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Public Amenity Benefits and Ecological Services Provided by Farmland to Local Communities in the Fraser Valley

- A CASE STUDY IN ABBOTSFORD, B.C. -

2007



Acknowledgments

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Interpretive Summary

We will happily spend a Sunday afternoon driving out to the country to see the sights, but we would rarely consider taking a leisurely trip to visit an industrial park or neighbouring subdivision. What is it about the countryside that we find so enticing? It has been said that the city is the world of the body, and the country is the world of the soul. If so, then how do we characterize these attributes of farmland that nourish the soul? How do we better integrate them into the everyday decision-making processes that affect our communities?

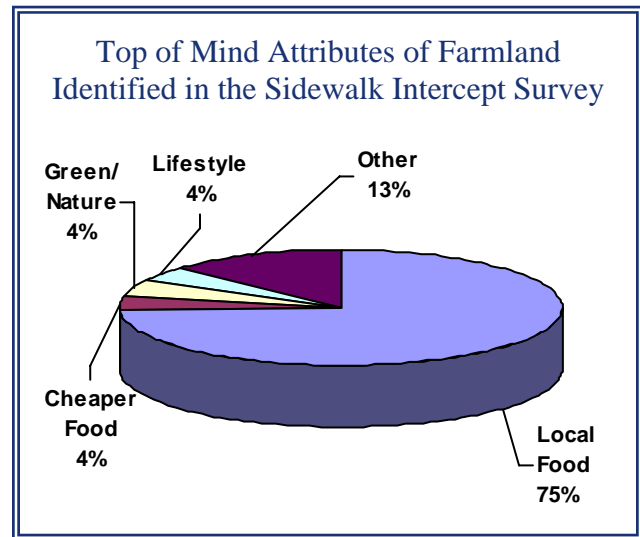
This study asked urban residents what is important to them about having farmland in their community? What benefits do they see and what *value* do they place on the benefits? These benefits are often termed ‘public’ or ‘social’ benefits as compared to ‘private’ or market based benefits. The results of this study provide an estimation of the value of the ‘public’ benefit of farmland and this value can then be considered in future land use decision-making processes.

The study area was the City of Abbotsford where approximately 75 percent of the land base is in the Agricultural Land Reserve and the balance is located within the urban development boundary. Abbotsford has the highest agricultural products output in the province and is experiencing rapid urban growth. Farmland is under pressure from an expanding urban population and an expanding agriculture production sector.

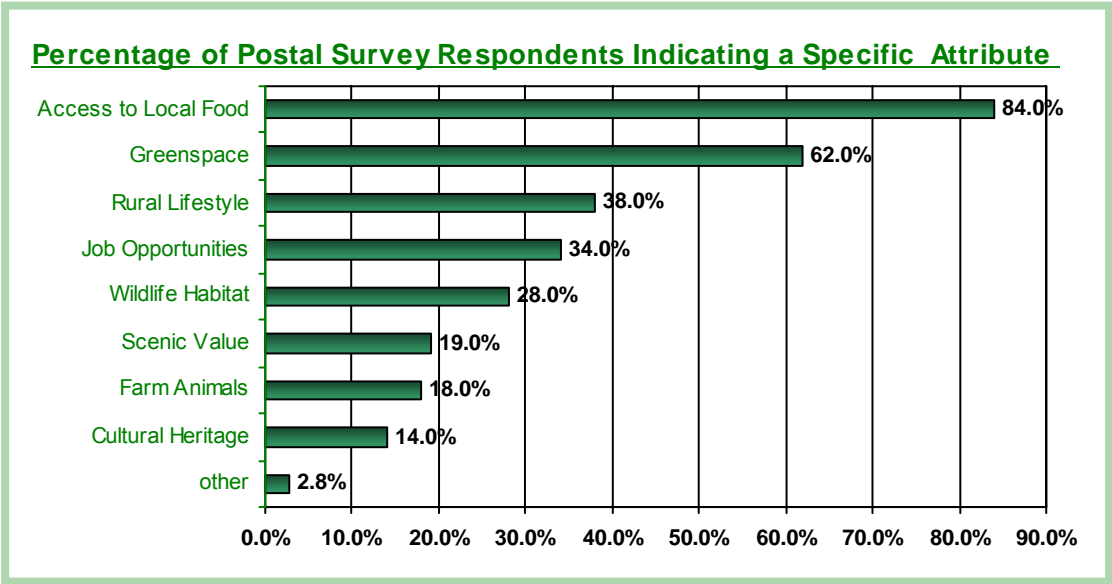
Abbotsford residents were initially asked, in a sidewalk intercept survey, to describe the attributes of farmland in their community that first come to mind. When asked, *‘Is it a benefit to have farmland in the community?’* 98 percent said yes.

When asked, *‘What would you say are some positive associations you have with farmland in your local community?’* responses were:

Access to Local Food	75%
Greenspace / Nature	4%
Lifestyle	4%
Cheaper food	4%
Others	13%



A more in-depth postal survey asked households a variety of questions, including: what they felt are the key attributes of farmland, and what value they would place on having farmland in their community. In one question respondents were asked to select the three most important attributes of farmland from a list of potential attributes. The number of times each attribute was considered in the top three is reported in the graph below.



Having access to local food was the dominant attribute in both surveys, followed by ‘greenspace’ and ‘lifestyle’ benefits. Economic issues were only mentioned once in the sidewalk survey, but were identified as a top three benefit on the postal survey by one third of the respondents. This suggests that while the economic or ‘market’ benefits of farmland are recognized in the community they are not at the top of mind when considering the benefits of having farmland in the community.

The attributes contributing to the public benefits of farmland can be considered as either ‘ecological’ services or ‘amenity benefits’. Ecological services, such as wildlife habitat and groundwater recharge, are determined by the area of land available to provide the ecological services. The value of amenity benefits such as greenspace, lifestyle, viewsapes and others are determined by the number of people living in the community who receive the benefits.

A variety of methods were used to estimate the value of the public benefits of farmland. The methods, the process and the analysis are detailed in the body of the report. Any potential negative impacts of farming were also considered and subtracted from the positive benefits. The project was a co-operative effort with the Public Policy Program at Simon Fraser University. The table below summarizes the findings as they relate to the long term public benefits from an acre of farmland:

Public Benefit	Present Value/Acre
Amenity Benefits	\$26,518
Public Nuisance Cost (odour)	<\$4,019>
Ecological Services (value of goods produced)	\$980 (fish)
	\$6,011 (water)
Total	\$29,490

The results can be stated as follows:

The present value of the stream of public amenity benefits and ecological services provided by each acre of farmland in Abbotsford in 2007 is estimated to be:

\$29,490

To interpret the estimate of public amenity values, it is helpful to recognize that the amenity benefits from farmland, like most public goods, are non-excludable. This means that when one person benefits from the good it does not exclude another person from also benefiting. This is in contrast to private goods that are for the benefit of one individual – **at the exclusion** of all others. An example of excludable goods is your computer or your car. An example of the non-excludable nature of public goods is captured by two neighbours, both with views of farmland, chatting over a summer barbeque. One neighbour says to the other, I really like my view of farmland. I like it so much I plan to buy another view - would you be willing to sell me your view?

One implication of the non-excludability of the amenity benefits of farmland is that their value varies with population. The more people who benefit from a public good the more value it has. If the population of Abbotsford meets the projected increase of 50 percent by 2030¹, the estimated value of the public benefits of farmland in Abbotsford would increase to \$40,192 per acre.²

Another implication of the non-excludable nature of amenity benefits is that public benefits cannot be compared directly with private benefits. If the farmland being viewed by our two neighbours in the example above was up for urban development, the developers could not pay the neighbours an amount per acre to compensate them for the loss of their public benefit. This is treating a public good as if it were a private good, which it is not. The two neighbours could not take monetary compensation to a 'public goods' store and buy some other public good to offset what had been lost.

¹ Lower Mainland Employment Study. 1998.

² \$40,192 is not simply 1.5 times \$29,490 because only the amenity benefits increase as population increases. Ecological services are based on the land base and value of the services provided. They stay the same as population changes.

The correct interpretation of \$29,490 per acre is that it is an estimate of the public benefits provided by the use of one acre of land as farmland and is only comparable to estimates of the public benefits provided by other uses of one acre of land.

This begs the question – what is the value of the public benefits from other land uses? One indicator of the public benefit of other urban land uses is the net taxes contributed by the land use – property tax revenues minus services received. A recent study in Abbotsford estimated the net taxes from different land uses³. Using this information, the present value of the public benefits from industrial land use is estimated at \$14,000 per acre and the public benefits from residential land use is estimated at - \$13,960⁴ per acre.

It is important to emphasize that these estimates are for a specific time and a specific location.

It is hoped that the information developed in this study will encourage land use decision makers to include the public benefits, as well as the private benefits, of land use in future land use decisions.



³ *Direct Financial Contribution of Farming Areas to Local Governments in British Columbia*, 2005.

⁴ The public benefit for residential land use is negative (red) because single family residential areas use more in local government services than property taxes collected.

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1.0 Introduction

The Fraser Valley is blessed with spectacular views, abundant water and moderate climate; attributes which can be referred to as natural capital. The abundance of natural capital in the Fraser Valley makes it a desirable place to live and one of the most productive farming areas in North America.

The population in the Fraser Valley is growing, and farmers are expanding their production to meet the growing local food needs. This creates land use pressures on both sides of the urban-rural edge. When making land use decisions, it is important for decision makers to take into consideration the public benefits that various land uses provide the community.

Sometimes these public benefits are referred to as non-market values, amenity benefits, ecological services or environmental benefits. This study uses the term amenity benefits and ecological services. Amenity benefits refer to benefits such as access to local food, greenspace, lifestyle and views while ecological services refer to public benefits from riparian habitat, wildlife habitat and groundwater recharge. Much of the existing work on the value of amenity benefits and ecological services focuses on the value of natural capital in a pristine environment. However, farmland is a managed environment, and little work has been done to estimate the value of its public benefit. This study looks at the benefits of one land-use over another, rather than looking at the absolute benefits of a natural landscape. The potentially negative impacts of farming activities are included in the estimation.

The study methodology involved three steps. First, an intercept survey⁵ was done to identify the attributes of farmland most recognized by urban residents⁶. Second, a postal survey was conducted to solicit urban residents' willingness to pay for maintaining the desirable attributes of farmland. Finally, respondents to the survey, that indicated a willingness to engage in further discussion, were invited to a focus group session to explore how they interpreted the survey questions.

Valuing natural capital has been criticized for producing very generous estimates of the value of the benefits to the public. The estimates of ecological services from farmland in this study were limited to areas where there were clearly identified benefits and accurate data to support the estimates. An additional moderating affect on the estimate of amenity benefits was the respondent's sensitivity to another property tax increase. The survey was mailed out one month after homeowners received their tax notices with the first tax increase from a major infrastructure initiative.⁷

Section 2 of the report describes the general approach to estimating the value of public amenity benefits and ecological services. Section 3 reviews previous work in this area while Section 4 provides a more detailed description of the methods used in this study. Section 4 adds the analytical component to the discussion in Section 2 so by nature has some repetitive elements. Those familiar with the topic may wish to skip section 2. Results are presented in Section 5 and discussed in Section 6. The intercept survey report, mail out survey form and cover letter, the raw data from the survey and focus group study summary are provided in the appendix.

The report opens with an interpretive summary. It is hoped that this will provide readers, that do not wish to explore the details of the methodology, with the key findings and an interpretation of the results.

⁵ An intercept survey involves interviewing people on the street and asking them a short list of questions on a specific subject. Results of the intercept survey are in appendix 8.3.

⁶ Urban residents are those residents living within the urban development boundary. Residents in the farming area were not surveyed.

⁷ Plan A is an infrastructure initiative, approved by referendum, that adds approximately \$150 to the annual property tax bill of the average home in Abbotsford.

2.0 General Approach to Valuing the Public Benefit of Farmland

2.1 APPROACH

Traditional economic analysis focuses on evaluating the quantity of a good or service available and its price in the market place. However, many things that benefit the public are not traded in the market place and traditional economic methods must be modified to estimate their value. Many types of natural capital fall into this category.

Despite the fact that farmland tends to provide less natural capital than pristine natural environments, it is clear that it provides benefits beyond the market values derived from the production and sale of agricultural products. Some examples include access to local food production, wildlife habitat, scenic views and recreational opportunities.

There are various ways of estimating these non-market goods in order to come up with an all-encompassing amenity value for farmland. One way is to estimate the total benefit of farmland by adding the benefits of each individual non-market attribute. In this instance, the residents of a given community would be asked how much they value each individual attribute of farmland and these values would then be added together.

Alternatively, investigators can ask residents general questions about how they value farmland in order to get a single value that presumably encompasses the benefits of all individual attributes. Regardless of whether the public is asked about individual attributes of farmland or farmland in general, it is not easy for individuals to attach precise values to non-market goods. This study uses several estimating techniques and when possible, to improve confidence, more than one technique is used to estimate the value of individual attributes of farmland. The potentially negative impacts of farming activities are also included in the final estimation.

2.2 GENERAL METHODS FOR ESTIMATING NON-MARKET VALUES

The various techniques used to estimate the value of non-market goods fall into the two broad categories of revealed preference and stated preference. Revealed preference includes methods that use expenditures on market goods to reveal an individual's demand or preference for a non-market good. Stated preference refers to methods that ask people how much they are willing to pay for a given non-market good and estimates are based on the answers received. Stated preference is often considered less reliable because it asks people what they would do rather than measure what they have done. This study uses techniques from both of these categories, each of which is described below.

2.2.1 Contingent Valuation (stated preference)

This stated preference method asks study participants what they would be willing to pay to retain a non-market benefit or what they would be willing to accept as compensation for the loss of that non-market benefit. Contingent valuation questions are often based on hypothetical scenarios, which must be carefully designed to ensure that respondents understand what they are being asked to value.

2.2.2 Hedonic Pricing (revealed preference)

This revealed preference method is used to estimate the value of particular non-market attributes that have a direct impact on the price of market goods. For example, this study compares the market price of residential lots that have a view of farmland to those without a view of farmland in order to determine the incremental amount individuals have paid for the scenic views provided by farmland.

