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The Importance Of Indigenous Biodiversity On Waikato Farms

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Summary

In this paper, we studied the importance of indigenous biodiversity (native bush) on farm properties in the Waikato Region. To do this, we surveyed both real estate agents and farmers. We discovered that opinions of native bush between the two groups were very different. A small percentage of real estate agents believed that indigenous biodiversity on farms mattered; type of farm sold and age of respondent influenced this belief. While approximately half of Waikato farmers believed that native bush was important; this was influenced by age, income, education level, number of farm owners and sex. Farmers suggested that rates rebates, as well as subsidized planting and subsidized fencing would motivate them to plant more native bush on their lands.

Keywords: Waikato, indigenous biodiversity, farms, surveys, logistic model.

Introduction

In 1992, at the United Nations Conference on Environment and Development in Rio de Janeiro, the Convention of Biological Diversity was created. New Zealand was one of the 150 countries that became a party to the Convention. All parties agreed to develop national biodiversity strategies and action plans to reduce biodiversity loss. New Zealand ratified the Convention in 1993 and produced the New Zealand Biodiversity Strategy (2000) to reflect its commitment (Ministry for the Environment 1997).

With around 30% of its land area within the public conservation estate, New Zealand has one of the largest protected land areas of any country (Ministry for the Environment 1997). However, it hides the state of the poorly protected lowland areas within conservation lands (Ministry for the Environment/Department of Conservation/Local Government New Zealand 2004, Department of Conservation 1996). Less than 20% of lands below 500 meters are part of the conservation estate, whereas some 50% of lands above 500 m are within it (Norton 2000, Norton 2001). The reason for this upland-lowland imbalance results from the high value that lowland environments provide for agriculturally productive activities. With so much of the lowland indigenous habitat gone, New Zealand's ecosystem offers little protection to the endemic species (Ministry for the Environment 1997, Hartley 1997). The State of New Zealand's Environment report shows the status of New Zealand's vulnerable species. Today about 1000 known animal, plant and fungi species are considered threatened (Department of Conservation/Ministry for the Environment 1998a, Department of Conservation/Ministry for the Environment 1998b, Ministry for the Environment 1997).

It is highlighted in the New Zealand Biodiversity Strategy that the conservation of New Zealand's indigenous biodiversity requires protection on both public and private land.

“New Zealand's public conservation land does not contain the full range of our ecosystems. How we manage the ecosystems and indigenous species outside of protected areas, on crown land not managed for conservation purposes, i.e. private land and in freshwater environments is critical to halt the decline of New Zealand's biodiversity. Distinctive habitats and ecosystems in these areas continue to be at risk of declining condition and loss of their indigenous components.” (Ministry for the Environment 2000).

The importance of private land for conservation has been recognized in a number of government initiatives including National law such as the Resource Management Act 1991, the Forest Amendment Act of 1993, the New Zealand Biodiversity Strategy, the preliminary report of the Ministerial Advisory Committee entitled “Bio-What” and the final report of the Ministerial Advisory Committee entitled “Biodiversity and Private land” (Norton 2001). Of those, the Resource Management Act is the most powerful and far-reaching in its immediate impact (Jay 2000).

New Zealand considers private support to be one of the key issues in biodiversity management (Department of Conservation/Ministry for the Environment 1998a, Department of Conservation/Ministry for the Environment 2002/2003, Ministry for the Environment/Department of Conservation/Local Government New Zealand 2004,

Kneebone *et al.* 2000, Kneebone 2000). Private land is important not only because of its indigenous biodiversity but also because it is the area where most of the human population lives, works, plays and encounters nature (Norton 2000). Private landowners make a large contribution to biodiversity conservation. Taranaki Regional Council, for instance, estimates that for every \$1 the Council spends, the landholder spends \$10. These initiatives by private landowners make a significant contribution to New Zealand's overall biodiversity (Ministry for the Environment/Department of Conservation/Local Government New Zealand 2004).

In managing for native bush on private lands, it is necessary to find ways to integrate indigenous biodiversity conservation with land uses rather than separate them (Kneebone *et al.* 2000, Kneebone 2000, Norton 2000, Hartley 1997). There is a need to take a "whole-property" perspective, which recognizes the need both to accommodate economic use of the land and to reduce the impacts on biodiversity (Kneebone 2000). With the right support and incentives, landowners can be the most effective stewards of the land and of the biodiversity associated with it (Kneebone *et al.* 2000).

