers also had the most positive harvesting experience. This is likely to be influenced by good local infrastructure, capability and access to alternative contractors in an established forestry region.

- (vi) Some farmers perceive that pine trees are easy to grow and require minimal input post-planting. Poor knowledge of what is required to drive the right outcomes, invariably leads to poor results. The resources described above, and case study outputs, would help address this knowledge gap.

(vii) The majority (86%) of land-owners plan to plant trees in the future, with the decision driven by strong values regarding land stewardship for future generations and wanting to ‘do what is right’ for the farm and environment. These kaitiakitanga values scored highly in interviews, with ‘Environmental reasons’ (representing good land stewardship) on average scoring 4.9 to 6.3 out of 7 (Table 12) as a farm tree planting objective. Kaitiakitanga values were particularly important for Māori landowners interviewed. It is important that these farmer values are made known to the wider public as they demonstrate farmers’ current and ongoing commitment and actions to improve land stewardship. Other findings that reinforce this notion include:

- a. Overall, environmental reasons received the highest weighting for future plantings.
- b. In general, farmers had a very positive view of farm tree plantings. They believed trees were integral to good land stewardship and valued the intrinsic environmental and aesthetic benefits of trees highly.
- c. Overall, farmers agreed that having trees on farm has a positive impact on the farming enterprise.

(viii) Financial constraints were the most commonly stated barrier. Although financial constraints are a primary barrier, farmers also tended to have a poor knowledge of the grants and support available for tree planting (e.g. only 55% of Rangitikei farmers said they were aware of the One Billion Trees Programmes funding). This emphasises the importance of extending information on financial support available to farmers for tree plantings through the case studies and the resources described above.

- (ix) Farmers were disappointed that small plantings were not recognised by the ETS for carbon credits: awareness was very low that the implementation of the Zero Carbon Act makes provision for this to be considered. Recognition for these plantings would be appreciated. Including these areas in the ETS supports the concept of ‘right tree, right place’. Many farmers have small areas of land less suited to pastoral farming scattered through their property and allowing small and fragmented planting to be recognised and included in the ETS will motivate many farmers to target these areas for tree planting to support high value outcomes.
- (x) Investigate and/or package information regarding markets and supply chains for alternative species, which is sought after by farmers particularly in areas less suited to radiata pine.

## 8 Acknowledgements

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## 9 References

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## 10 Appendices

### 10.1 Phone Interview Questionnaire

#### Background

1. How many properties do you own? (**NOTE: If more than one property owned need to add new line in spreadsheet with SAME respondent number, and repeat questions for each property – put property identifier into cell so can easily match data up to correct property**)
2. Where is your farm property located?
3. Are you in a catchment that has a regional plan that restricts land use?  
*(0 = no; 1 = yes; 2 = unsure)*
  - a. If so, do you know what this plan is?  
*(comment)*
4. What is the total area (ha) of your farm?
  - a. How much is effective (ha)?
5. Of the total farm area, what area is owned (ha)?
6. Of the owned effective area, how much would you classify as flat/rolling (i.e. mowable or able to be fertilised by truck) and how much would you classify as steep (i.e. fertilised by plane)?
7. Can you please describe the land use on each property?  
*(enter 'Y' under appropriate land uses)*
8. In terms of decision making, are you the primary decision maker, contribute to decision making or do you have little to no input in decisions made?  
*(1 = primary decision maker; 2 = contribute; 3 = little/no input)*
9. How is your business structured (i.e. Trust, partnership, sole proprietorship)  
*(1 = Sole proprietorship; 2 = partnership; 3 = Trust; 4 = other (&note))*

#### Forestry Involvement

10. Do you currently have trees on farm? This may include forestry woodlots, riparian planting, erosion control planting, conservation and native trees.  
*(0 = no; 1 = yes)*
11. In terms of tree blocks across your farm(s), what would be the:
  - a. approximate total area of timber, riparian, native and other tree types established
  - b. what year would these have been planted.
  - c. Species type
  - d. Entered into ETS
  - e. Any management? i.e. pruning, weed control?