2.2.3 Travel Cost (revealed preference)

This revealed preference method estimates the value of a particular location by measuring how much people are willing to pay to travel there. It is often used to value sites used for recreation.

2.2.4 Benefit Transfer

This estimation method entails simply using non-market good value estimates from existing studies. It is widely used because time or money constraints often limit the ability of a particular study to examine the value of more than one non-market good. Investigators using this method must make certain that their study parameters are comparable to those of the study from which they get their estimates.

2.3 POTENTIAL AMENITY BENEFITS AND ECOLOGICAL SERVICES ATTRIBUTED TO FARMLAND IN ABBOTSFORD

2.3.1 General Benefits Identified in Other Literature⁸ and the Intercept Survey⁹

The non-market benefits ascribed to farmland by existing literature include:

- plant and wildlife habitat,
- soil erosion control,
- flood protection,
- improved water quality,
- carbon sequestration,
- scenic views,
- recreation opportunities, and
- providing a safe and reliable food supply.¹⁰



These benefits are often grouped into active and passive benefits. Recreation opportunities are an example of an active benefit because they require individuals to take action in order to benefit from the non-market good. Wildlife habitat is an example of a passive benefit because individuals do not have to do anything in order to benefit from the knowledge that wildlife habitat is being protected.

It is important to keep in mind that farmland will not provide the same amount of natural capital as a pristine environment. In addition, farmland in different places, and even within different parts of a single farming area, often provide a unique set of ecological services.

⁸ See Section 3 and the Bibliography in Section 7.

⁹ In Appendix Section 8.4.

¹⁰ Ducks Unlimited Canada, "Agriculture and the Environment" in Natural Values: Linking the Environment to the Economy, available at: www.ducks.ca/conservation/wetland_values/conservation.html, [November 2006].

The most frequently identified positive attributes of farmland in the Abbotsford intercept survey were:

- local food production
- calmer lifestyle,
- environmental values, and
- the presence of farm animals ¹¹

2.3.2 Characteristics of Farmland in Abbotsford that Relate to the Provision of Ecological Services

Farmland in Abbotsford is characterized by three distinct areas: Mount Lehman uplands, Abbotsford Airport Area and Sumas and Matsqui Prairie. Each area has particular soil types and hosts particular types of farms. This study estimated the value of ground water recharge on farmland in Abbotsford in each of the three different areas and then amalgamated them to produce a total for the city.¹²

The uplands area is often referred to as the Mount Lehman/Bradner area. Soils in this area are described as, ‘moderately to well drained, medium textured material of varying thickness, overlying dense compacted sub-soil’.¹³ Agriculture activities in this area are dominated by poultry, nursery, horticulture and pasture for small livestock operations. The area has many small streams so is a significant contributor of riparian habitat. The dense sub-soil limits the flow of nitrates into the groundwater, so groundwater pollution is not a significant concern in this area.

Soils in the Abbotsford Airport area have developed on well or rapidly drained silty loess material overlying gravelly outwash or glacial till. The land is level and the underlying gravelly material contains the Abbotsford Aquifer, an unconfined aquifer. The dominant agriculture activities are berry and poultry production. The soil type and agriculture operations in the Airport area provide conditions that can lead to nitrate contamination of the groundwater. This study took this into consideration when estimating the value of groundwater recharge. There are few streams in this area due to the topography and soil characteristics.

The Matsqui and Sumas prairies have medium-textured stone-free soils with a relatively high water and nutrient holding capacity. The dominant agriculture production is dairy, berry and nursery crops. There are streams present but there are limited groundwater resources underlying these areas, consequently they were not considered in the estimates for groundwater recharge.

2.4 SPECIFIC APPROACHES TO ESTIMATING THE AMENITY BENEFITS AND ECOLOGICAL SERVICES OF FARMLAND IN ABBOTSFORD

2.4.1 General Willingness To Pay for Farmland Preservation

The primary tool used to gather data on the broad value of the amenity benefits and ecological services provided by farmland in Abbotsford was a postal survey to a random sample of urban residents¹⁴ in Abbotsford. The survey¹⁵ asked the respondent to picture a scenario in which the city council proposes

¹¹ The results of the Intercept Survey are in Appendix 8.4.

¹² Please see map in the appendix for the boundaries of the three areas.

¹³ From *Soil Management Handbook for the Fraser Valley*.

¹⁴ Urban residents refers to all the residents within the urban boundary. Rural residents were not surveyed.

¹⁵ The full survey form is included in the appendix.

to use 1,000 acres of farmland for urban development. Respondents were asked to indicate the maximum amount they would be willing to pay in additional property taxes to have the land remain as farmland. Respondents were then asked what they would be willing to pay to prevent the loss of 1,000 acres of farmland if one half of the existing farmland had already been lost to urban development and then finally, if the 1,000 acres was the last 1,000 acres of farmland in Abbotsford. These questions provide the urban residents willingness to pay to preserve farmland for three different quantities of farmland in the community.

The scenario asked for a ‘general’ willingness to pay for farmland preservation and did not attempt to break down the reasons or distinguish the difference between the market or non-market benefits of farmland. The benefits from farm wages and the sale of farmland production, benefits that are traded in markets, were not specifically excluded.¹⁶

In order to explore how the community values some of the particular attributes of farmland, respondents were asked a number of questions about specific amenity benefits.

2.4.2 Specific Amenity Benefits and Ecological Services Estimated in This Study

This section discusses the approach this study took with each specific attribute that was estimated and explains why some attributes were not included.

2.4.2.1 Local Food Production

In the intercept survey, local food production was the most frequently mentioned benefit of having farmland in the community. This attribute was estimated three ways:

- a) Contingent valuation. Respondents to the postal survey were asked how much more they would be willing to pay for a dozen cobs of corn from Abbotsford than for a dozen cobs of corn from California.
- b) Travel cost method. Respondents to the postal survey were asked how many times a year they visit local farms to buy farm products and how far they travel on each trip.¹⁷
- c) Market Price Savings. Price data on various locally grown products in Abbotsford and in Vancouver was collected to determine whether local products were less expensive when bought and consumed closer to farmland.

2.4.2.2 Access to Farm-based Recreation

Abbotsford residents have easy access to farm-based recreation opportunities including farm tours, corn mazes, and farm petting zoos. This attribute was estimated with the travel cost method by asking respondents to the postal survey how many times a year they visit local farms for recreation and how far they travel on each trip.

¹⁶ In the intercept survey, when asked what first comes to mind when you think of farmland in the community, only 1.2% of the respondents mentioned the business side of agriculture.

¹⁷ This information was also verified through the data collected from farmers on the visits to their farm stands.

2.4.2.3 Scenic Views

Many urban homes in Abbotsford have views of the farmland that currently surrounds the city. This study measured this attribute of farmland in two ways.

- a) The postal survey asked respondents whether they live in a home with a view of farmland. If they answered yes, respondents were asked how much they would be willing to pay to prevent the loss of the farmland they can see from their home. If they answered no, they were asked how much more they would be willing to pay for a similar house with a view of farmland.
- b) The hedonic pricing method compared the price of residential lots with views of farmland to those without a view of farmland.

2.4.2.4 Riparian Habitat

Riparian areas provide essential habitat and food sources for fish and other wildlife. Whole streams, or portions of them, are often lost when land is developed for urban uses. This study used stream maps to estimate the stream density in areas with urban development and areas with farmland. Any incremental gains in stream length in the farmland areas were considered an ecological service provided by farmland.

2.4.2.5 Groundwater Recharge

Groundwater is an important resource in most communities. Abbotsford residents in the urban part of Abbotsford receive water from either the City of Abbotsford or Clearbrook Water Works. The City of Abbotsford uses groundwater as a backup supply for its municipal water system. Clearbrook Water Works uses groundwater exclusively for a portion of Abbotsford drinking water, and some rural residents use groundwater as their main water source. Urban development increases the amount of impervious surface in a given area, which increases runoff and decreases groundwater recharge. Any incremental gains in groundwater recharge from the higher level of permeable surface on farmland as compared to urban developed land, were considered an ecological service provided by farmland.

2.4.2.6 Wildlife Habitat

The farmland in Abbotsford is home to many types of wildlife. This attribute was measured by asking postal survey respondents how much they would be willing to donate to a non-profit trust that would protect 1,000 acres of wildlife habitat on farmland.

2.4.3 Specific Amenity Benefits and Ecological Services NOT Estimated in This Study

2.4.3.1 Carbon Sequestration

This study did not estimate carbon sequestration on farmland. The amount of carbon sequestered tends to remain stable under consistent farming practices and increases or decreases when farming practices change. Agriculture in the Fraser Valley has adopted many of the practices that tend to increase carbon sequestration, such as cover cropping, but has also seen significant changes in land use patterns over time. Without a detailed analysis of the land use activities and management practices it is not possible to estimate the level of carbon sequestration on the farmland in Abbotsford. Carbon credits currently trade in open markets so when an estimation of the level of sequestration is developed it will be easy to estimate the value of the ecological services provided by farmland.

2.4.3.2 Soil Erosion / Soil Conservation

This study did not estimate this potential benefit of farmland because no studies on the impact of farming on soil conservation and soil erosion could be found that would be transferable to the Fraser Valley.

2.4.3.3 Recreational Hunting and Fishing

This study did not include recreational hunting and fishing as a benefit due to time and data constraints. One approach would be to identify the number of hunters in the area and estimate the money spent on licenses, travel and accessories per day of hunting or per license per year. Other studies have used this technique with recreational fishing. Olewiler (2006) estimated the ecological service provided by recreational hunting and fishing in the Fraser Valley at \$36/ha/yr but felt that this value could not be automatically transferred to Abbotsford without checking local conditions first.

2.4.3.4 Reduced Flooding

Farmland in Matsqui Prairie and Sumas Prairie are in the Fraser River Floodplain and are managed through a series of dikes and pumps. They do not impact flooding. The Abbotsford Airport area is over an unconfined aquifer so flooding is not an issue in this area. Maintaining the Uplands as farmland, instead of converting it to urban development, will minimize surface flows and reduce the need for additional drainage infrastructure. This was not considered a significant benefit at this time so with no clear methodology, a benefit from reduced flooding was not estimated.

2.5 POTENTIAL BIAS IN NON-MARKET VALUE ESTIMATIONS

It is important to recognize both the strengths and limitations of this study's estimates of the amenity benefits of farmland. The following section captures some of the key areas of concern about valuing non-market goods and discusses how this study addresses them.

2.5.1 Contingent Valuation Question Bias

When using the contingent valuation method, the clearer the question and the more realistic the scenario, the more likely it is that the respondent can accurately place a value on the specific benefit in question. For the three questions regarding the broad value of farmland preservation, the scenario for respondents to consider involved the removal of 1,000 acres of farmland for urban development. Respondents were asked about their willingness to pay, through a property tax increase, to preserve the land as farmland. This scenario was likely very familiar to local residents, given that the City of Abbotsford requested the removal of 1,300 acres from the Agriculture Land Reserve for urban development in 2005. More recently, the residents of Abbotsford approved a referendum that funds arts and recreational infrastructure development via a property tax increase.

The focus group provided strong support that the 'farmland loss' question was a very realistic scenario and was well understood by the survey respondents.¹⁸

¹⁸ A summary of the focus group report is in Appendix 8.4

The potential bias associated with the contingent valuation approach to estimating the amenity value of farmland loss are:

- An upward bias from not specifically excluding the economic benefits from the contingent valuation question
- A downward bias from conducting the survey within a month of households receiving their first tax bill from an infrastructure upgrade.

2.5.2 Survey Design Bias

Researchers have reported that the order in which questions are asked in a survey can influence the response¹⁹. To minimize any question order bias, three different versions of the survey were evenly distributed to the three survey areas, each with the questions in a different order.

Researchers have also found that in sequential questions, the response to the first question in a sequence can bias the responses to the second and third question²⁰. This potential bias existed in the 'farmland preservation' question. To minimize this potential bias with the data from the three questions on the broad value of farmland preservation, responses for the first question were analyzed from 1/3 of the respondents, for the second question from a different 1/3 of the respondents, and for the third question from the last 1/3 of the respondents.

2.5.3 Benefit Transfer of Ecological Services Bias

Estimates of ecological services often involve using estimates developed in other areas and transferring them to the study area. This reduces the accuracy of the estimates, as no two areas are exactly the same. The ecological services estimated in this study are limited to ones where local information was available.

2.5.4 Survey Distribution Bias

In order to get a diverse and representative sample, this study distributed an even number of postal surveys to three different areas of Abbotsford. The intention was to receive surveys from people of all income levels and from residents both with and without views of farmland from their homes.

2.5.5 Agricultural Land Reserve Bias

British Columbia is one of very few jurisdictions in North America that has a farming area protected by provincial legislation. The Agricultural Land Reserve (ALR) sets aside specific lands where agriculture is the primary use and any other uses must be approved by the BC Agricultural Land Commission.

The ALR has been in place since 1972 and has a high degree of awareness and support among residents in urban areas.²¹

¹⁹ Bibliography is in Section 7

²⁰ Bibliography is in Section 7.

²¹ Over the life of the ALR, public opinion polls have identified public support for the ALR around 90% +/- 5%. *Stakes in the Ground*, <http://www.agf.gov.bc.ca/polleg/quayle/stakes.htm>

The presence of a relatively strong regulatory mechanism likely impacts the urban population's willingness to pay for farmland preservation. Taxes are currently being used to support the Agricultural Land Reserve by paying for the administration of the ALC. In addition, landowners were compensated for loss of development rights at the inception of the ALR by reducing the school tax rate in the ALR by 50 percent and by providing a Farm Income Insurance program for farmers. The Farm Income Insurance program ended in the early 1990's. The lower school tax rate still applies.

It is likely that the existence of the ALR will have a negative bias on the willingness to pay to preserve farmland and also increase the proportion of respondents that are unwilling to pay anything for farmland preservation.



3.0 Previous Work on Valuing the Amenity Benefits of Farmland

There is a large body of work related to estimating the value of natural capital and ecological services. Some researches have applied these methods to estimate the amenity benefits and ecological services provided by farmland near the urban fringe.