Farmers in New Zealand own a great deal of land and can therefore have a significant effect on biodiversity. However, the development of farming technology has led to changes in farming methods. The biggest change is intensification involving higher stocking rates, made possible by modern machinery and fertilizers. This has resulted in greater agricultural efficiency in terms of production, but this has been achieved at considerable environmental cost. Farming is intensifying in fertile downland and lowland areas (Kneebone *et al.* 2000). In the Waikato region alone, only fragments of the original lowland forest remain, and many of these fragments are not representative of native forest. The intensification of farming activities, particularly dairy conversions, in lowland areas has placed water quality and biodiversity at greater risk (Kneebone *et al.* 2000). Removal of native forest can be associated with increases in pest species, erosion problems, and loss of native species.

How can we increase biodiversity on farmlands in the Waikato region? We first need to understand how farmers feel about biodiversity and what characteristics influence someone to have native bush. Therefore, our hypothesis is that certain independent characteristics such as age, farm income, gender, and education level will have an effect on whether someone believes native bush is important on farms. We will test the hypothesis on farmers as well as real estate agents that sell farms.

Data collection

Two surveys were conducted to analyze the importance of native bush on farm properties in the Waikato region. The first was given to Waikato real estate agents and the second to Waikato farmers.

Real estate agent survey

The purpose of this survey was to derive detailed information on real estate agents' views towards native bush. For more detail refer to Trinh (2005).

An early draft of the survey was pre-tested with the assistance of two experienced rural sales consultants. The purpose of the pre-test was to ensure comprehension and clarity of the survey so that necessary changes could be made before final implementation. Their updates were used to create the final draft of the survey. Survey questions asked respondents about the properties they focused on selling, market price and salability questions, native bush questions and demographic questions.

Once the final draft of the survey was completed, the survey was distributed. As our study focused on farms in the Waikato region, we surveyed real estate agents that focused their time on farm property sales, as opposed to those that sold private homes or lifestyle blocks.

As the Waikato region is not very large, we contacted rural managers in the region and asked them if we could distribute the survey to their agents. We then personally went to a large majority of rural agencies and handed out surveys to all of the agents at the agencies. One week later, we returned to the agency to pick up the completed surveys. Agencies that participated in the study included Bayleys, Harcourts, Ray White, Lodge, First National, Century 21, L.J Hooker, Professional, and Pastoral. Agency locations included Hamilton, Cambridge, TeKuiti, TeAwamutu, Morrinsville, Waihi and Huntly.

A total of 69 surveys were handed out to agents. Of those, 42 surveys were returned completed. We were told that the other 27 surveys were not returned because the agents were either not interested or did not have time. Therefore, the response rate for the real estate agent survey was 62.3 %.

Farmer survey

The early draft of the survey was based on the real estate agent final survey. The draft of the survey was pre-tested by two retired farmers in Hamilton. It was decided to use cognitive interviewing for the pre-testing. Cognitive interviews go through surveys one section at a time with one respondent, in this case farmer, at a time. Their updates were used to create the final version of the survey. In general, the farmer survey questions

resembled many of the real estate agent survey questions. Survey questions asked respondents about the general characteristics of their farm, native bush questions and demographic questions. For more detail refer to Trinh (2005).

Our goal was to obtain information from farmers in the Waikato region, so we first needed to find farmer in four ways: (1) from the Federated Farmers of New Zealand, (2) by ordering a list from Agriquality Limited in Palmerston North, (3) from a list of farmstays in the New Zealand bed and breakfast book, and (4) from a local farmer and a friend who knows some farmers.

In total, we obtained contact details for 296 farmers. Of the 296 names and addresses, 193 included phone numbers. We took two approaches to survey distribution: (1) For the names without phone numbers, we would mail a survey with a freepost return envelope so they would not have to pay for postage, and (2) for the names with phone numbers we would first contact them by phone and ask them if they would do the survey, and if their response was positive, we would post them a survey with a free post return envelope.

According to Czaja and Blair (2005), phone contacts with respondents should be undertaken on different days of the week and at different times of the day. We telephoned 193 farmers on 10 June 2005 and 11 June 2005 both in the morning and the afternoon (from 10 pm to 5 pm). On these 2 days we were able to make contact with 86 farmers while for the other 107 calls, either no one picked up or an answering machine picked up. Of 86 farmers we made contact with, 33 people agreed to undertake the survey and 53 people refused. Reasons for refusals were that they were not interested or did not have time.

On the evening of 20 June 2005 (from 5 pm to 11 pm), we tried to contact the other 107 people. This time we were able to contact 65 people; the other 42 calls still had no response (either no one picked up or an answering machine picked up). On that day, 38 people were interested in undertaking the survey, and 27 people were not. Reasons for refusals were typically that they were not interested or did not have time.