12. Do you have any waterways on farm

(0 = no; 1 = yes)

- a. Are all of these riparian planted, only partially planted or not at all?  
(1 = all; 2 = partial; 3 = none)

13. Do you plan to plant more trees in the future?

(0 = no; 1 = yes; 2 = unsure)

- a. What will be the main objective of these planned trees (i.e. timber, carbon, riparian, erosion control, added value (e.g. manuka if planted for honey), shade/shelter)  
(1 = timber; 2 = carbon; 3 = environment; 4 = riparian; 5 = shade/shelter; 6 = retirement; 7 = added value; 8 = other (&note))
- b. Do you think you will register these in the ETS?  
(0 = no; 1 = yes; 2 = unsure)
- c. If timber/carbon revenue is a planting objective, what species do you plan to plant?

14. Have you harvested any trees off your property in the past?

(0 = no; 1 = yes)

- a. How did you find the experience of harvesting? What, if any, were the challenges and benefits of the harvesting process?  
*(Make an assessment of experience based on respondents comments:  
1 = positive, 2 = negative, 3 = neutral)*
- b. After harvest, did you replant with the same type of tree, either in the same place or another equivalent area?  
(0 = no; 1 = yes)

#### **Knowledge and Understanding (ONLY NEED TO ASK THESE QUESTIONS ONCE, NOT PER FARM)**

15. Please rank your current understanding of the following topics on a scale of 1-7 with 1 being very poor/no understanding and 7 having a very good understanding.

- a. Costs and returns of farm woodlots (1-7)
- b. Local markets for wood products (1-7)
- c. Forest management (1-7)
- d. Harvesting process (1-7)
- e. Forestry services available (1-7)
- f. Impact of farm woodlots on the environment (1-7)
- g. ETS requirements and carbon trading (1-7)

16. Are you aware of any grants/funding available for planting trees on farm

(0 = no; 1 = yes)

- a. Can you list

(1 = 1BT; 2 = other Govt; 3 = Council; 4 = Iwi; 5 = other)

**Perceptions and Attitudes (ONLY NEED TO ASK THESE QUESTIONS ONCE, NOT PER FARM)**

For the following section, I will make a number of statements and ask for your agreement to those statements on a 1-7 scale, with 1 being strongly disagree and 7 being strongly agree.

17. "Pinus radiata is the best tree crop for farm timber stands in New Zealand")

(1-7; or 0 if no opinion)

18. "Having trees on farm positively impacts on the farming enterprise"

(1-7; or 0 if no opinion)

19. "Farm forestry in combination with farming negatively impacts on the surrounding community"

(1-7; or 0 if no opinion)

20. Overall, do you believe farm woodlots provide a positive, negative or neutral impact on the environment?

(1 = positive, 2 = negative, 3 = neutral/no opinion)

21. Overall, do you have a positive, negative or neutral opinion of the ETS and carbon credits?

(1 = positive, 2 = negative, 3 = neutral/no opinion)

22. Can you rank the following factors on a 1-7 scale for their importance to you when planting trees, 1 being very **unimportant** and 7 being very **important**<sup>2</sup>

- a. Income from timber (1-7)
- b. Environmental reasons (1-7)
- c. To keep for future generations (1-7)
- d. Land investment (1-7)
- e. Scenic beauty (1-7)
- f. Income from carbon (1-7)
- g. Maintaining license to farm (1-7)

23. Do you belong to any farming or forestry association?

(0 = no; 1 = yes)

- a. If yes, please list

(comment, can allocate numerical code after)

**Information Channels (ONLY NEED TO ASK THESE QUESTIONS ONCE, NOT PER FARM)**

24. Have you ever tried to find information about farm forestry or planting trees on farm, whether through online or written sources or from talking to other people?