The early efforts at valuing the amenity benefits of farmland are captured by Halstead (1984), Bergstrom et al. (1985), Beasley et al. (1986) and Bowker and Didychuk(1994). These studies estimated how the public valued varying levels of urban development on farmland and how the public valued farmland when different quantities were being preserved. This work was driven in part by a growing interest in the US in preserving farmland through the purchase of private property development rights.

These studies used ordinary least squares (OLS) in the analysis and estimated a household willingness to pay (WTP) for preserving farmland. Most also estimated the WTP over different quantities of farmland preservation. This provides an estimate of WTP using consumer surplus rather than using a marginal WTP for a specific quantity of farmland. The results for the various scenarios ranged from \$6/year to \$176/year. Table 3.1 contains a brief summary of their location, approach and results:

Author	Location	Approach	Result
Halstead	Massachusetts	<ul style="list-style-type: none"> * WTP for development rights to protect farmland * 3 levels of development intensity and 3 communities with different quantities of farmland * one on one interviews 	<ul style="list-style-type: none"> * \$28/yr to \$60/yr based on intensity of urban development * \$50/yr - \$90/yr based on level of farmland in the community
Bergman et al.	South Carolina	<ul style="list-style-type: none"> * WTP for protection of 4 different quantities of farmland * mail survey * payment option given 	<ul style="list-style-type: none"> * \$5.70/yr for the smallest quantity * \$8.94/yr for the largest quantity.
Bowker and Didychuk	New Brunswick	<ul style="list-style-type: none"> * WTP for protection of 4 quantities of farmland * one on one interviews * payment into a tax exempt trust 	<ul style="list-style-type: none"> * \$49/yr for the smallest quantity * \$86/yr for the largest quantity
Beasley et al	Alaska	<ul style="list-style-type: none"> * WTP to protect against different types/levels of development * one on one interviews 	<ul style="list-style-type: none"> * \$76/household for moderate development

Results from Bergman et al. are an order of magnitude lower than Halstead and Bowker and Didychuk. In the discussion of results, Bergman et al. suggest that the results in their study area were low, likely

because ‘Greenville County is located in a predominantly rural area; and alternative supplies of agricultural land amenities are not difficult to find’.

This compares to Halstead’s description of his study area where ‘between 1967 and 1977 approximately 300,000 acres of active and potential farmland were converted to urban uses’. The New Brunswick area studied by Bowker and Didychuk had ‘experienced rapid urban and industrial development resulting in a loss of approximately 397,000 acres of farmland from a base of 492,300’.

Farmland in Abbotsford, as the least expensive land available, is under pressure for conversion to non-farm uses to accommodate the projected 50 percent increase in population over the next 25 years. Given this situation, it is anticipated that the WTP for farmland preservation in the Fraser Valley would be more similar to the Halstead and Bowker and Didychuk results than to the Bergman et al. results.

More recent work by Chang (2005) used a similar study approach in Taiwan and found a household WTP for farmland preservation of \$50/yr.

Other more recent work has focused on specific components of the amenity benefits or ecological services provided by farmland. Knowler et al. (2003) estimated the value of fish habitat on farmland in the interior of B.C. to be between \$1,300/km and \$7,200/km of stream length. Christie et al. (2004) found that the WTP for set-a-sides for biodiversity in the U.K. was between £42 and £58/yr. Using the travel cost method, Fleischer and Tsur (2000) estimated that tourists in Israel valued the recreational aspects of farmland between \$49 and \$67 per visit. More recent studies have chosen the Heckitt two step process with the probit model in an effort to recognize the unobserved zero responses.

Recently Fleisher and Tsur (2005) incorporated the amenity values of farmland into a model designed to estimate the socially optimal allocation of land between urban and rural use. A component to the optimizing exercise is the recognition that public amenity values are non-exclusive. Non-exclusivity means one person’s ability to receive the benefit does not exclude another’s ability to receive benefit. This creates a situation where benefits rise with population, and also rise with loss of farmland and provides the basis for the optimization question – at what point do the public benefits of land used as farmland exceed the public benefits of land used as urban development?²²

This study will follow a similar form as the early work of Halstead, Bergman et al and Bowker and Didychuk focusing on estimating the overall WTP for farmland preservation in the municipality of Abbotsford. Specific amenity benefits will be analyzed with various methods, and then compared to the overall WTP estimates.

It is important to note that the areas where most of the previous work has been done have already lost 50 percent of the farmland to urban development. In Abbotsford, 75 percent of the city’s land base is designated as farmland and falls within the Agricultural Land Reserve.



²² There would be a direct relationship between population and the level of amenity benefits as long as the growth pattern remains the same. If development reduces to potential for individuals to enjoy the amenity benefits, for example high density reduces the proportion of residences that have a view, the relationship may be slightly less than one.

4.0 Methodology

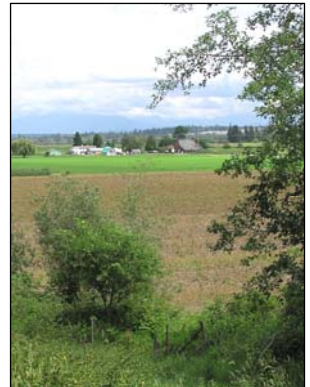
The approach used to estimate how the urban population values farmland involved the following steps:

1. Undertake an ‘intercept’ survey to identify the key concepts that local residents attach to farmland,²³
2. Send a postal survey to 2,500 local households soliciting their willingness to pay for specific attributes of farmland and general farmland preservation,
3. Use responses from the postal survey, travel cost, hedonic pricing, benefit transfer and other methods to estimate the benefits of specific characteristics of farmland and finally,
4. Facilitate a focus group²⁴ to confirm how respondents interpreted the questions in the postal survey.

The postal survey was designed using the results from the intercept survey and was developed over the course of one month using input from both MAL government employees and university professors.²⁵ The sample of 2500 Abbotsford addresses were chosen by taking the addresses of all households on the B.C. Assessment role, separating them into three groups based on the area of town where they were located, then choosing every eighth address within each subgroup. Three different design of survey forms were developed to minimize response bias²⁶ and they were distributed evenly between the three areas.

The balance of this chapter provides a detailed description of the methodology used in estimating:

4. The overall value of farmland preservation
- 4.2 The benefit to Abbotsford residents of local food production and agri-tourism
- 4.3 The benefit to Abbotsford residents of scenic views of farmland
- 4.4 The benefit to Abbotsford residents of the ecological services provided by farmland through increased:
 - Wildlife habitat
 - Quantity and quality of riparian areas
 - Groundwater recharge
- 4.5 The cost to Abbotsford residents of farming related nuisance.



4.1 THE VALUE OF FARMLAND PRESERVATION

The key questions in the postal survey on the broad value of farmland preservation were located in a part of the survey titled “Loss of Farmland.” The explanation above the questions provided respondents with a scenario in which 1,000 acres of farmland would be rezoned by the city council for urban development.²⁷ Respondents were asked what they would be willing to pay in additional property taxes to have the land remain as farmland in three different situations²⁸:

- i. the current quantity of farmland
- ii. after 50 percent of the existing farmland had already been lost to urban development, and
- iii. if the 1,000 acres was the last remaining farmland in Abbotsford

²³ An intercept study ‘intercepts’ people on the street and asks them a few questions on a specific topic. The intercept survey for this project interviewed 113 people outside West Oaks Mall and Zellers in Abbotsford and asked them several questions related to farmland in their community. The results from this survey are in Appendix 8.4.

²⁴ Respondents to the postal survey were provided with an option to discuss farmland preservation further at a focus group session. The focus group was composed of these volunteers.

²⁵ See Appendix 8.3 for the postal survey and cover letter.

²⁶ The three designs had the WTP questions in different order to guard against question order bias.

²⁷ The question was titled ‘Loss of Farmland’ in the survey. See Appendix 8.1.

²⁸ Because the response to part i may bias the response to part ii and part iii, the answer to only one part was taken from each survey. Part i was used from one third of the survey, part ii from another one third and part iii from the final third.

The willingness to pay responses for each question were regressed upon a variety of demographic characteristics in order to identify any characteristics of the population that significantly increased or decreased the willingness to pay. The equations took the following form:

$$WTP(i) = f\{Y, E, G, R, F, L, A, H, I\} \quad (4.1)$$

$$WTP(ii) = f\{Y, E, G, R, F, L, A, H, I\} \quad (4.2)$$

$$WTP(iii) = f\{Y, E, G, R, F, L, A, H, I\} \quad (4.3)$$

Where:

WTP(i) = WTP to preserve 1,000 acres with current quantity of farmland
WTP(ii) = WTP to preserve 1,000 acres after 50% of the existing farmland is lost to urban development
WTP(iii) = WTP to preserve 1,000 acres if they were the last 1,000 acres
Y = the years of residency in Abbotsford
E = the education level reached by the respondent
G = gender (dummy²⁹)
R = rent or own (dummy)
F = household member works in farm related business or not (dummy)
L = household member works in land development or not (dummy)
A = age of respondent
H = number of people in the household
I = annual household income



There were no prior expectations regarding functional form so the equations were tested in both log and linear forms to determine the best fit.

If one were to plot the mean value of WTP(i), WTP(ii) and WTP(iii), the three points would fit on a curve that describes the relationship between a household's WTP for farmland and the quantity of farmland available³⁰.

Economic theory predicts $WTP(iii) > WTP(ii) > WTP(i)$, that there is an inverse relationship between the quantity of farmland and WTP and that the relationship is not linear. This relationship can be described in the following general form:

$$WTP = a + Q^b - u \quad (4)$$

Where WTP = a household's willingness to pay for preserving farmland
a = a constant
Q = the quantity of farmland available in the community
u = an error term

The general form of equation 4 is shown below in figure 4.1:



²⁹ A dummy variable has a value of 1 or 0 and is used to distinguish if the characteristic exists or not. In this way the dummy variable captures any variation due to the specific characteristic it represents.

³⁰ The demand curve described by the three points is the household demand curve as compared to individual demand curve so values are aggregated by household rather than by population.

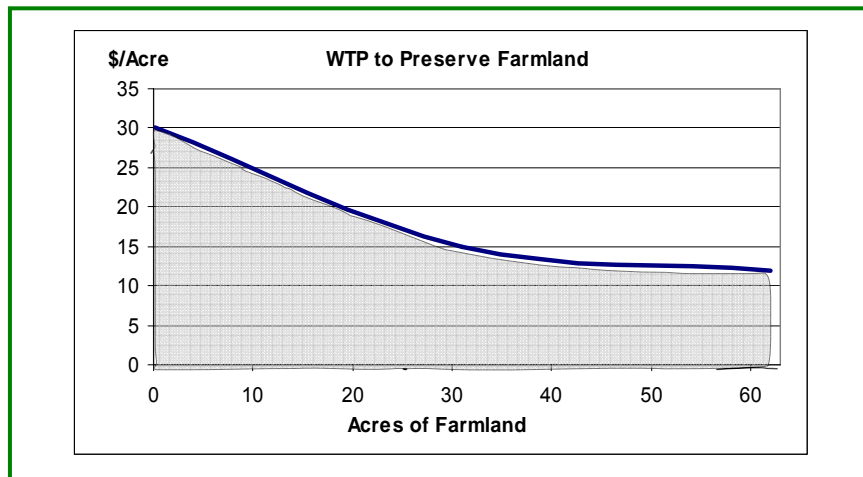


Figure 4.1 The general relationship between a household's WTP for farmland preservation and the quantity of farmland available.

There are approximately 62,000 acres of farmland in Abbotsford so the total benefit to a household³¹ is the area under the curve, between 1(000) acres and 62(000) acres on the horizontal axis. It is represented as the shaded area in figure 4.1.

The 'Loss of Farmland' questions posed a scenario in which respondents could choose to pay additional property taxes **each year** to preserve farmland. The present value of an annuity in perpetuity, using a 5 percent discount rate, was used to convert the nominal amount of the annual tax payment to the value of a stream of tax payments. Most of the specific benefits will continue in perpetuity so they are also converted into the value of a stream of payments for comparison purposes.



³¹ This refers to the consumer surplus benefit received by a household.

4.2 BENEFIT OF LOCAL FOOD PRODUCTION AND AGRI-TOURISM

Results from the intercept survey show that the most frequently identified benefit of farmland is local food production.³² Respondents gave reasons such as quality/freshness, better for the local economy, better prices, and better for the environment.

Three approaches were used for estimating the benefits of local food production:

- a. Stated Preference. Question 1.5 asked residents how much more they would be willing to pay for a dozen cobs of corn from Abbotsford than a dozen cobs of corn from California in the grocery store.
- b. Revealed Preference. Local residents incur travel costs when they drive to farms to buy local products or take part in recreational activities on farms. Questions 1.2, 1.3, and 1.4 asked questions about how often and how far people travel to buy products direct from the farm. Travel costs were estimated as follows:

Travel Costs value/acre = [total households * average trips per year * average cost per trip * PV\$1] / acres of farmland in Abbotsford



- c. Market Price Savings. Prices of a variety of popular local products were compared in Abbotsford and Vancouver markets to estimate this price difference. Market Price Savings (MPS) was estimated using the following equation:

MPS value/acre = [total trips per year * sales per trip³³ * premium for local * PV\$1] / acres of farmland in Abbotsford

4.3 SCENIC VIEWS OF FARMLAND

Respondents to the intercept survey used words like 'rural', 'lifestyle', 'natural', 'greener' and 'less urban' to describe some of the benefits of farmland in their community. The scenic view of farmland captures some of these concepts. It was estimated with the contingent valuation method and by estimating a hedonic pricing model for farmland views.

In the section of the postal survey titled 'farmland and scenery' the scenic view benefit of farmland was estimated by asking residents what they would be willing to pay for either maintaining a view of farmland from their home or gaining a view of farmland from their home. The benefit of the two perspectives was estimated as follows:

Scenic Value (buy) /acre= [households in Abbotsford without a view * average house price in Abbotsford * average WTP for a house with a view] / acres of farmland in Abbotsford

Scenic Value (protect) /acre = [households in Abbotsford with a view * average WTP to protect a view * PV\$1] / acres of farmland in Abbotsford

³² When asked if farmland was a benefit 98% said yes and when asked why 53% said local food production. The next most common response was 'lifestyle' at 18%.