After 3 days of phone calls to 193 people, 71 people agreed to do the survey, 80 refused, 4 were uncontactable and we left messages on the other 38 phones. Therefore, 47.02 % of those contacted agreed to do the survey.

We were now ready to mail out our survey. For the 71 people that were contacted by phone and agreed to do the survey, we mailed a survey, accompanied by a handwritten letter, a cover letter and a \$1 scratch off lottery ticket. All other people mailed a survey accompanied by a handwritten letter and a cover letter, but no lottery ticket. After three weeks, a second survey was mailed non-respondents.

A total of 216 surveys were mailed out. Ten surveys were returned immediately because of wrong addresses. These 10 surveys were from the list provided by Agriquality Limited. This reduced the effective mailout to 206. Of these, 145 surveys were returned. However, 8 of these surveys were not filled out by the respondent, reducing the effective returned surveys to 137. This was a response rate of nearly 67 %. Of the 8 non-

completed surveys, 6 surveys were not done because the farmers had sold their farms, while 2 surveys were mailed out to farmers who died. Of the 137 completed surveys, 63 surveys were from people that agreed to complete the survey, 55 were from people without phone numbers that were from the Federated Farmers list, and the rest of the 19 surveys were from people that received our message on their answering machines. Of the 71 people that agreed to do the survey, 63 people followed through – a response rate of 89 %. This result shows that the decision of calling people to request their involvement in the survey was appropriate.

Weekly survey return results show that in just after one week of the first mailout, 59.1 % of the total completed surveys were returned (Table 1). The returns significantly declined in the second week and the third week (13.1 % and 4.4 % respectively). However, with the support of the follow-up mailout, the number of returned surveys considerably increased (from 6 surveys to 25 surveys after one week from the second mailout). Therefore, we believe that the decision to use the follow-up mailout was appropriate. In the 6th week from the first mailout or the third week from the second mailout there was only one survey returned, suggesting that the data collection could be stopped and we started coding and entering the information from completed surveys into an excel sheet .*

Table 1. Weekly survey returns

Weeks from the first mailout	Weeks from the second mailout	Number returned	% returned (of 137)
1	-	81	59.1
2	-	18	13.1
3	-	6	4.4
4	1	25	18.2
5	2	6	4.4
6	3	1	0.7
		137	100

Results

We obtained data from completed surveys of real estate agents and from completed surveys of farmers. These data provided us with an understanding as to how real estate agents and farmers in the Waikato region felt about indigenous biodiversity.

Results from the Waikato real estate agents

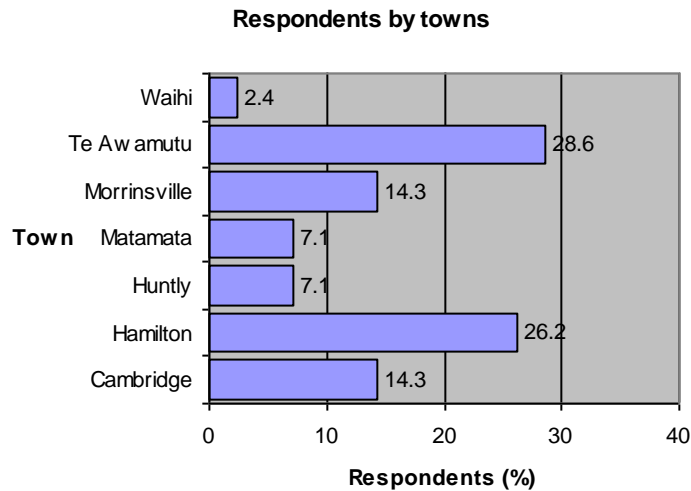
General profile

The Waikato real estate agents surveyed were 97.6 % male. On average, they had worked 12 years as a real estate agent and sold between 20 and 50 properties.

* Two more surveys since the analysis finished were collected. The results from these two surveys will be included in future reports.