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<sup>2</sup> Rodenberry & Manley (2011)

*(0 = no; 1 = yes) – If no, skip rest of this section*

25. Please indicate if in the last year you have looked for information on the following topics:

- a. Site preparation and planning *(0 = no; 1 = yes; blank if N/A)*
- b. Forest management and silviculture *(0 = no; 1 = yes; blank if N/A)*
- c. Woodlot harvesting *(0 = no; 1 = yes; blank if N/A)*
- d. Marketing farm woodlots *(0 = no; 1 = yes; blank if N/A)*
- e. Carbon trading *(0 = no; 1 = yes; blank if N/A)*
- f. Integrating trees on farm for non-timber purposes (e.g. bees, riparian) *(0 = no; 1 = yes; blank if N/A)*

26. Please also indicate the ease of finding information for the following topics on a 1-7 scale with 1 being very difficult and 7 being very easy.

**SKIP ANY SUBQUESTIONS IF INFO ON TOPIC HAS NOT BEEN SEARCHED FOR**

- a. Site preparation and planning *(1-7; or blank if N/A)*
- b. Forest management and silviculture *(1-7; or blank if N/A)*
- c. Woodlot harvesting *(1-7; or blank if N/A)*
- d. Marketing farm woodlots *(1-7; or blank if N/A)*
- e. Carbon trading *(1-7; or blank if N/A)*
- f. Integrating trees on farm for non-timber purposes *(1-7; or blank if N/A)*

27. What information channels did you use to find this information

- a. *(1 = websites; 2 = newspapers; 3 = advisors; 4 = discussion groups/workshops/field trip; 5 = journals; 6 = other. Can add others if necessary)*

28. Overall, did you have confidence in the information you received from each source?

*(0 = no; 1 = yes; 2 = unsure)*

29. What is your preferred information channel for information regarding trees on farm?

*(0 = don't know; 1 = websites; 2 = newspapers; 3 = advisors; 4 = discussion groups/workshops/field trips; 5 = journals; 6 = other. Can add others if necessary)*

**Adoption Barriers (ONLY NEED TO ASK THESE QUESTIONS ONCE, NOT PER FARM)**

30. What barriers exist for you in regards to planting trees on farm

*(0 = none; 1 = lack of/confusing information; 2 = access to capital; 3 = not the main decision maker; 4 = don't like trees; 5 = council policies/processes; 6 = other. Add others in later if necessary)*

31. What incentives are there for you in regards to planting trees on farm

*(0 = none; 2 = access to grants/funding; 3 = access to good advice/support; 4 = aesthetics; 5 = environmental benefits; 6 = ability to diversify income; 7 = stock shelter; 8 = other. Add others in later if necessary)*

32. Are there any other comments or thoughts you would like to share regarding trees on farm?

## 10.2 Project Summary Information (Sent to Phone Interviewees)

### INTEGRATING DAIRY AND HILL COUNTRY SHEEP & BEEF FARMING WITH FORESTRY FOR PROFITABLE, SUSTAINABLE LAND USE

Farmers are having to re-evaluate their farm businesses and farming systems because of increasingly stringent environmental (nutrients, greenhouse gases, biodiversity) and market regulations; climate change impacts; competing substitute products (e.g. “clean” meat), market volatility; and farm business and family factors such as farm transition and ownership. Furthermore, the economic and social well-being of rural towns and communities is linked to employment and returns from the farming sector, particularly in more isolated farming districts. At a national level, Government, in support of the Paris21 Climate Agreement, has agreed to a 30% reduction in GHG emissions below 2005 levels as its National Determined Contribution (NDC) and to net zero emissions by 2050. The ETS is being updated, including with respect to the settings for forestry, to support the attainment of these reduction targets. Including forestry in farm business enterprises, particularly on land less suited to intensive agriculture, can provide a practical multi-purpose solution to the above challenges. However, forestry is not viewed favourably by some farmers for lifestyle and community reasons, and because of their perceptions of forestry's relative economics and timing of returns. As well, agriculture (unlike post 1989 forests registered in the scheme) is not yet implicitly in the ETS.