³³ *Economic and Community Impacts of Farmers Markets in British Columbia*, 2006. B.C. Association of Farmers Markets and University of Northern British Columbia.

The willingness to pay to buy a view of farmland represents the value of a stream of benefits over time. Therefore, it does not need to be converted into a present value.

Real estate transactions place a market value on scenic views. Lots with a view tend to sell for more than lots without a view. A hedonic price analysis was done on the sale price of lots in Abbotsford, as a revealed preference approach, to estimate the value of a view of farmland. All lots sold through the MLS³⁴ service from June 2005 to June 2007 were included in the analysis.³⁵ The hedonic equation used is as follows:

$$\text{Sales Price} = a_0 + a_1 S + a_2 (Y_2) + a_3(Y_3) + a_4V + U$$

Where

Sales Price = nominal sales price of the lot

S = square footage of the lot

Y2 = dummy, 1 if sold in 2006, 0 if not

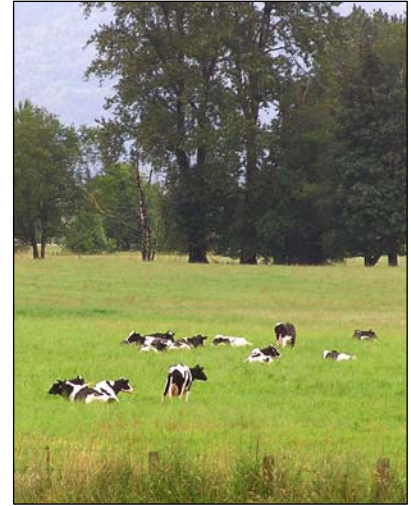
Y3 = dummy, 1 if sold in 2007, 0 if not

V = dummy for view of farmland, 1 if view, 0 if not

U = error term

Nominal values were used because the dummy variables capture inflationary trends³⁶.

Results from the three different estimation methods were compared and contrasted.



4.4 THE ECOLOGICAL SERVICE BENEFITS TO URBAN ABBOTSFORD RESIDENTS PROVIDED BY FARMLAND

The following ecological services are provided by farmland in greater amounts than land that has been developed for urban uses and could be estimated using existing data and/or valuing techniques:

- wildlife habitat
- quantity and quality of riparian areas
- groundwater recharge

4.4.1 Wildlife Habitat

Wildlife habitat has been recognized as an important ecological service. Farmland provides a variety of habitats for wildlife. To estimate how much the public values the wildlife habitat contribution of farmland in Abbotsford, respondents were asked how much they would be willing to contribute to a non-profit trust to protect 1,000 acres of wildlife habitat on farmland.

³⁴ Multiple Listing Services of the Fraser Valley Real Estate Board

³⁵ Lots were used because new building lots are typically free of all amenities. The only aspects that vary are the neighbourhood characteristics and the viewscape. The lots were spread evenly throughout the community and there was not a clear 'neighbourhood' distinction that could be used.

³⁶ Dummies were preferred because the real estate market was undergoing rapid change that varied between local communities. Use of a 'deflator' estimated over a broader area would have been less accurate.

Wildlife habitat value was estimated using the following equation:

$$\text{Wildlife Habitat value / acre} = [\text{total households} * \text{average WTP/1,000 acres} * \text{PV \$1}] / 1,000 \text{ acres}$$

4.4.2 Riparian Habitat

Farmland tends to have more streams than urban developed land and farmers, following environmental regulations, do not have a significant negative impact on riparian areas. The City of Abbotsford has maps of all streams in the municipality, which are available in digital form. Geographical information systems (GIS) were used to estimate the stream density on land under urban development and the stream density on farmland. The difference between these two amounts was used to estimate the ecological services provided by riparian habitat on farmland. The stream density estimate for all farmland incorporated the different stream densities in the different farming areas in Abbotsford.



Various studies have produced estimates of the value of the natural capital provided by riparian habitat in other locations. Knowler et al. (2003) looked specifically at the market value of salmon habitat in the Fraser Basin. This produced a local estimate of riparian habitat value. It is important to recognize, however, that Knowler based the estimate of the value of habitat on the market value of harvested fish, so no consideration was given to other non-market values of fish and fish habitat.

The equation used to estimate the benefit from riparian habitat on farmland was:

$$\text{Riparian Habitat value} = [\text{additional stream density (meters per hectare)} * \text{hectares of farmland} * \text{riparian value per meter of stream} (\$/\text{km}) * \text{PV \$1}] / \text{acres of farmland}$$

4.4.3 Groundwater Recharge

Groundwater is becoming increasingly important in the Fraser Valley. Groundwater is recharged by rainwater, which infiltrates the soil surface and moves down to the water table. Placing buildings, roads, parking lots, etc. on land creates impervious surfaces. Rain hitting impervious surfaces is normally collected in storm drains and discharged as surface water into rivers. The amount of pervious surface on a land base is a reflection of that land's ability to provide groundwater recharge.

The amount of impervious surface on farmland was estimated using GIS data. The amount of impervious surface on land under urban development was weighted based on the primary use of the land at the time and local government lot coverage restrictions. Residential land was assumed to have 60 percent – 65 percent impervious surface, commercial was assumed to have 95 percent, industrial was assumed to have 95 percent, and farmland was estimated at 3 percent impervious surface. The value of groundwater recharge on farmland was calculated by measuring the difference between the amount of impervious surface on land under urban development and farmland.

The Farmwest web page provides current and historical climate data with a focus on the water balance.³⁷ The web page estimates the 'effective' precipitation for different areas in the Fraser Valley by climate station location. Effective precipitation is an estimate of the rainfall that gets added to groundwater.

³⁷ Sponsored by the Northwest Field Corn Association. <http://www.farmwest.com/index.cfm>

Certain portions of the Abbotsford aquifer, particularly in the airport area, have high nitrate levels. Some agricultural practices have been identified as potential contributors to the elevated nitrate levels. Unpublished work by Environment Canada on the Abbotsford Aquifer, based on well test results, provided iso-concentration maps that outline the areas with nitrate concentrations above 10 parts per million, which is the standard for Canadian drinking water. The iso-concentration maps are digitized and were analyzed with GIS to estimate the net area of the farmland over the aquifer where the water was within the Canadian drinking water standards.

The groundwater recharge benefit of farmland was estimated once for the Airport area and once for the Upland area. Groundwater resources under Matsqui and Sumas prairies were not considered, as they are not used for drinking water and do not play a significant role in providing base flows for streams.

Water was valued at the cost of obtaining water from outside the municipality boundaries.

The groundwater recharge benefit was estimated as follows:

Ground Water Recharge value (uplands) = farmland in the uplands(ha) * percent less
impervious area* groundwater recharge / year * cost of water * PV\$1

Ground Water Recharge value (airport) = (farmland <10ppm N – farmland >10ppmN) *
percent less impervious area* groundwater recharge/year * cost of water * PV\$1

4.5 PUBLIC COST OF NUISANCE ODOURS FROM FARMING ACTIVITIES

The contingent valuation method was used to estimate the cost incurred by the public as a result of nuisance odours from farmland. Households were asked how much they would contribute to a non-profit trust that would help farmers access technologies that would reduce nuisance odours. The WTP for reducing nuisance odours was estimated using the following equation:

$$\text{Nuisance Odour value/acre} = \frac{[\text{total households} * \text{average WTP} * \text{PV \$1}]}{1,000 \text{ acres}}$$

4.6 FOCUS GROUP STUDY

Despite every effort to make the postal survey questions clear, some responses left the researchers with questions as to how respondents interpreted various questions.

The focus group brought together ten people from the respondents to the survey who volunteered to discuss how they interpreted a variety of questions on the survey form. The group was not a representative sample of the population or the survey sample as they likely had strong feelings about the subject. However, they were able to provide some good insight into how respondents interpreted questions in the postal survey.

5.0 Results

This section reports on the data obtained from the postal survey, direct data collection and the focus group session. The results are discussed in section 6.

Numbers used in aggregating the data include:

STATISTIC	VALUE	SOURCE
Households in Abbotsford	39,556	Stats Canada (2006) ³⁸
Acres of Farmland (ALR)	62,532	GIS mapping
Hectares of Farmland (ALR)	26,055	GIS mapping
Present Value of \$1 in perpetuity (PV\$1)	20	Based on 5% interest rate
Mileage cost	\$.48km	Provincial Government Rate

5.1 GENERAL RESPONSE TO THE POSTAL SURVEY

Of the 2,500 surveys mailed out to Abbotsford households, 43 were returned undeliverable, leaving a maximum potential sample size of 2,457. 377 completed surveys were received from respondents for a response rate of 15 percent. The sample was drawn from three separate areas within Abbotsford. The response rate from the different areas was 31 percent, 32 percent and 37 percent. A chi square test of the response rates of the three different survey forms across three different areas indicated one of the nine cells was below the minimum expected count. This was not considered a significant problem with the data set³⁹. Households located within the Agricultural Land Reserve were not included in the sample.⁴⁰

In the 'Loss of Farmland' section of the survey, 93.8 percent of the respondents were willing to pay something to preserve the 1,000 acres as farmland. Of the respondents that indicated they would not pay to preserve the farmland, none indicated that farmland was not important to them, 94 percent said they felt they should not have to pay to preserve farmland and 6 percent wrote in a variety of reasons⁴¹. Figure 5.1 below presents these results in graphic form.

³⁸ Statistics Canada Population and Dwelling Counts adjusted for urban rural population breakdown (43,654 dwellings *90.8% urban = 39,556 urban dwellings)

³⁹ One cell had 26 responses as compared to the expected minimum level of responses of 35. Given that the different forms and different areas are used to minimize bias and that the final numbers are only viewed as rough estimates, the low response in one cell is noted but is not considered to compromise the results.

⁴⁰ The ALR is a provincial designation for farming. The goal of the study was to estimate how the urban population valued farmland so only urban households were sampled.

⁴¹ Not in appendix. Available from author.

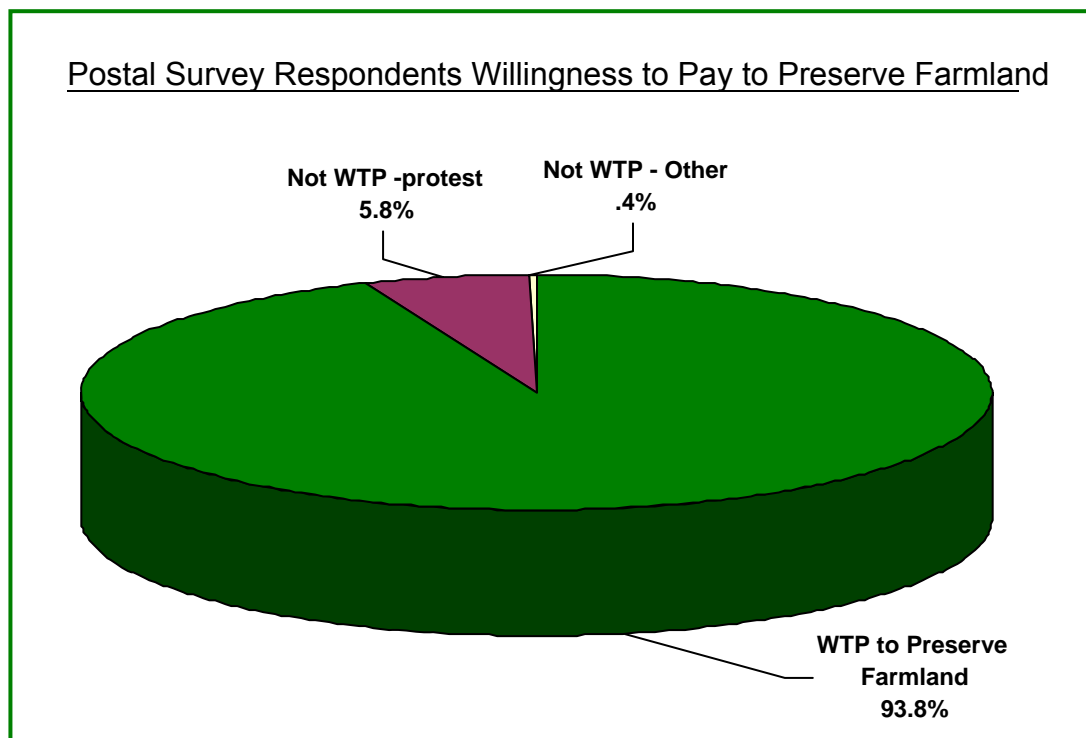


Figure 5.1 Proportion of Respondents WTP to Preserve Farmland

Other studies have considered those not willing to pay, because they didn't think they should have to, as protest votes and removed them from the sample. 22 responses, representing 5.8 percent of all responses, were considered protest votes and discarded. This level of protest votes is low compared to 9 percent reported by Bowker and Didychuk.

Previous studies have also received a certain percentage of respondents that would prefer urban development over farmland⁴². Presumably, these respondents would actually need to be compensated for preserving farmland, yet there was no mechanism to estimate this amount. These 'unrecorded' observations complicate the data analysis⁴³. In this study, it is interesting that no respondents indicated that farmland is not important to them in the 'Loss of Farmland' section and only one respondent indicated farmland was not important when responding to the 'Farmland Trust' question. This simplifies the data analysis⁴⁴.



⁴² Bibliography Section 7.

⁴³ Unrecorded observations violate the conditions for Ordinary Least Squares analysis. Other studies with unrecorded observations have used a Heckett two step process with a Probit analysis

⁴⁴ With no 'unrecorded observations' the data set better meets the conditions for use of OLS.

5.2 BENEFITS OF FARMLAND TO URBAN ABBOTSFORD RESIDENTS.

Figure 5.2 shows the responses to question 1.1 ‘what do you think are the three most important benefits of having farmland in Abbotsford?’