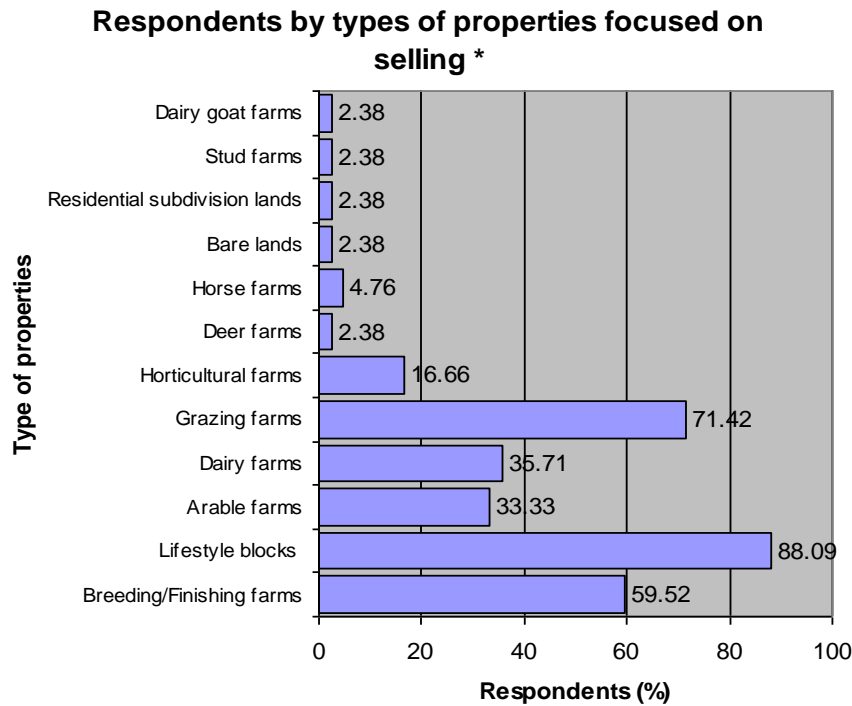
Approximately, 40.5 % of them were between the ages of 44 and 55, 69 % of them had received a sales person's certificate while the other 31 % had either a manager certificate or full AREINZ. Respondents were from Cambridge (14.3 %), Hamilton (26.2 %), Huntly (7.1 %), Matamata (7.1 %), Te Awamutu (28.6 %), and Waihi (2.4 %) (Figure 1).

Figure 1: Real Estate Agent Respondents by Towns



There were 12 types of properties that real estate agents sold (Figure 2). Many agents indicate that they sold several types of properties. Overall, grazing farms (71 %), breeding/finishing farms (60 %), lifestyle blocks (88 %) were their most common.

Figure 2: Types of Properties Real Estate Agent Respondents Focused on Selling*



* Numbers do not add to 100 % as many respondents indicated that they focused on sales of more than one type of property.

Respondents indicated that the top three factors influencing the selling price of a farm property were location (93 %), production level (43 %) and contour of farm (36 %).

Respondents were asked to indicate the top three factors that make a farm property sell quickly. Price was found to be the most popular response, followed by location and presentation.

Native bush importance

Twenty four percent of real estate agents perceived that native bush was important to farmers. When asked an open ended question about the perceived benefits of native bush, two responses stood out: aesthetic/visual appeal (33 %) and enhancement of environment (21 %).