This project aims to address these key issues and provide landowners, iwi and rural professionals with the information they need to help landowners make well-informed forestry enterprise decisions and increase their confidence in implementing forestry as a land-use option. A range of forestry species and silvicultural options (exotic and indigenous) will be assessed for: their economic viability when integrated into pastoral production systems (e.g. income from timber and carbon) and environmental benefits (e.g. erosion control, enhanced biodiversity, reduced environmental externalities). As well, guidelines will be generated on management required to achieve high value end-products and environmental outcomes from trees including tree varieties, tree management, pest control, areas required to be viable and harvesting implications. Non-forestry options (e.g. riparian margins, shelter belts, wetlands) will be assessed to mitigate contaminant loss (both point source and diffuse) and achieve biodiversity improvements. Information will also be provided to stakeholders on the resources already available for assessing land categories and their most appropriate land use, and industry support available for implementing forestry programmes.

Regional geographic diversity will enable a range of forestry options suited to different circumstances to be explored. Perrin Ag has clients in Waikato, and the Bay of Plenty where they have particularly strong links with iwi agricultural enterprises. These regions have a mix of dairying, and sheep & beef cattle enterprises. There is some forestry in these regions and an export port and mills are relatively close. In contrast to these regions, the Taihape district in the Rangitikei region is relatively remote and consists predominantly of large hill country farms, with topography and climate (drier summers, winter frosts) limiting potential farming enterprises. Distance from port and harvest costs (access) will also influence the choice of forestry options in this district. The local farmer group associated with a previous application to SFF on future farming (project 405675) want to be part of this project to explore the ‘best fit’ forestry options for this region.

The project will be delivered by Perrin Ag and Scion researchers in collaboration with farmer (dairy, and sheep & beef cattle) and industry groups in the two regions. Perrin Ag are developing researcher capability with the recent appointment of Dr Liz Dooley (PhD in Ag Systems and Management) with further appointments anticipated. Their consultants are experienced modellers in the tools required for the project. Perrin Ag staff have clients and farmer contacts in these regions, including Māori farming enterprises. The Forest Growers Levy Trust, DairyNZ and Regional Councils have indicated strong support (including financial) for this project. Researchers will work with farmer and industry groups from each study area to refine the project direction.

The project will have four inter-connected elements:

1. Identify farmer perceptions of forestry and barriers to integrating forestry with farming businesses.

Structured interviews with 25 to 35 farmers per region to identify knowledge gaps and barriers to integrating forestry within pastoral farming businesses (including social license to operate factors). Farmers will be interviewed in person (20%) and by telephone (80%). Qualitative and quantitative data will be collected. Interviewees will be selected with the help of farmer groups, DairyNZ, regional council staff, possibly RMPP groups, and Perrin Ag's client base. The data collected will guide the implementation of the following stages and ensure project outputs are aligned with farmer requirements. These may differ between regions and sectors.

2. Undertake a diverse range of farm case studies (including iwi-owned) to illustrate the integration of various forestry options into pastoral farming systems.

A range of complementary, integrated farming and forestry enterprises will be evaluated with 6 Waikato / Bay of Plenty cases and 4 Rangitikei individual cases. Case studies across a variety of primary land uses (e.g. dairy, sheep and beef cattle, deer) will be undertaken. Forestry options include: Pinus radiata, Douglas fir, Manuka and apiculture, and permanent post-1989 forest activity for carbon and biodiversity, short rotation exotic species (including high stocking rate special purpose radiata pine for wood fibre supply). Non-forestry options (e.g. riparian margins, shelterbelts) and plantings of native species will be included to provide a holistic approach to sustainable land management and enhance environmental outcomes. Case studies will be selected on their potential to demonstrate enhanced business and environmental performance. Sustainability outcomes and maintaining landowners 'licence to operate' will be evaluated, highlighting reduced environmental externalities (both gaseous and water) and improved biodiversity. Eligibility for, and the impact of, the One Billion Tree programme and funding from regional councils will be assessed. A range of scenarios per case will be undertaken and risk evaluated. Questions raised in the farmer interview findings will be addressed with hard data provided to support farmer decisions i.e. full physical and financial analysis for current and projected long-term financial and environmental performance. At least two case studies will represent iwi interests and incorporate Māori objectives e.g. kaitiakitanga and the long-term financial business performance.

3. Undertake case study scenarios on the formation of farm syndicates to purchase and convert land at scale to offset the environmental externalities of members and provide improved returns to them.