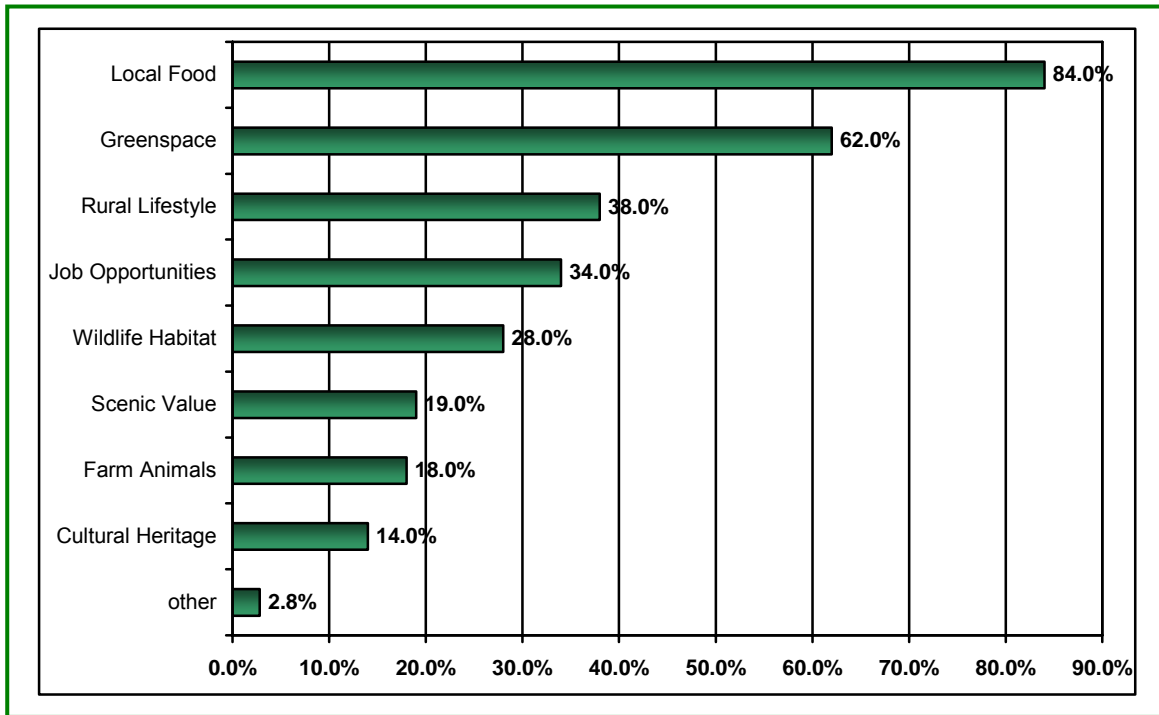


Figure 5.2 Benefits of Farmland to Residents of Abbotsford⁴⁵

84 percent of the survey respondents identified ‘local food’ as one of the three most important benefits of having farmland in their community. In the intercept survey 74 percent identified local food production as a positive part of having farmland in Abbotsford.

Job opportunities were identified by about a quarter of the respondents. This is much higher than in the intercept survey where ‘economic issues’ were only identified by 1 percent of the respondents when asked ‘what first comes to mind when you think of farmland?’ This suggests that while the economic aspect of farming is important to people it is not the first thing that comes to mind when thinking of farmland.



⁴⁵ The percentages do not add to 100 as respondents could choose up to 3 benefits that were important to them.

5.3 VALUE OF THE OVERALL PUBLIC AMENITY BENEFITS OF FARMLAND TO ABBOTSFORD RESIDENTS

5.3.1 Estimate of the Overall Public Amenity Benefits of Farmland to Abbotsford Residents

Table 5.3 indicates the estimated marginal willingness to pay for farmland preservation through additional property taxes at the three different quantities of farmland.

Table 5.3 MARGINAL WILLINGNESS TO PAY TO PRESERVE FARMLAND	
Farmland Conversion Scenario	Willingness to Pay
The first 1,000 acre s	\$ 25.14
1,000 acres after 1/2 is gone	\$ 31.27
The last 1,000 acres	\$ 57.19

The three points can be used to estimate a curve that describes the average household in Abbotsford's willingness to pay for farmland preservation based on the quantity of farmland that exists in the community.

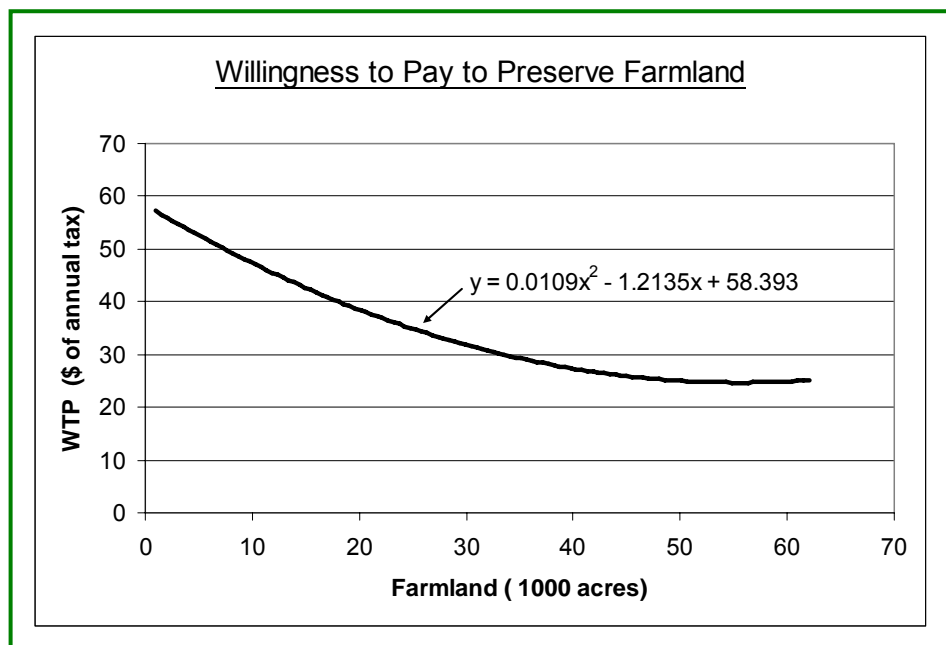


Figure 5.3 The specific relationship between the WTP to protect farmland and the quantity of farmland available.

The area under the curve can be calculated by integrating the equation over the length of the curve. The equation for the integration is:

$$y = \frac{0.0109x^3}{3} - \frac{1.2135x^2}{2} + 58.393x \quad (5.1)$$

Solving the integration equation between $x=1$ and $x=62$ gives a value of \$2,096.15 which represents each household's willingness to pay⁴⁶ for preserving the total amount of existing farmland in Abbotsford. There are currently 62,532 acres of farmland in Abbotsford. The weighted average WTP for 1,000 acres over all the farmland is $(\$2096.15 / 62.532)$ or \$33.52.

There are 39,556 households in Abbotsford receiving this benefit in perpetuity. This information can be used to estimate the present value of the benefit of one acre of farmland to the urban households of Abbotsford as follows:

Present Value of Amenity Benefits/acre⁴⁷ = total households * WTP for one acre per household * PV\$1

$$= 39,556 * (\$ 33.52/1000) * 20$$

$$= \$ 26,518/\text{acre}$$

\$ 26,518 is an estimate of the present value of the public amenity benefits received by urban Abbotsford residents from each acre of land used as farmland as compared to urban development land.

Postal survey respondents were also asked how much they would contribute to a non-profit trust to ensure that farmland remains farmland permanently. The respondents that were willing to pay were willing to contribute an average of \$28.72 annually, however, only about one third (106) of the respondents were willing to pay through this method. Input from the subsequent focus group indicated that the lower level of response was likely due to a lack of familiarity with non-profit trusts.

The estimate of the collective benefits of farmland using the farmland trust method is:

$$\begin{aligned} \text{Present Value of Amenity Benefits /acre} &= (\text{total households} * \text{average WTP/household}^{48} \\ &\quad * \text{PV\$1})/1,000\text{acres} \\ &= (39,556 * \$8.62 * 20)/1,000 \text{ acres} \\ &= \$ 6,819/\text{acre} \end{aligned}$$

5.3.2 Demographic Factors Affecting the Public Amenity Value

Previous studies have had mixed results in identifying demographic characteristics that impact the WTP for preserving farmland. Some have found that education, household income and past affiliation with farming significantly increase the WTP but no demographic characteristic has been significant in all studies.

⁴⁶ In this case it could be termed the net social welfare benefit.

⁴⁷ Present value is the value today of a stream of payments at equal intervals into the future.

⁴⁸ Note: The average WTP/household is adjusted to be the average for all households in the sample.

The WTP at all three levels of scarcity was regressed over a number of demographic characteristics (equations 4.1, 4.2, 4.3) in both linear and log form. No characteristics were consistently significant at the 10 percent level. Previous farm experience was significant in the log form of WTP(ii) but in no others. Gender was significant in the log form of WTP(iii) but in no other.

The results for this study indicate that the WTP to support farmland preservation is consistent throughout the community.



5.4 VALUE OF THE SPECIFIC AMENITY BENEFITS AND ECOLOGICAL SERVICES PROVIDED BY FARMLAND

5.4.1 Local Food Production

The value of local food production was estimated in three ways, the travel costs incurred to buy from local farms and two approaches to the market price differential method.

5.4.1.1 Travel Cost Method

The postal survey responses indicate that local residents support local farms by buying from them on average 12 times a year with each round trip averaging 9.4 km.

The estimated travel costs incurred by Abbotsford households to buy farm products directly are:

$$\begin{aligned}
 \text{Present Value of Travel Costs/acre} &= [\text{total households} * \text{trips per year} * \text{cost per trip} * \\
 &\quad \text{PV\$1}] / 62,532 \text{ acres} \\
 &= [39,556 * 12 * (9.4 \text{ km} * \$0.48/\text{km}) * 20] / 62,532 \text{ acres} \\
 &= \$ 685/ \text{acre}
 \end{aligned}$$

If the benefit of buying from local farms did not meet or exceed the individual's cost of receiving the benefit, they would not make the trip. Given this consideration, the estimate of the present value of the benefits of local food production of \$685 per acre should be considered the lowest potential value.

5.4.1.2 Market Price Differential Method

One question on the postal survey provided respondents with a scenario in which there is California-grown corn on the cob next to Abbotsford-grown corn on the cob in the supermarket. Respondents were asked how much more they would be willing to pay for the Abbotsford-grown corn if it were more expensive than the corn from California, which is \$2.00 a dozen. The average response was \$.91 per dozen cobs of corn, which represents a 46 percent premium over corn from California. This is higher than previous studies but was not much higher than the price differential between Abbotsford and Vancouver markets for locally produced food.⁴⁹

⁴⁹ Previous unpublished studies by the Ministry of Agriculture and Lands indicated that the 'local premium' was in the 5 - 10% range.

A survey of the price of local produce in Abbotsford and Vancouver markets indicated that Vancouver shoppers were paying approximately 35 percent more than Abbotsford shoppers for the same local products including strawberries, raspberries, blueberries and corn. Table 5.4 is a summary of the market survey.

Table 5.4.1 RESULTS OF MARKET SURVEY OF LOCAL PRODUCE PRICES					
Location	Name	Blueberries	Strawberries	Raspberries	Corn
Abbotsford	Birchwood Dairy	\$2.99/lb.		\$2.99/lb.	\$5.50/doz.
Abbotsford	Maan Farms	\$3.50/lb.	\$2.60/lb.	\$3.50/lb.	\$6.50/doz.
Abbotsford	Wisby's		\$2.00/lb.		\$6.50/doz.
Abbotsford	Abbotsford Nursery and Farm	\$2.99/lb.	\$2.50/lb.	\$2.99/lb.	\$3.99/doz.
Abbotsford	Rosedown Farms	\$2.99/lb.	\$2.39/lb.	\$2.99/lb.	\$5.50/doz.
Abbotsford	Neufeld Farm	\$2.40/lb.	\$2.50/lb.	\$1.80/lb.	\$6.00/doz.
	Abbotsford Average	\$2.97/lb.	\$2.40/lb.	\$2.85/lb.	\$5.67/doz.
Location	Name	Blueberries	Strawberries	Raspberries	Corn
Vancouver	Kin's Market (Cambie and 12 th)	\$3.69/lb.	\$2.99/lb.	\$2.50/lb.	
Vancouver	Trout Lake Farmers Market	\$4.82/lb.	.	\$9.30/lb	\$7.50/doz.
Vancouver	Granville Island Public Market	\$3.81/lb	\$2.89/lb.	\$3.99/lb	\$9.12/doz.
Vancouver	Riley Park Farmers Market	\$4.09/lb.		\$3.50/lb.	\$9.00/doz.
Vancouver	Capers	\$3.99/lb.	\$3.99/lb.	\$5.99/lb.	
Vancouver	IGA on Burrard	\$3.99/lb.		\$8.00/lb.	\$3.96/doz.
	Vancouver Average	\$4.07/lb.	\$3.29/lb.	\$5.55/lb.	\$7.40/doz.
	Difference	\$1.10/lb.	\$0.89/lb.	\$2.70/lb.	\$1.73/doz.
	Premium	37%	37%	95%	31%

During the survey of local farm stands, farm stand owners were also asked about the average sales amount per customer visit. The average of the farms interviewed was \$20.83. This is similar to an earlier estimate of per visit sales done for farmers markets throughout the province.⁵⁰

The total Abbotsford household local farm purchasing visits is estimated at 475,000 annually (39,556 households * 12 visits per year). At \$20 per visit this is approximately \$9.25 million per year in local food sales. If this food was purchased in Vancouver it would attract a 35% premium

⁵⁰ *Economic and Community Impacts of Farmers Markets in British Columbia*, 2006. U.N.B.C.

or approximately \$3.24 million.⁵¹ This cost savings is one of the benefits that Abbotsford residents receive because they live in close proximity to farm stands. This value can be converted to a present value benefit per acre as follows:

Present Value of Market Price Benefit/acre = (total benefit * PV\$1) / 62,532 acres

$$= [\$3.24 \text{ million} * 20 / 62,532]$$

$$= \$ 1,036 \text{ per acre.}$$

This is a market based estimate so does not consider the non-market benefits such as food security.