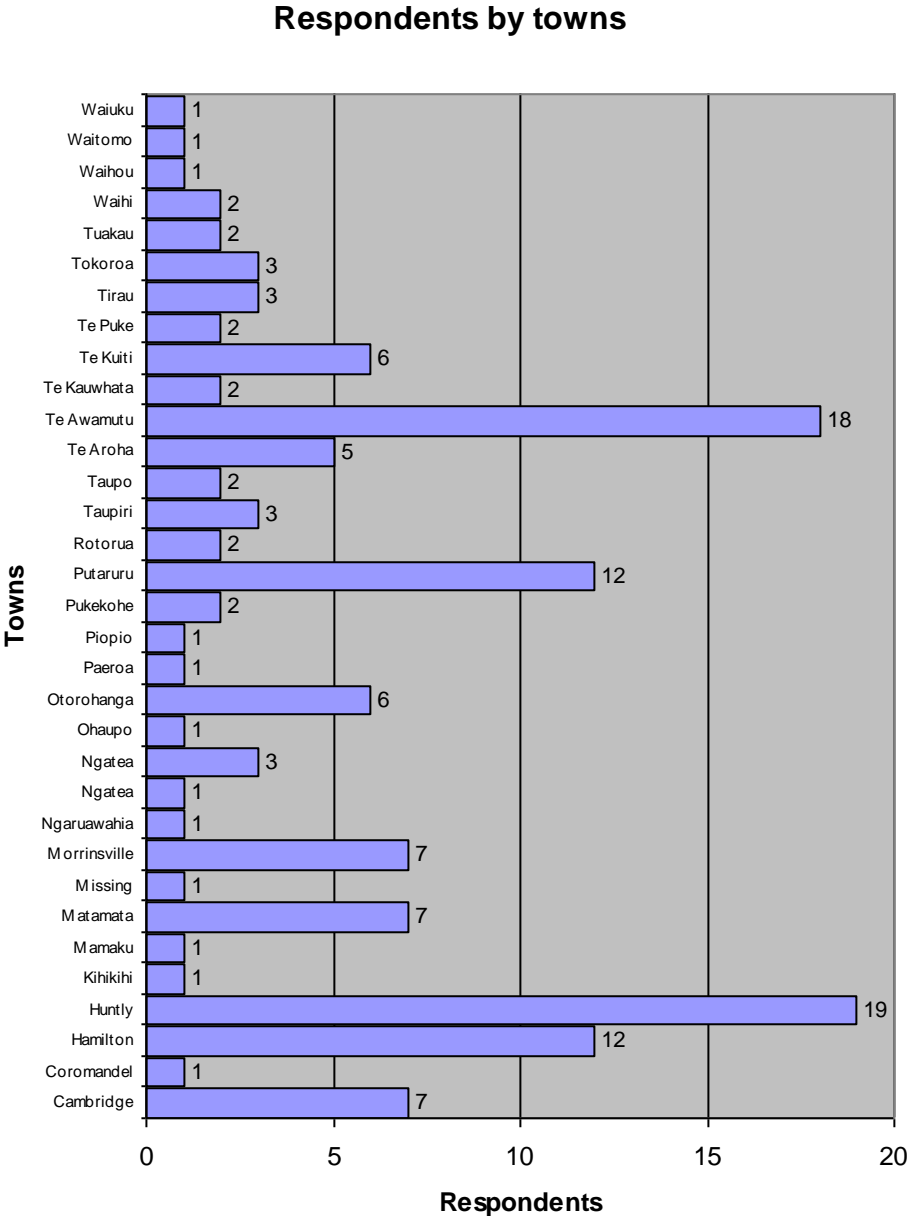
Results from the Waikato farmers

General profile

The Waikato farmers that had undertaken the survey were 64.2 % male. On average, they have been farming for 24 years. Almost half (48.9 %) of them, received annual

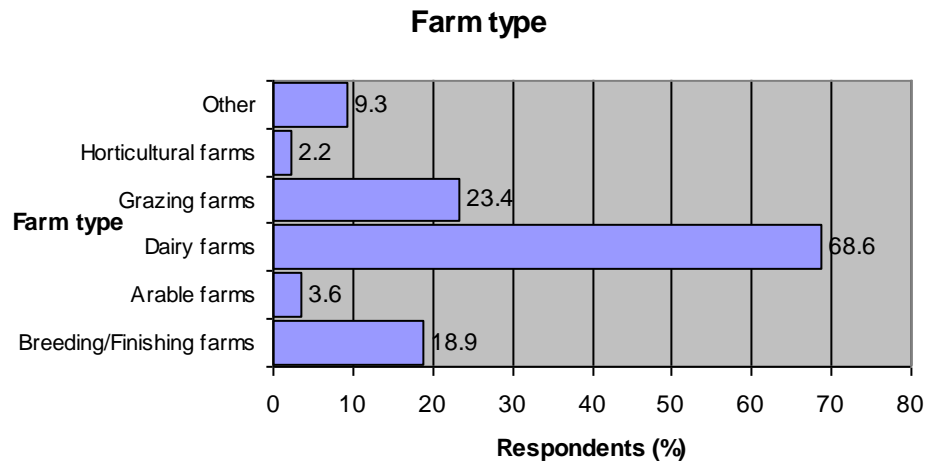
incomes of \$100,000 to \$499,999. Approximately, 26.3 % of them were between the ages of 46 and 55. The most common ethnic background was European (96.4 %), and the most prevalent education level was a school certificate (56.9 %). Respondents were from a variety of towns; however a large percentage were found to be from Hamilton, Huntly, Te Awamutu, and Putaruru (Figure 3).

Figure 3: Farmer Respondents by Towns



Of the 12 general farm types that farmers worked in the Waikato region, dairy farms were the most common (68.6 %). This was followed by grazing farms (23.4 %) and breeding/finishing farms (18.9%) (Figure 4).

Figure 4: Respondents by farm type



Native bush importance

Native bush was found to be important to 44.5% of respondents (Table 2). Being able to view native bush was important or very important to 34.3% of respondents. It was slightly important to 32.8% and not important to 28.5% of respondents (Table 3).