Three case studies will be undertaken to evaluate the opportunity for farm syndication to collectively offset environmental externalities i.e. purchasing large parcels of land (>1000ha) suitable for forestry conversion. Farmers operating high value properties best suited to pastoral farming (dairy, sheep & beef, other) can invest in forestry syndicates to offset some, or all, of their environmental responsibilities through off-farm mitigations.

4. Extension activities

Study findings will be extended to agribusiness consultants and farmers to support their, or their clients', decisions. Extension activities will include: published information on current knowledge and barriers to forestry within pastoral businesses; published and on-line information on the case studies; three case study farm field days; three workshops days with invited participants from industry; a presentation to: the NZ Institute of Primary Industry Management (NZIPIM), regional workshops and national conference; and articles in rural media.

Project outcomes will include:

- Greater understanding/awareness of factors limiting forestry uptake and the information needed to support well-informed forestry decisions to inform extension and policy.
- Alleviating negative perceptions of forestry through improved understanding of forestry land use options, environmental mitigations, and their impact on long-term business performance.
- Case study evidence that farmers and rural professionals can relate to highlighting the merits of including forestry enterprises in an enterprise portfolio.
- Diverse case studies and scenarios, covering a wide range of forestry and non-forestry tree planting options, will provide landowners with information and confidence needed to undertake land use change and plant the right trees, in the right place, to achieve high value outcomes.
- Farmers and iwi owners having greater knowledge and better understanding of forestry options available (including eligibility for, and the impact of, the ETS) resulting in informed decision making and increased confidence to implement forestry as a land-use option.

- Forestry alternatives will underpin pastoral farming, helping meet their environmental and carbon mitigation, thus future-proofing the farming enterprises. Indirectly, this will contribute to the continuity of rural communities.
- Increased understanding and uptake of forestry and non-forestry tree plantings to improve sustainable land management supporting businesses operate within the new ‘farming with limits era’ and maintaining landowners’ licence to farm.
- Raised awareness of funding support available to landowners such as the One Billion Tree programme and from regional councils.
- Farmers and iwi owners having greater knowledge and understanding of the environmental and biodiversity benefits from riparian strips, shelter belts, and wetlands, and the grants and programs available to support landowners with these plantings.
- The above will result in increased, and more effective, uptake of forestry by pastoral farmers. Including Māori agribusinesses, as part of their farm business portfolio. This uptake will also contribute to the Government’s billion trees and climate change targets.
- The information and tools will also be a useful resource for those in the forestry sector, and for training in the farm and forestry sectors resulting in increased knowledge and skills in the sector.
- Improved regional environmental outcomes because of increased forestry, particularly in areas less suited to farming e.g. reduced sediment and nutrient loss to waterways, and carbon to atmosphere. Similarly, greater biodiversity in areas planted in native species.
- Improved log supply security post 2030, helping to underpin wood processing and investment in this sector.
- Identification of knowledge gaps where further work is required. Better informed enhancement and development of tools, processes and practices for farmers and advisors to evaluate farm forestry alternatives. This will align with the review of tools currently underway. This project, along with review findings, could underpin follow-on work in developing tools and processes for evaluating and planning forestry alternatives for individual enterprises to support farm decisions.

## 10.3 Project Information Letter and Description (Face to Face Interviews)

22 November 2019

Dear

### Integrating dairy and hill country sheep & beef farming with forestry for profitable, sustainable land use (Information Sheet)

Perrin Ag Consulting is undertaking MBIE (one billion trees) and industry-funded research on Farming with Forestry. This project will investigate opportunities for integrating forestry (native or exotics) enterprises into pastoral farming businesses for profitable, sustainable land use. The primary researchers on this project are Leighton Parker (Senior Consultant) and Dr Liz Dooley (Senior Consultant – Research) at Perrin Ag Consulting. Researchers will work closely with industry organisations, such as DairyNZ and Farm Forestry Association, on extension activities.