Summary of local food production:

ESTIMATION METHOD	BENEFIT PER ACRE
Travel Cost Method	\$ 685
Market Price Differential	\$ 1,036

5.4.2 Value of Farm Based Recreation

Abbotsford residents indicated that they traveled to farms three times a year on average for recreational activities. Similar to the travel cost method utilized above, the minimum value that urban Abbotsford households place on these trips can be estimated from the costs incurred to make the trip. The annual benefit is estimated as follows:

Present Value of Recreation/acre= [total households * trips per year per household
*miles traveled * cost per mile * PV\$1] / total acres

$$= \frac{[39,556 * 3 * (9.4 \text{ kilometers per trip} * \$.48 \text{ per kilometer}) * 20]}{62,532 \text{ acres}}$$

$$= \$ 171/\text{acre}$$

5.4.3 Value of Scenic Views

The value of a view of farmland was estimated three ways. First, by a hedonic pricing model that looks at the difference in price between property with a view of farmland and property without that view. Second, through a willingness to pay question on the postal survey that asked those with a view of farmland what they would pay to keep it. Third, another willingness to pay question on the postal survey asking those without a view of farmland how much they would pay to gain one.

⁵¹ The market premium with Vancouver was chosen because it represented a much larger portion of the product sold than did corn. The higher premium with corn may relate in part to a local mystique around local corn.

5.4.3.1 Hedonic Pricing Model Method

The value that property owners place on a view of agriculture land was estimated using a hedonic price analysis on 45 (empty) building lots. The advantage of using empty building lots for estimating the value of a view is that there are very few other amenities on bare land except perhaps a 'neighbourhood' value, which may be associated with the location of the lot. This model used all sales of bare land sold through the Multiple Listing Service for the 24 month period from June 2005 to June 2007. The lots were well distributed among the different communities in Abbotsford. The equation used to estimate the 'value of a view' was as follows⁵²:

$$LP = \beta c + \beta_1 LS + \beta_2 V + \beta_3 2006 + \beta_4 2007 \quad (5.4)$$

Where LP is the lot selling price in thousands of (nominal) dollars

c is a constant

LS is the lot size in square feet

V is the view and a dummy, 1 if there is a view of farmland, 0 if there isn't

2006 is a dummy, 1 if sold in 2006, 0 if not

2007 is a dummy, 1 if sold in 2007, 0 if not

The results of the regression are:

VARIABLE	COEFFICIENT VALUE
Constant	117.72
Lot Size	0.01
View	18.54
2006	39.66
2007	65.13

Dependent Variable: SELLPRICE

Method: Least Squares

Date: 07/05/07 Time: 11:28

Sample: 1 46

Included observations: 46

Variable	Coefficient	Std. Error	t-Statistic	Variable
C	117.7184	35.35268	3.329831	0.0018
SQFT	0.010631	0.004703	2.260308	0.0292
YR06	39.66200	15.69808	2.526551	0.0155
YR07	65.13339	17.60777	3.699128	0.0006
VIEW	18.53852	10.95867	1.691677	0.0983
R-squared	0.321083	Mean dependent var		232.8457
Adjusted R-squared	0.254847	S.D. dependent var		36.35522
S.E. of regression	31.38264	Akaike info criterion		9.832709
Sum squared resid	40379.68	Schwarz criterion		10.03147
Log likelihood	-221.1523	F-statistic		4.847573
Durbin-Watson stat	0.724906	Prob(F-statistic)		0.002704

⁵² Dummies were used to catch the price variation between years rather than deflating prices to the base year. It was felt that dummies were more accurate in a local community than a broad based estimate of deflator values – particularly during the volatile real estate market of the mid 2000's.

The coefficient for the view is 18.538, which suggests that those who bought bare lots between June 2005 and June 2007 paid approximately \$18,000 for a view of farmland.

Fifteen of 45 or 33 percent of the lots sold had a view of farmland. A similar 34 percent of the postal survey respondents indicated they had a view of farmland from their home.

Using the results of the Hedonic Pricing Model the value of the scenic views of farmland in Abbotsford can be estimated as follows:

Present Value of Scenic Views/acre = [number households with a view * premium paid for a view]/62,532 acres

$$= [39,556 * .33 * \$18,538]/62,532 \text{ acres}$$

$$= \$3,870 / \text{acre}$$

5.4.3.2 WTP to Protect a View

34 percent of the postal survey respondents indicated they had a view of farmland from their home and were willing to pay \$61.09 on average per year to protect their view. The willingness to pay to protect a view can be used to estimate the value of scenic views using the following equation:



Present Value of Scenic View/acre = (number of households with a view* WTP per household * PV\$1)/62,532 acres

$$= (39,556 * .33 * \$61.09 * 20)/ 62,532 \text{ acres}$$

$$= \$255 \text{ per acre}$$

It is important to note that in this instance, respondents were not asked to value 1000 acres of view in particular, so their willingness to pay must be averaged over all farmland in Abbotsford.

5.4.3.3 WTP to Purchase a View

The respondents that did not have a view were willing to pay 4.2 percent more on average for a view. With an average home value in Abbotsford of \$264,295 the premium for a view is \$11,152.54.⁵³ The present value of the scenic value of farmland can be estimated by multiplying this by the number of households in Abbotsford that do not have a view:

Present Value of Scenic View/acre = [number of households with no view * WTP for a view]/62,532 acres

$$= [(39,556 * .66) * \$11,152]/62,532 \text{ acres}$$

$$= \$4,656 \text{ per acre}$$

⁵³ Based on the price of the average Abbotsford home in 2006, which was \$264,295.33. This data is from the Fraser Valley Real Estate Board Monthly Statistics Package, December 2006.

Note that the purchase price reflects the value of the property over time so the value is already a present value of all future benefits.

Table 5.4.3 SUMMARY OF ESTIMATES OF THE VALUE OF SCENIC VIEWS	
Estimation Method	Benefit per Acre
Willingness to Pay to Protect	\$ 255 per acre
Willingness to Pay to Purchase	\$ 4,656 per acre
Hedonic Pricing Model	\$ 3,870 per acre

5.4.4 Value of Riparian Habitat

The incremental stream length on farmland compared to urban development times the value of riparian habitat was the general approach to estimate the riparian habitat benefits provided by farmland.

Knowler et al (2003) estimated the freshwater salmon habitat in the Fraser River watershed at \$ 7,010 per kilometer of stream in pristine condition. If farming activities or urban development degrade the habitat by 20 percent, the value of incremental stream length in the farming area, based on Knowler's estimates, would be \$ 5,608.⁵⁴

The City of Abbotsford has mapped the streams within the municipal boundaries and the data for farmland and urban areas is presented in table 5.4.4

Table 5.4.4 STREAM DENSITY IN DIFFERENT ZONES IN ABBOTSFORD			
OCP Class	Length (m)	ACP Area (ha)	Density (m/ha)
Agriculture	759,867	25,967	29
Total Agriculture			29
Commercial	6,182	313	20
City Centre	687	138	5
City Residential	1,003	451	2
Institutional	2,296	362	6
Industrial Business	8,972	1,007	8
Industrial Business CICP	1,433	170	8
Suburban Residential	16,796	847	20
Urban Residential	15,169	3,042	5
Total Urban	51,638	6,330	8.16

⁵⁴ A recent literature review, available on request, indicates that 80% of riparian habitat value is achieved in the first few meters close to the stream. This has been retained on most farms. Anecdotal evidence suggests that riparian habitat is more degraded in urban areas than farming areas but no estimate is available at this time.

The stream density in the farmland area is 29 meters per hectare and in the urban area is 8.2 meters per hectare. The difference in stream density is 20.8 meters per hectare.⁵⁵

The fish productivity benefit of having farmland instead of land in urban development is estimated as follows:

$$\begin{aligned} \text{Present Value of Riparian Habitat/acre} &= [\text{stream density improvement} * \text{hectares} * \\ &\quad \text{riparian value/ meter} * \text{PV\$1}]/\text{acres of farmland} \\ &= [20.8 \text{ meters/ha} * 26,055 \text{ ha} * \$5.608/\text{m} * 20]/ 62,532 \text{ acres} \\ &= \$ 972 / \text{acre} \end{aligned}$$

5.4.5 Value of Groundwater Recharge

The value of the additional groundwater recharge on farmland when compared to the urban area can be estimated as follows:

$$\text{Present Value of Ground Water Recharge} = \text{cost of water} * (\text{recharge rate} * \text{area} * \text{incremental infiltration}) * \text{PV\$1}$$

5.4.5.1 Recharge area

The B.C. Ministry of Environment included contour maps of nitrate concentrations in their update report on the condition of the Abbotsford Aquifer in 2005.⁵⁶ This study used these contours and with GIS estimated the area overlying the portions of the aquifer with more than 10 parts per million (ppm) of nitrate and the area overlying the portion of the aquifer with less than 10ppm.⁵⁷ Table 5.4.5.1 is the result of that estimate:

Table 5.4.5.1 AREA OVER THE ABBOTSFORD AQUIFER CONTRIBUTING TO GROUNDWATER RECHARGE	
Abbotsford Aquifer	Area (ha)
Overlying >10ppm	1,415
Overlying <10ppm	3,921
Difference (under – over)	2,506

The ALR covers approximately 8,000 ha in the uplands area.

⁵⁵ This stream density data is from the City of Abbotsford's Official Community Plan.

⁵⁶ McArthur and Allen, 2005. Unpublished report modeling nitrate concentrations in the Abbotsford Aquifer using test well sample data.

⁵⁷ 10ppm is the Canadian drinking water standard for nitrate nitrogen

5.4.5.2 Recharge Rate

The Farmwest web page provides current and historical climate data with a focus on the water balance.⁵⁸ The following data was taken from the Farmwest site:

Table 5.4.5.2 EFFECTIVE PRECIPITATION FOR AIRPORT AND UPLANDS AREAS

Year	Langley Central	Abbotsford Airport	Uplands ⁵⁹
2002	399 mm	537 mm	468 mm
2003	521 mm	702 mm	612 mm
2004	508 mm	1351 mm	930 mm
2005	505 mm	656 mm	581 mm
2006	561 mm	609 mm	585 mm
Average		771 mm	635 mm

5.4.5.3 Cost of Water

The price of Metro Vancouver water to residents of the Township of Langley at the border of the municipality is approximately \$0.35 per cubic meter. The current residential water rates in the City of Abbotsford are \$0.43 per cubic meter. The Abbotsford rates include supply and distribution. Clearbrook Waterworks is a small water purveyor in central Abbotsford that extracts groundwater from the Abbotsford Aquifer at no cost and distributes it to approximately 10,000 residents. Their residential rate is \$0.22 per cubic meter. The difference between the Abbotsford rate and the Clearbrook rate is a proxy for the cost of water in Abbotsford. This difference is \$0.21 per cubic meter. The cost of water in Metro Vancouver is projected to rise in the very near future to \$.39. Abbotsford/Mission water system is in the process of expanding its source capacity. This will increase the cost of accessing water. A value of \$.40 per cubic meter was used for water as it is close to the Metro Vancouver rate in the very near future and close to what Abbotsford will be paying in the near future.

5.4.5.4 Impervious Surfaces

The incremental water infiltration is estimated by the difference in impervious surfaces between the land in Abbotsford in urban development and the farmland. Previous GIS analysis of Abbotsford farmland by Ministry of Agriculture and Lands estimated that 3 percent of the farmland was covered by impervious surfaces. Land in urban development includes commercial, industrial, and residential and nearly all of the industrial and commercial area is impervious. Lot coverage maximums from the local zoning bylaw plus driveways and other outbuildings suggest residential impervious surfaces range from 60 percent for low density to 65 percent for high density.

The average percentage of impervious surface in the urban area was estimated by weighting the different uses as follows:

⁵⁸ Sponsored by the Northwest Field Corn Association. <http://www.farmwest.com/index.cfm>

⁵⁹ The estimate for the Abbotsford Uplands is an average of Abbotsford Airport Weather Station and the Langley Central Weather Station.

Table 5.4.5.4 ESTIMATE OF IMPERVIOUS SURFACES UNDER DIFFERENT LAND USE

Zoning	Areas in Hectares	Percent Impervious	Impervious Area in Hectares
Commercial	480	95%	456
High Density Residential	481	65%	313
Low Density Residential	2,277	60%	1,366
Industrial	569	95%	540
Total	3,807	70%	2,675

The reduction in impervious surface from land in urban development to farmland is from 70 percent to 3 percent, for a difference of 67 percent.

With the above data the value of groundwater recharge from farmland as compared to urban development can be estimated as follows:

Present Value Total (airport) = \$0.4 cubic meters * 0.771 cubic meters per year * (2506 hectares * 10,000 meters squared per hectare * 0.67) * PV\$1
= \$103.562 million

Present Value/acre (airport) = total value / acres in airport area
= \$ 103.562 million / 12,800 total acres in the airport area
= \$ 8,091/acre

Present Value Total (uplands) = \$0.4 cubic meters* 0.635 cubic meters per year * (8,000 hectares * 10,000 meters squared per hectare * 0.67) * PV\$1
= \$272.288 million

Present Value/acre (uplands) = total value / acres in the uplands
= \$272.288 million/19,200 acres in the uplands area
= \$14,182/acre

The Matsqui Prairie and Sumas Prairie areas do not provide a ground water resource for the community or for streams in the area, as they are both managed as drainage and diking districts.⁶⁰

The total benefit of groundwater recharge considering all the farmland in Abbotsford is:

Present Value of Ground Water Recharge/acre = (Uplands benefit + Airport benefit)/
acres of farmland in Abbotsford
= (\$103.562 + \$272.288) * \$ million /62,532 acres
= \$6,011 per acre

⁶⁰ Drainage and dyking districts control the water in the roadside ditches for drainage (pumping out) in the winter and irrigation (pumping in) in the summer.