Table 2. The importance of native bush to farmers

Opinion	Respondents (N)	Respondents (%)
It is not important	70	51.09
It is important	61	44.52
No answer	6	4.37
Total	137	100

Table 3. The importance of being able to view native bush

Being able to view native bush	Respondents (N)	Respondents (%)
Very important	11	8
Important	36	26.3
Slightly important	45	32.8
Not important	39	28.5
No answer	6	4.4
Total	137	100

The benefits that native bush provided to the farm system were found to be important or very important to 29.2 % of respondents, it was slightly important to 36.5 % of respondents, while 30.7 % of respondents believed that it was not important (Table 4).

Table 4. The importance of the benefits that native bush brings to the farm system

The benefits that native bush provided to the farm system	Respondents (N)	Respondents (%)
Very important	11	8
Important	29	21.2
Slightly important	50	36.5
Not important	42	30.7
No answer	5	3.6
Total	137	100

Knowing that the future owner of the farm would have native bush on the property was very important or important to 37.9 % of respondents, slightly important to 27.7 % of respondents and not important to 30.6 % of respondents (Table 5).

Table 5. The importance of knowing the future owners of the farm would have native bush on the property

Knowing the future owners of the farm would have native bush on the property	Respondents (N)	Respondents (%)
Very important	14	10.2
Important	38	27.7
Slightly important	38	27.7
Not important	42	30.6
No answer	5	3.6
Total	137	100

Respondents were asked to choose between nearly identical 200-hectare farms that differed only in the size and location of native bush: Farm A had no native bush, Farm B had 20 hectares of native bush scattered throughout the farm property, and Farm C had 20 hectares of native bush in one large block. A large majority of participants selected Farm A (46.7%), however 35% of respondents chose Farm B (Table 6).

Table 6. Farm property preference

The preferred farm	Respondents (N)	Respondents (%)
Farm A (no native bush)	64	46.7
Farm B (20 hectares of native bush – in scattered blocks)	48	35
Farm C (20 hectares of native bush – one large block)	18	13.1
No answer	7	5.1
Total	137	100

When asked what incentives would motivate them to protect native bush, 35% of respondents indicated for a rates rebate. The next most popular suggestion was subsidized planting and fencing. Other suggestions included use less of rates in administration and councilor's remuneration; help with river banks planting, weed control and carbon credits; and put land into QEII trust and create extra titles.

Regression Analysis

Regression analysis is a statistical technique that attempts to explain the movements in one variable, the dependent variable, as a function of movements in a set of other variables, the independent (or explanatory) variables (Studenmund 2001).

In our study, we were interested in understanding what characteristics real estate agents and farmers believed were an important influence on having native bush on a farm property. Therefore, our dependent variable was whether real estate agents believe that it is important to have native bush on a farm property in the first instance and whether farmers believe it is important to have native bush in the second instance. Our independent variables were the characteristics we felt were import such as age and type of farm. As our dependent variable was a binary variable where one represented native bush being important, and zero represented if it was not important, the appropriate model to test our theory is the binomial logit model.

According to Ready, Berger and Blomquist (1997), a binomial logit model provides a good statistical fit and allows for easy interpretation. The form of the general logistic equation is:

$$\ln \frac{D_i}{1 - D_i} = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_K X_{Ki} + \varepsilon_i$$

where: $D_i = 1$ if the respondent believes that native bush is important and 0 otherwise
 X 's are the independent variables and ε is an error term

We used the econometric software package Eviews 5.1 to run our regressions.

Real Estate Agent Model

Our first goal was to determine which characteristics are important to real estate agents when they are thinking about native bush on a farm property. Our binomial logit model is as follows:

$$\ln \frac{Bushimport}{1 - Bushimport} = \beta_0 + \beta_1 Dairy + \beta_2 Lifestyle + \beta_3 Age + \beta_4 Age^2 + \beta_5 Avesize + \beta_6 Family$$

Where:

Bushimport = 1 if the real estate agent believes that it is important for farmers to have native bush on their farm, 0 otherwise

Dairy = 1 if dairy farms are the type of farm that the real estate agent focuses on selling, 0 otherwise

Lifestyle = 1 if lifestyle blocks are the type of farm that the real estate agent focuses on selling, 0 otherwise

Age = 1 if the real estate agent is under age 25, 2 if 26-35 years old, 3 if 36-45 years old, 4 if 46-55 years old, 5 if 56-65 years old, 6 if over 65 years old

Age² = Age*Age

Avesize = the size of the average farm in hectares

Family = 1 if the real estate agent believes that having family living in the same area is very important, 2 if it is important, 3 if it is slightly important, 4 if it is not important

To understand the relationship between the independent variables and the dependent variable for the real estate agents, we used binomial logit regression (Table 7).