This project will work with pastoral farmers in the Bay of Plenty, Waikato and Rangitikei regions to explore options for integrating forestry with their farming systems to enhance environmental benefits (water quality, erosion), reduce greenhouse gas emissions, hedge expected financial impacts of inclusion in the ETS, and sustain or enhance business viability. Interviews will identify current farmer perceptions and knowledge of farm forestry to inform the selection of farm forestry case studies. Case studies will be used to evaluate and compare farm performance resulting from the integration of a range of potential forestry options into pastoral farming systems, including the eligibility and effect of farm forestry being registered in the Emissions Trading Scheme (ETS) and the impact on pastoral farming operations. The environmental and climate resilience benefits arising from forestry will be quantified for their businesses. The outcome will be new farmer-oriented knowledge and information on effectively integrating forestry with farming. This will include both the factors to consider in optimising future farming and forestry systems for a range of situations and environments, and the transition pathways for achieving these options. This information will be shared with NZ farmers, rural professionals and policy people via field days, workshops and rural presentations and published material made available.

In the first phase of this project, face-to face interviews will be undertaken with decision makers for ten farming businesses to explore farmers' knowledge, experience, interest in, and perceptions of forestry enterprises. Farmer sources of information of forestry will be identified. Background information on the farmers and their business will be asked for to provide context. A selection of diverse views and levels of knowledge and experience are sought to represent industry. These interviews will help determine the case studies selected and information outputs required to ensure pastoral farmers have access to relevant information on forestry enterprises and their management that could potentially benefit their business.

We would appreciate it if you were prepared to be interviewed for the project. The interview is expected to take about an hour. We would like to record and transcribe the interview for analysis. Only the researchers working on the project will have access to the interview data. You will be provided with the recording (should you want), and a copy of the transcript or interview case report to ensure you are satisfied with what is included. You will also have the opportunity to amend the transcript or interview case report. You will not be identified in the report or any publications (a pseudonym will be used rather than your name) and only relatively generic information on you and your business will be provided in the report to minimise the likelihood of your being identified. You will have the opportunity to see the final report before it is released.

You are not obliged to accept this invitation. If you decide to participate, you have the right to:

- decline to answer any particular question.
- ask for the recorder to be turned off at any time during the interview.
- ask any questions about the study at any time during participation.
- provide information with the expectation that your name will not be used in any reporting.
- be given access to the interview recording should you want this, and a copy of the transcript or case report with the right to modify this within two weeks of receiving it.
- withdraw from the study up to two weeks after receiving the transcript or case report.
- be given access to the project report when it is completed.

The researchers named are responsible for the ethical conduct of this research. If you have any concerns about the conduct of this research that you wish to raise with someone other than the researchers, please contact Lee Matheson (Managing Director of Perrin Ag Consulting) on 029 3955312 or [Lee@perrinag.net.nz](mailto:Lee@perrinag.net.nz).

If you have any queries or would like to discuss the project with us, please contact Leighton Parker (021 2439394, [Leighton@perrinag.net.nz](mailto:Leighton@perrinag.net.nz)) or Liz Dooley (021 1078179, [Liz@perrinag.net.nz](mailto:Liz@perrinag.net.nz) ).

Yours sincerely

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### *Future Tree Planting Plans*

<sup>1</sup> “We thought we would actually fence it out, exclude the livestock altogether and try and let it re-establish itself. ... we would probably have to under-plant with some other primary species, I think” [R5]

<sup>2</sup> “My beekeeper that I employ thinks it’s probably because of the kōwhai and the amount of native bush. The kōwhai flowers early, so it’s the first flowering tree here for us and it’s great. Pretty much when the kōwhai flowers, the queen starts laying and off they go. It’s really cool”. [R2]

### *Tree Management*

<sup>3</sup> “A lot of them are still ... only a metre or so apart in that three. I couldn’t bear to cut them down if there were a lovely form. They’re getting pretty close to maturity now. They probably could be harvested. ... I sort of think ... every year that goes on, it’s now really putting tonnes of timber in there and [I am] loathe to cut them down. Obviously, you can’t get them too big or they can’t process them”. [R4]