Table 5.4.5.5 SUMMARY OF THE VALUE OF GROUNDWATER RECHARGE	
Area	Value / Acre
Uplands	\$14,182
Airport	\$ 8,091
Weighted over all Farmland	\$6,011

5.4.6 Value of Wildlife Habitat

111 or 31.4 percent of the postal survey respondents would contribute annually to a non-profit trust to protect wildlife habitat on 1,000 acres of farmland. The ones that would contribute were willing to pay \$33.91 on average. This represents \$10.63 per household per 1,000 acres. The present value of the benefits of wildlife habitat protection can be estimated as follows:

$$\begin{aligned}
 \text{Present Value of Wildlife Habitat / acre} &= [\text{Average WTP per household per 1,000 acres} * \\
 &\quad \text{total households} * \text{PV\$1}] / 1,000 \text{ acres} \\
 &= (\$10.63 * 39,556 * 20) / 1,000 \text{ acres} \\
 &= \$8,410 / \text{per acre}
 \end{aligned}$$

5.4.7 Value of the Public Nuisance Cost of Odour Reduction

The willingness to pay to reduce nuisance odours can be used to estimate the social cost of odours from farmland. Only 25 percent of respondents were willing to donate to a non-profit trust that would help farmers buy odour reduction technologies. The mean willingness to pay by those respondents was \$20.68 per year. For all households it averages \$5.08 per year. The public cost of odours can be estimated as follows:

$$\begin{aligned}
 \text{Present Value of Nuisance Cost/acre} &= (\text{average WTP to reduce odours} * \text{total} \\
 &\quad \text{households} * \text{PV\$1}) / 1,000 \text{ acres} \\
 &= (\$5.08 * 39,556 * 20) / 1,000 \text{ acres} \\
 &= \$4,019
 \end{aligned}$$



5.5 SUMMARY OF ESTIMATED AMENITY BENEFITS AND ECOLOGICAL SERVICES

Zoning	BENEFIT	METHOD	VALUE PER ACRE
Overall Amenity Benefits	Farmland Loss	CV*	\$ 26,518
Specific Benefits	Farmland Preservation Trust	CV	\$ 6,819
	Local Food	MPS**	\$ 1,036
	Recreation	Travel Costs	\$ 171
	Scenic Views	Hedonic - CV	\$3,870 - \$4,656
	Riparian habitat	Market Value	\$ 972
	Wildlife Habitat	CV	\$ 8,410
	Groundwater Recharge	Market Value	\$ 6,011
	Nuisance Odour	CV	\$ 4,019

* Contingent Valuation ** Market Price Savings

Individuals in the focus group study had great difficulty separating out the value of a specific amenity benefit from the collective benefit. This supports the finding that when people are willing to pay for a specific amenity benefit they seem to be willing to pay a similar amount as the collective benefit. The aggregate values for the specific benefits differ depending on what portion of the community that values the specific amenity benefit.

This is summarized in Table 5.5a below:

Table 5.5a SUMMARY OF RESPONSE TO CONTINGENT VALUATION QUESTIONS		
Amenity	Mean WTP of Willing Respondents	Present Value per Acre
Preserve farmland first 1,000 acres – tax	\$25 ⁶¹	\$19,778
Preserve farmland 1,000 acres – trust	\$29	\$6,819
Wildlife habitat 1,000 acres – trust	\$34	\$8,410
Odour reduction 1,000 acres – trust	\$21	\$4,019

⁶¹ This is the mean for the first 1,000 acres, which is used as comparison to the others that also relate to the first 1,000 acres

While the cultural or public benefits of riparian areas and groundwater recharge are included in the collective amenity benefits the market value of the ecological services are not. The ecological services estimated in this study are specific to the market value of goods produced. These values can be added to the estimate of the overall amenity benefits when estimating the total public benefit of farmland over urban development.

The estimate of the public cost of odour may be overestimated (see section 6.2.6) and given the discussion in the focus group session an argument could be made that the cost of odour is already included in the estimation of the amenity benefits of farmland. Until further work can clarify how the ‘public nuisance cost’ of odour is or is not considered in the ‘farmland preservation’ estimate of public amenity benefits, it will be subtracted from the amenity benefits when estimating a final public benefit of farmland.

The final estimate is summarized in table 5.5b

Table 5.5b FINAL ESTIMATE OF THE PUBLIC AMENITY BENEFITS AND ECOLOGICAL SERVICES PROVIDED BY FARMLAND	
Public Benefit	Present Value / Acre
Amenity Benefits	\$26,518
Minus Nuisance Cost (odour)	-\$4,019
Plus Ecological Services (value of goods produced)	\$980(fish)
	\$6,011(water)
Total	\$29,490



6.0 Discussion of Results

6.1 PUBLIC AMENITY BENEFITS OF FARMLAND TO URBAN RESIDENTS

The average household in Abbotsford is willing to pay \$33.52 per year in additional property taxes to retain the amenity benefits of 1,000 acres of Abbotsford farmland. This amount is on the lower end of the range of the values estimated by Halstead, Bowker and Didychuk, Beasley et al., and Chang. Their studies estimated values from \$28 per year to \$90 per year. There are several possible explanations as to why this study's estimate is low. These include:

- the perception in BC that residents already pay for an Agricultural Land Commission that has a mandate to protect farmland in the Agricultural Land Reserve,
- the relative abundance⁶² of farmland in Abbotsford compared to areas analyzed in previous studies, and
- the degree of tax fatigue of the respondents at the time of the survey.

The amenity benefits of farmland can be received by one household without excluding another household. Goods or benefits with this characteristic are called non-excludable, which has implications on how the results of this study can be interpreted.

The amenity benefits of farmland can be received by one household without excluding another household. Goods or benefits with this characteristic are called non-excludable, which has implications on how the results of this study can be interpreted.

The present value of the benefits of farmland is a function of the household willingness to pay, the number of households receiving the benefit and the scarcity of farmland⁶³.

$$\text{Public Amenity Benefits} = F(\text{WTP}, H, S) \quad (6.1)$$

Where WTP = household WTP to preserve farmland
H = number of households in the area
S = relative scarcity of farmland

As the number of households increase and the amount of farmland decreases the public amenity benefit per acre will increase. For example if the population of Abbotsford increases by 50 percent, as predicted by 2025⁶⁴, and the amount of farmland remains the same, the public amenity benefit of farmland will increase to $(\$26,518 * 1.5 =) \$39,777$ per acre.

In other areas where the population is higher and farmland relatively scarce the public amenity value will be even higher. For example, if the same household WTP to preserve farmland in Abbotsford was applied to Metro Vancouver the public amenity benefit per acre would be over \$500,000 per acre.⁶⁵ A similar study would need to be done in Metro Vancouver to provide a more accurate estimate, however, the very rough calculation, using the Abbotsford estimates, demonstrates how the amenity benefits of farmland can be very large in areas near urban centers where farmland is relatively scarce.

⁶² This is supported by the finding in this study that the WTP to preserve farmland increases with scarcity.

⁶³ Respondents were willing to pay more to preserve 1,000 acres of farmland if ½ was already gone or if it was the last 1,000 acres as compared to the loss of 1,000 acres at the current state.

⁶⁴ Lower Mainland Employment Study and other population projections.

⁶⁵ Based on 870,992 households and approximately 127,000 acres of farmland in Metro Vancouver.

It is important not to confuse the public amenity benefits and ecological services with the market price of land. The market price of land is an estimate (by the buyer) of the present value of the stream of **private benefits** the purchaser will receive over time. The estimate of \$26,518 of public amenity benefit per acre of farmland represents the stream of values the whole community will receive from that land over time.

Public benefits of urban development can come from a positive difference in the property tax paid and the community services received. A recent study by the Ministry of Agriculture and Lands estimated the net financial contribution of different land uses in Abbotsford and Pitt Meadows.⁶⁶ These can be converted to present values to be used as comparison to the public amenity benefits of farmland. Table 6.1 is a summary of these estimates:

Table 6.1 ESTIMATE OF PUBLIC BENEFITS OF DIFFERENT LAND USES IN ABBOTSFORD BASED ON NET OF TAXES PAID OVER SERVICES PROVIDED				
Land Use	Areas⁶⁷	Net Financial Contribution	Net Financial Contribution per Acre	Present Value of the Public Benefit
Residential	10,858	- 7,582,000	- \$ 698	- \$ 13,960
Commercial	3,134	4,612,000	1,472	\$ 29,440
Industrial	900	647,000	719	\$ 14,380
Farmland	62,583	1,253,000	20	\$ 400
Farmland Amenity Benefits and Ecological Services				

Table 6.1 provides a starting point for the discussion around the public benefits of different land uses. Residential is negative as residential areas receive more services than they pay for in taxes.

6.2 BENEFITS OF SPECIFIC CHARACTERISTICS OF FARMLAND TO URBAN ABBOTSFORD RESIDENTS

6.2.1 General Comments

Researchers have found that respondents to contingent valuation surveys have difficulty separating their values for specific benefits from their value of the collective benefit of a given item.⁶⁸ This was evident in this study's postal survey respondents. When respondents did indicate a willingness to pay in support of a benefit, the mean willingness to pay did not vary much when compared to the broader 'loss of farmland' question. The mean amount for households that indicated a willingness to pay and the resulting aggregate value per acre are summarized in table 5.5.2.

⁶⁶ Direct Financial Contribution of Farmland to Local Governments in British Columbia

⁶⁷ City in the Country Plan. Figure 32, page 46

⁶⁸ Bibliography Section 7.

Two possible explanations for this are:

- people are willing to pay a certain amount for benefits from farmland but have difficulty allocating this amount among the various individual benefits of farmland or,
- people are passionate about a specific benefit of farmland and prefer to use all their resources to support that benefit.

The individuals that took part in the focus group had difficulty separating the specific benefits of farmland from the overall value of farmland. Any time the group discussed one specific value, other values got drawn into the conversation. Most postal survey respondents seem to have a more holistic view of the benefits of farmland and had difficulty focusing on particular attributes.

6.2.2 Local Food Production

Local food production was mentioned by 84 percent of the respondents as an important benefit of having farmland in the community. It is not clear how much the recent media attention around the 100-mile diet and local eating impacted this response. Focus group members spoke strongly about many aspects of local food production. No specific attribute, such as quality, freshness, price, convenience, or farm experience, stood out.

The benefit of local food production was estimated using the travel cost method and by the market premium paid for local produce. Given that the travel cost method estimates the lower end of the value range and the stated market premium and the actual market premium are reasonably close, the market premium approach is considered a better estimate of the value of local food production.

In posing questions around the value of local food production it is important to try and separate the ‘quality’ aspect from the ‘support local’ aspect and when it comes to local food the ‘food security’ aspect. The question on purchasing local corn did not do an adequate job of separating the quality and local purchase aspects. Local corn has a reputation of being better quality than corn from California which may explain the higher than expected premium people were willing to pay.

Estimates for the benefit of local food production were relatively low given that it was the dominant attribute of farmland. A more thorough investigation into the characteristics of local food production that people value, would help future work on estimating amenity benefits of farmland.

6.2.3 Scenic Views

The value of scenic views was estimated in three ways:

- Hedonic pricing model of sales of building lots
- Willingness to pay for an equivalent house with a view of farmland
- Willingness to pay to protect a view



The postal survey question on the willingness to pay to protect an existing view was flawed in that it did not specify a specific quantity of farmland to protect.⁶⁹ The mean amount of those willing to pay to protect a view, \$61.09, was the highest mean willingness to pay observed in this study. However, without a quantity to attach to, it must be considered for all of the farmland in Abbotsford, resulting in a

⁶⁹ It would have been considerably difficult to specify a quantity of farmland given that an individual's home could have a view of any number of acres of farmland.

relatively small value per acre. If the respondents actually answered as if it were for 1,000 acres, the present value per acre would be \$13,708 – a point between the other two estimates.

The hedonic pricing model estimated that individuals pay approximately \$18,000 for a view of farmland. The postal survey data found that the mean willingness to pay for a view of farmland was \$11,152 based on the average house price in Abbotsford. The price of the empty building lots used in the hedonic pricing model does not necessarily come from the lot's view of farmland, purchasers may include their value of views of other natural attributes in their purchase price. It is interesting to note that the relative value of what people have paid for a view and what people say they would pay is consistent with human behaviour. The Hedonic estimate is \$7,000 higher than the WTP estimate. People who value a view at \$18,000 or more have a view while people that valued a view at \$11,000 don't have a view, because they were not prepared to pay the market value for a view.

A number between the hedonic pricing model and the willingness to pay response may be the best estimate of the scenic view value of farmland.

6.2.4 Riparian Habitat

The estimate of the additional benefit to riparian habitat of farmland over urban development was supported by excellent local data on the difference in stream density between farmland and urban development land and a detailed analysis of the market value of fish production supported by riparian habitat in the Fraser River system.

The value of \$970 per acre should be considered a low estimate, as this analysis did not consider the cultural value of the salmon fishery in B.C., a value that could end up being much higher than the production value. Some estimates of the value of riparian habitat in the literature have been as high as \$3,542 per acre.⁷⁰

6.2.5 Groundwater Recharge

The local area also has a very strong data set on groundwater to work with.⁷¹ Despite taking into consideration the loss of groundwater use due to nitrate contamination over a third of the Abbotsford Aquifer, the present value of the additional groundwater recharge (over urban areas) in the uplands and a portion of the Abbotsford aquifer was \$ 6,011 per acre when averaged over the whole farming area.

This is a first step estimate of the benefits of groundwater recharge because groundwater is part of a very dynamic system. Groundwater provides base flows for streams in summer, an important value for fisheries, and can accept recharge from streams in the winter. This study assumed that if groundwater was available for human use it would be a small part of the total groundwater resource and that any redirection of potential groundwater recharge flows to surface flows would directly reduce the ability for groundwater extraction for human use.

The value of groundwater recharge could also include an estimate of the cost of the damage caused when water, that would go to groundwater recharge, is redirected to surface run-off contributing to higher peak flows in winter. This can cause extra flooding in the lowlands and 'scour' fish-bearing streams.

⁷⁰ Olewiler ; referenced in *The Value of Natural Capital in Settled Areas of Canada*

⁷¹ Relative to other ecological services estimates

More work is needed to estimate the multiple aspects of groundwater recharge. Until then, the groundwater recharge value averaged over the whole farmland area will be used to compare to the other values.

6.2.6 Wildlife Habitat and Nuisance Odour Reduction

The relatively high contingent valuation of wildlife habitat appears inconsistent with the intercept survey and the postal survey rankings of the benefits of farmland. Wildlife habitat and nuisance odour reduction were the only benefits that were valued exclusively with contingent valuation in the postal survey.

The focus group did not give any insight as to why wildlife habitat would be valued so highly. It is likely that respondents had a difficult time unbundling the farmland attributes and those that would contribute to wildlife habitat contributed an amount similar to the amount they did to farmland preservation as a whole.