Table 7. Logistic Results for Real Estate Agent Data (With Significant Results in Bold)

	C	Dairy	Life	Age	Age ²	Avesize	Family
1. Native Bush Importance to Real estate agents	12.22 (0.05)	-2.23 (0.05)	-2.19 (0.09)	-4.09 (0.09)	0.58 (0.07)	-0.001 (0.86)	-1.40 (0.20)
McFadden R ² = 0.409 Log likelihood = -11.55							
2. Native Bush Importance to Real estate agents only looking at family. (Probability)	3.08 (0.1)						-1.58 (0.02)
McFadden R ² = 0.14 Log likelihood = -18.33							

Equation 1 in our main model. Here we see that four variables are significant when analyzing whether real estate agents believe that native bush is important to have on a farm property: whether they focus on selling dairy farms or lifestyle blocks, as well as age and age². If the real estate agent focuses on selling dairy farms or lifestyle blocks we see that their believe as to whether native bush is important to have on farm properties decreases. We also find that as the agent gets older, they feel that it is less important to have native bush on farm properties.

Since we felt that the real estate agent might feel that whether family lives close to a farm would be important (as it was nearly significant in equation 1), we tested this variable individually. What we found was that if the real estate agent believes that it is important for farmers to have family living in the area of the farm, they feel that native bush is important on farm properties (since 1 = very important and 4 = not important).

Farmer Logit Model

We then wanted to see what characteristics were important in relation to the farmers belief that native bush was important. Therefore, our dependent variable was whether farmers feel that native bush is important for their farms. We believed that several characteristics might have an effect on the farmers' view of native bush, these included income, age, education, and gender. The binomial logit model was also used for the farmer's model.

Our farmer logistic model is as follows:

$$\ln \frac{\text{Impnat}}{1 - \text{Impnat}} = \beta_0 + \beta_1 \text{Inc} + \beta_2 \text{Age} + \beta_3 \text{Age}^2 + \beta_4 \text{Age}^2 + \beta_5 \text{School} + \beta_6 \text{Futbush} + \beta_6 \text{Bighome} + \beta_6 \text{Sex} + \beta_6 \text{Numowner}$$

Where:

Impnat = 1 if the farmer feels that it is important to have native bush on their farm, 0 otherwise

Inc = the average yearly income of the farm

Age = 1 if farmer is under 25, 2 if 26-35 years old, 3 if 36-45 years old, 4 if 46-55 years old, 5 if 56-65 years old, and 6 if over 65 years old

Age² = Age*Age

School = The highest year of formal schooling the farmer has attended (1 = School certificate, 7th form Bursary, or NZCEA, 2 = Tertiary education, 3 = Attended University, 4 = University degree, 5 = Graduate school)

Futbush = the importance of knowing the future owners of the farm will have native bush on the property where 1= Very important, 2 = Important, 3 = Slightly important, 4 = Not important

Bighome = 1 if the farmer perceives that having a large farm house is very important, 2 if it is important, 3 if it is slightly important, and 4 if it is not important

Sex = 1 if the farmer is female, 0 if the farmer is male

Numowner = the number of people who own the farm

The results of results of the logistic equation are presented in Table 8.

Table 8. Logistic Results for Farmer Data (With Significant Results in Bold)

	C	Inc	Age	Age ²	School	Futbush	Bighome	Sex	Numowner
1. Native Bush Importance to Farmers	28.14 (0.007)	8.6E-06 (0.02)	-1.74 (0.01)	0.03 (0.01)	1.31 (0.05)	-1.76 (0.04)	-1.38 (0.05)	3.45 (0.05)	-1.97 (0.01)
McFadden R ² = 0.61									
Log likelihood = 32.32									

In this model, all variables are significant at the 5 % level. We find that people with higher incomes are more accepting of native bush on farm property. Older people are less interested in native bush. As education increases, so also does that important of

native bush on the property. If someone believes that native bush is not important for a farm to have in the future (4 = not important and 1 = very important) then whether they feel native bush is currently important will decrease. A similar result occurs with the size of the farmhouse (4=not important and 1=very important). If they believe that the size of the farmhouse is important they will not be as in support of native bush on farmland. Finally, females are more likely to feel that native bush is important while as the number of owners of a farm increases, the importance of native bush decreases.

Therefore, farmers' views towards native bush is affected by several variables: the number of people that own a farm, age, income, education level, gender, the perception of knowing that future generations of farms will have native bush on their property, and the size of the farmhouse.

Discussion and Conclusions

In this study, we used mail surveys to analyze how real estate agents and farmers felt about native bush (indigenous biodiversity) and explored characteristics that influenced these views.