<sup>4</sup> “It’s not like I’ve got one plantation of one high numbers. At each plantation I’ve got a fair staggering of them” “Once again that whole establishment thing. As I say I don’t do well with just a few out my back door. To do 50 ha, obviously I wouldn’t do it myself. The economics of planting once is one thing. but when you have to go back and plant a couple of times because the hares have got them and whatever...”. [R4]

<sup>5</sup> . “That’s one thing we have used ... those blocks”. He adds “you’ve just got to be careful ... what class of stock you put in. That’s another knowledge thing. If you can put in young, say, replacement ewe lambs once they’ve come straight off the shears, even the first year if you put them through that block they won’t go and try and graze on the bark, particularly the ones [trees] you don’t want getting damaged. ... they’ll probably just knock a lot of that grass down and it’s probably a bit rank, but if you keep introducing them (not all the time, they might go through it twice a year the first year)” [R3]

“Cattle, you’d want to be very careful about. We don’t put cattle in them because if we’re growing a cypress crop for beef cows, that’s a bit of a no-no because you’ve got the problem they can abort if they’ve eaten the leaf or needles”. It’s getting to the stage now in that block where there’s not so much pasture left underneath because of the age of the trees (20 years) and the shading. That’s through that part of its life but it’s still beneficial”. [R3]

“When you get that, under our afforestation grant block (mixed timber species), we’ve used it for winter shearing. We’ve grazed it in the autumn or late summer shut it up.” [R3]

<sup>6</sup> “I saw recently on Country Calendar about a pine nut thing down in Marlborough. They were using them for that reason as well, to keep controlling the grass with stock.” [R3]

<sup>7</sup> “Native plantings include “mānuka, mostly pittosporums, a lot of flaxes, cabbage trees, the cordylines and toetoes ... There’d be over a dozen species” [R5]

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### *Species Selection and Availability*

<sup>8</sup> “They’re legumes. They nitrify the ground and they can be stock food but they’re also very well-behaved trees, and he has quite a few but I’ve never heard anyone else mention them, so it’s that right tree, right place”. [R1]

### *Harvesting*

<sup>9</sup> .”I don’t know if it’s water or exposure to prevailing winds or what it is. Some obviously like some sorts of slope better than others. Some of them have done very well.” [R4]

<sup>10</sup> “that wool shed was built to house 2,000 [sheep], the wool room near carries a hundred bales of wool. Underneath it, it has these 12x4 Douglas fir beams across this massive area. You couldn’t buy those, ... the floors were actually tongue and groove radiata wide boards and they’re beautiful”. [R5]

<sup>11</sup> “That’s when we cleaned all these up and they were shocking, ugly, big logs. Some of them were almost two metres across at the stump, just massive. The ones that weren’t suitable, they took them to Karioi and split them for pulp. The big saw logs, there was some good stuff. ... They were 40 to 50 tonnes each in logs, about a hundred years old. Basically, a truckload on one tree per truck. ... The smallest timber higher up in the trees was sawn in New Zealand. The rest of it all went as K-grade to China. ... prior to that period in the early nineties, there was a cost to try and deal with it.” [R5]

### *Availability of Labour and Markets*

<sup>12</sup> “If we could keep it on a flat line, just good production, it’s much easier for those guys involved. They’ve got massive amounts of money tied up in capital, so they need to know they’ve got longevity in it. It’s no use having massive prices for two years and three, four and five, [then] there’s nothing and you’ve gone broke. That’s no good for anyone because then they exit the industry. When it picks back up, they’re not there” [R3]

### *Funding for native regeneration*

<sup>13</sup> “Horizons Advisers, they’re very good when they do their SLUI plan ... they’ve identified the areas but they’re more into planting poplars and thing”. [R1F]

“It’s also, as [husband] pointed out, finding the labour to do it. I actually have confidence that if you ring-fenced it, you would get regeneration of the kōwhais because there’s so much kōwhai seed there but the sheep eat [it], even though it’s technically toxic, ...you don’t get young kōwhais regenerating where you’re grazing. They would be naturally regenerating [if they were fenced off]”. [R1F]

“Instead of ringing off individual pockets, ring off eight pockets together but you’re talking significant [area of] land then” [R1F]