In general, real estate agents results show that the major factors that affect the selling price of a farm property were location and production and contour of the farm. Price and location were the dominant factors affecting how long a farm property is on the market. When asked whether native bush was important to have on farm property, only 25% of respondents indicated an importance. Perceived benefits of native bush were aesthetic/visual appeal, stock shelter, shade, and enhancement of the environment such as bird life, rainfall, and plant diversity.

Real estate agent logit regression results show that several variables influence whether they believe native bush on a farm property is important: this includes when an agent focuses on selling dairy farms or lifestyle blocks, age, and the perception of the importance of farmers having family living in the same area.

Approximately 45% of farmer respondents indicated that it is important to have native bush on a farm. When asked to choose a piece of farmland with native bush or without, we find that approximately 47% of respondents prefer land with no native bush, which 35% would prefer land with native bush but in scattered blocks while only 13% believed native bush in one large block would be good.

The farmer logit regression results show that a farmer's view towards native bush is affected by several variables: the number of people that own a farm, age, income, education level, gender, the perception of knowing that future generations of farmers will have native bush on their property, and the size of the farmhouse.

In addition, we learned that many farmers believe that the most important goal is for their business to make a profit. Since they do not profit from native bush and believe native bush is unproductive, it is not highly valued. Comments included: "Actually the

one (property) with no bush would be the most valuable, (as it is) more productive”; “The price of land is so expensive. You need to farm every area (inch of it) to go towards mortgage repayment”; “Farming is a business, native bush won’t pay the mortgage”. However, comments also show that farmers like scattered plots of native bush for themselves as native bush makes them feel good. But native bush is not important for farming purposes, because in farming every hectare is used for profit. As suggested by respondents, in order for the government to encourage more native bush on farm properties they should create incentive policies that deal with: (1) Planting cost; (2) Fencing; (3) Pest control; (4) Weed control; (5) General maintenance; (6) Rates rebates.

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References

- Craja, R., and Blair, J. (2005). *Designing surveys: A guide to decisions and procedures*, Thousand Oaks and London and New Delhi, Pine Forge Press.
- Department of Conservation/Ministry for the Environment (2002/2003). *New Zealand Biodiversity Strategy*, Wellington, Ministry for the Environment.
- Department of Conservation/Ministry for the Environment (1998a). *New Zealand’s Biodiversity Strategy: Our chance to turn the tide*, Wellington, Ministry for the Environment.
- Department of Conservation/Ministry for the Environment (1998b). *New Zealand’s Biodiversity Strategy: Our chance to turn the tide – A Summary of the Draft Strategy*, Wellington, Ministry for the Environment.
- Department of Conservation (1996). *Biodiversity*, Wellington, Department of Conservation.
- Hartley, P. (1997). *Conservation strategies for New Zealand*, Wellington, New Zealand Business Roundtable.
- Jay, M. (2000). *Nature conservation 5: Conservation in production environment: Managing the matrix*, J. L. Craig, N. Mitchell and D. A. Saunders (ed), Surrey Beatty and Son Pty Limited.
- Kneebone, J., Lindsay, J. R., Prime, K., and Christensen, M. (2000). *Bio-what?*, Wellington, Ministry for the Environment.
- Kneebone, J. (2000). *Biodiversity and private land*, Wellington, Ministry for the Environment.

- Ministry for the Environment/Department of Conservation/Local Government New Zealand (2004). A snapshot of council effort to address biodiversity on private land, Wellington, Ministry for the Environment.
- Ministry for the Environment (2000). The New Zealand Biodiversity Strategy. Wellington, Ministry for the Environment.
- Ministry for the Environment (1997). The state of New Zealand's environment, Wellington, Ministry for the environment.
- Norton, D. A. (2000). Conservation biology and private land: shifting the focus. *J. Conservation Biology.*, 14: 1221-1223.
- Norton, D. A. (2001). Is the amount and focus of ecological research in New Zealand sufficient to sustain indigenous biodiversity on private land?. *J. New Zealand Journal of Ecology.*, 25: 77-82.
- Ready, R., Berger, M., and Blomquist, G. Measuring amenity benefits from farmland: Hedonic pricing vs. contingent valuation. *J. Growth and change.*, 28: 438-458.
- Studenmund, A. H. (2001). Using econometrics: A practical guide, Boston and San Francisco and New York and London and Toronto and Sydney and Tokyo and Singapore and Madrid and Mexico City and Munich and Paris and Cape Town and Hong Kong and Montreal, Addison Wesley.
- Trinh, P. (2005). The importance of indigenous biodiversity of Waikato farms. The University of Waikato.