The WTP for wildlife habitat and nuisance odour control were based on 1,000 acres to be consistent with the farmland protection question. The focus group discussion indicated that it is unlikely that respondents connected the value to 1,000 acres of farmland but rather to 1000 acres of wildlife habitat. Using aerial photos and the Land Use Inventory it appears the amount of farmland that could be used as wildlife habitat in Abbotsford is in the 10 percent range. If this were the case the wildlife habitat benefit would be closer to \$800 per acre of farmland. In future studies, the questions may be more relevant to the respondents if the question related to habitat for a specific animal or if the analysis could relate back to the potential quantity of wildlife habitat available.

Regarding nuisance odour control it is more likely that respondents were considering all farmland. It makes little sense to control odour on 1000 acres if the adjoining 1000 acres does not. If the respondents WTP did consider all farmland the WTP per acre would be \$64 per acre. This question will need to be reassessed in future work.

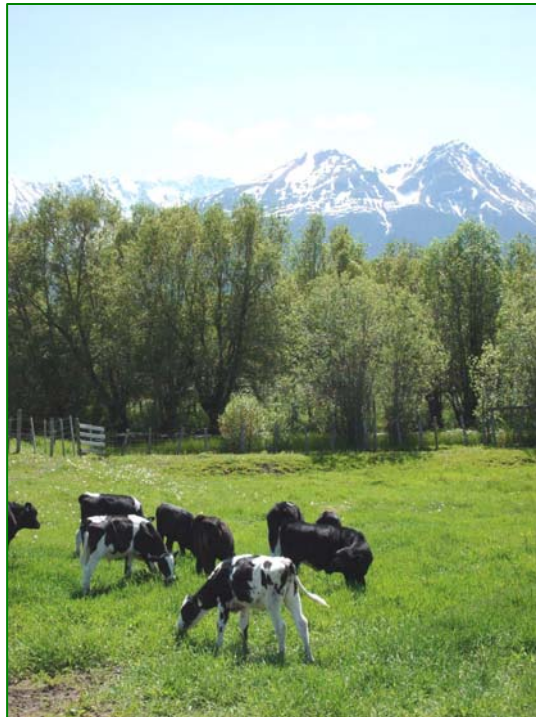
The results may be more meaningful if the summary table of results has an additional column indicating if the estimate is considered high, low or a good approximation and why.

Table 6.2 SUMMARY OF AMENITY BENEFITS AND ECOLOGICAL SERVICE BENEFITS WITH COMMENTS				
Benefit	Method	Value per Acre	Quality of Est.	Reason
Cumulative Farmland Loss	CV	\$ 26,518	Low /Good	
Farmland Trust	CV	\$ 6,819	Low	Poor knowledge of trusts
Local Food	MPS	\$ 1,036	Low	Market value only
Recreation	Travel Cost	\$ 171	Low	Lowest marginal benefit
Riparian habitat	Market Value	\$ 972	Low	Market value only
Scenic Views	Hedonic - CV	\$ 3,870- \$ 4,656	Good	
Wildlife Habitat	CV	\$ 8,410	High	Question not clear
Groundwater Recharge	Market Value	\$ 6,011	Good	
Odour reduction	CV	\$ 4,019	High	Question not clear

6.3 FUTURE WORK

This study provided a good first look at the public amenity benefits and ecological services provided by farmland to a local community. The study identified several areas where further work would improve our understanding of the subject. They include:

- 1) Several benefits suggested by previous work were not estimated in the study due to lack of clear methodologies or lack of good local information. Further work is needed to estimate these benefits from farmland.
- 2) Strategies need to be developed to help survey respondents better understand the benefit they are valuing and to better identify specific values. A larger scale focus group study may be required to achieve this.
- 3) The amenity benefits of farmland in Abbotsford are not restricted to the residents of Abbotsford. Residents of neighbouring communities also benefit. It would be very interesting and informative to undertake a similar study on a broader, regional basis. For example in Metro Vancouver.
- 4) Access to local food production was the dominant farmland attribute identified by urban Abbotsford residents. The estimate of value using MPS only captured a small portion of the benefit of local food. A more detailed analysis of the social and cultural benefits of local food production would be helpful.



7.0 Bibliography

1. Beasley, Steven D., Workman, William G. and Williams, Nancy A. Estimating the Amenity Value of Urban Fringe Farmland: A Contingent Valuation Approach. *Growth and Change*, October 1986
2. Bergstrom, John, C., Dillman, B.L. and Stoll, John, R. Public Environmental Amenity Benefits of Private Land: The Case of Prime Agricultural Land. *Southern Journal of Agricultural Economics*. July 1985. pp 139-149
3. Bowker, J.M. and Didychuk, D.D. Estimation of the Nonmarket Benefits of Agricultural Land Retention in Eastern Canada. *Agriculture and Resource Economics Review*. October 1994. 218-225.
4. Chang, Koyin, Ying, Yung-hsiang, 2005. External Benefits of preserving agricultural land: Taiwan's rice fields. *The Social Science Journal* 42 (2005) 285 -293
5. Cho, Seong-Hoon, Newman, David H., Bowker, J.M. 2005. Measuring rural homeowners' willingness to pay for land conservation easements. *Forest Policy and Economics*, 7 (2005) 757 – 770
6. Christie, et al. A valuation of biodiversity in the UK using choice experiments and contingent valuation. *Applied Environmental Economics Conference* 2004, 26 March, The Royal Society
7. Fleischer, Aliza and Tsur, Yacov. Measuring the recreational value of agriculture landscape. *European Review of Agricultural Economics*. Vol 27(3) pp.385-398
8. Fleischer, A. and Tsur, Y. The Amenity Value of Agricultural Landscape and Rural-Urban Allocation, Discussion Paper No.5.04. The Center for Agricultural Economic Research and the Department of Agricultural Economics and Management, The Hebrew University of Jerusalem.,2004
9. Halstead, John, M. Measuring the Nonmarket Value of Massachusetts Agricultural Land: A Case Study. *JNAEC*. April 1984. pp.12-19.
10. Knowler, Duncan J. et al. Valuing freshwater salmon habitat on the west coast of Canada. *Journal of Environmental Management* 69 (2003) 261 – 273
11. Krieger, Douglas, J. Saving Open Spaces , Public Support for Farmland Protection. *American Farmland Trust*. 1999
12. Olewiler, Nancy. Environmental sustainability for urban areas: The role of natural capital indicators. *Cities.*, Vol 23, No 3, p. 184-194.(2006)
13. Olewiler, Nancy (2004). The Value of Natural Capital in Settled Areas of Canada. Ducks Unlimited and the Nature Conservancy of Canada.
14. Silberberg, Eugene. *The Structure of Economics*. McGraw Hill. 1990
15. Turner, R. Kerry, et al. Valuing nature: lessons learned and future research directions. *Ecological Economics* 46 (2003) 493-510
16. Whitehead, John, C. A Practitioner's Primer on Contingent Valuation. Department of Economics. East Carolina University. April 2000.

8.0 Appendix

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8.1 COVER LETTER AND SURVEY FORM

June 12, 2007

Dear Abbotsford Resident,

I am a graduate student in the Public Policy program at Simon Fraser University who is examining the costs and benefits of farmland. The community of Abbotsford has a long history of farming and continues to be one of the largest food producing areas in British Columbia. This summer, as part of my Master's thesis project, I am working with the BC Ministry of Agriculture and Lands, researching the extent to which Abbotsford residents value the farmland in their community. We have chosen to focus on Abbotsford because as both the population of the community and the amount of agricultural production continue to grow, policy-makers and elected officials face many land use management challenges, particularly on the urban-rural fringe.

Enclosed is a ten minute survey that asks for your opinions on farmland and urban development. Urban development includes any commercial, industrial, or residential development. Your household was randomly selected to participate in this survey and all of your responses will remain completely anonymous. The data I collect from this survey will form the basis of my thesis and will be compiled into a report for the Ministry. My hope is that this data will help policy-makers and elected officials make more informed land use decisions. Your responses are important to me and I encourage you to discuss them with any members of your household over the age of 19.

To thank you for participating in the survey, I've included a \$10 gift certificate for The Keg Steakhouse. If you are interested in discussing the issues surrounding farmland in more detail after you've completed and sent in your survey, I welcome you to take part in a telephone interview or a focus group. If you are interested in participating, simply put your contact information on the enclosed yellow slip, which you can either return with the completed survey or send separately. Those that participate will be entered in a prize draw for a \$100 Canadian Tire gift card.

Please use the enclosed postage-paid envelope to return the survey by Wednesday, July 11, 2007. If you have any questions, please do not hesitate to contact me at 604-556-3090 or hcavendi@sfu.ca. Thank you for taking the time to participate in this study!

Sincerely,

Hannah Cavendish-Palmer
Research Officer, Coast Region

Ministry of Agriculture
and Lands

Regional Operations Branch

Mailing Address:
1767 Angus Campbell Road
Abbotsford BC V3G 2M3

Telephone: 604 556-3090
Facsimile: 604 556-3030

Web Address: <http://www.al.gov.bc.ca>

Farmland in Your Community: What does it mean to you?



Section 1: General Questions

1.1 What do you think are the 3 most important benefits of having farmland in Abbotsford?

- | | | | |
|---|--|--|---|
| <input type="checkbox"/> Scenic views | <input type="checkbox"/> Job opportunities | <input type="checkbox"/> Cultural heritage | <input type="checkbox"/> Green-space |
| <input type="checkbox"/> Farm animals | <input type="checkbox"/> Rural lifestyle | <input type="checkbox"/> Local food | <input type="checkbox"/> Wildlife habitat |
| <input type="checkbox"/> Other (please explain) _____ | | | |

1.2 How many times a year do members of your household buy farm products directly from local farms, farmers markets, or roadside stands in Abbotsford?

- | | | |
|---------------------------------------|---|---|
| <input type="checkbox"/> 0 times | <input type="checkbox"/> 6 to 10 times | <input type="checkbox"/> 16 to 20 times |
| <input type="checkbox"/> 1 to 5 times | <input type="checkbox"/> 11 to 15 times | <input type="checkbox"/> 21 times or more |

1.3 How many times a year do members of your household visit an Abbotsford farm for recreation (e.g. for farm tours, corn mazes, farm petting zoos, etc.)?

- | | | |
|---------------------------------------|---|---|
| <input type="checkbox"/> 0 times | <input type="checkbox"/> 6 to 10 times | <input type="checkbox"/> 16 to 20 times |
| <input type="checkbox"/> 1 to 5 times | <input type="checkbox"/> 11 to 15 times | <input type="checkbox"/> 20 times or more |

1.4 If you visit Abbotsford farms for recreation or farm products, how many kilometres do you travel on each roundtrip on average?

- | | | | |
|------------------------------------|-------------------------------------|--------------------------------------|--|
| <input type="checkbox"/> 1 to 5 km | <input type="checkbox"/> 6 to 10 km | <input type="checkbox"/> 11 to 15 km | <input type="checkbox"/> 16 km or more |
|------------------------------------|-------------------------------------|--------------------------------------|--|

1.5 Suppose you are in a local supermarket and California-grown corn on the cob is on sale for \$2.00 a dozen, next to Abbotsford-grown corn on the cob, which is more expensive. How much **more** would you be willing to pay for the Abbotsford-grown corn per dozen cobs?

- | | | | |
|---|---|---|---|
| <input type="checkbox"/> \$0 | <input type="checkbox"/> \$0.25 more/doz. | <input type="checkbox"/> \$0.75 more/doz. | <input type="checkbox"/> More than \$1.00 more/doz. |
| <input type="checkbox"/> \$0.10 more/doz. | <input type="checkbox"/> \$0.50 more/doz. | <input type="checkbox"/> \$1.00 more/doz. | (how much?) \$ _____ |

Section 2: Farmland Trusts

One way to maintain farmland and help farmers take care of it is by establishing non-profit trusts. These trusts can buy the right to control farmland and ensure that it remains farmland permanently, protect wildlife habitat on farms, and assist farmers in buying technologies that reduce odours. Individuals can make tax-deductible donations to trusts for specific purposes.

2.1 If a farmland trust existed in Abbotsford, would you be willing to make an annual donation to it?

☐ Yes

If you answered yes to question 2.1, what is the largest amount you would be willing to donate **annually** to this type of trust for one or all purposes?

	Purchase 1000 acres of farmland	Protect 1000 acres of wildlife habitat	Reduce odours on 1000 acres of farmland	Other (please explain)
\$0	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$1 to \$10	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$11 to \$20	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$21 to \$30	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
\$31 to \$40	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
More than \$40 (how much?)	\$ _____	\$ _____	\$ _____	\$ _____

☐ No

If you answered no to question 2.1, what is the **primary** reason why?

- ☐ Farmland is not important to me
- ☐ I don't think I should have to pay for farmland preservation
- ☐ Other (please explain) _____

Section 3: Farmland and Scenery

3.1 Do you live in a home that has a view of farmland?

☐ Yes

If you answered yes to question 3.1, what is the most you would be willing to pay **each year** in additional property taxes to prevent losing the farmland you can see from your home to urban development?

- | | |
|---------------------------------------|---|
| <input type="checkbox"/> \$0 | <input type="checkbox"/> \$31 to \$40 |
| <input type="checkbox"/> \$1 to \$10 | <input type="checkbox"/> More than \$40 |
| <input type="checkbox"/> \$11 to \$20 | (how much?) |
| <input type="checkbox"/> \$21 to \$30 | \$ _____ |

☐ No

If you answered no to question 3.1, what percentage **more** would you be willing to pay, over the market value of your current house, to purchase an identical house that has a view of farmland?

- | | |
|-----------------------------------|--|
| <input type="checkbox"/> 0% more | <input type="checkbox"/> 15% more |
| <input type="checkbox"/> 1% more | <input type="checkbox"/> 20% more |
| <input type="checkbox"/> 5% more | <input type="checkbox"/> More than 20% |
| <input type="checkbox"/> 10% more | (how much?) |
| | % |

Section 4: Loss of Farmland

Imagine a situation where your city council proposes to use 1000 acres of farmland for urban development. The reason for changing the land use is to increase the tax base. The increased tax base would reduce your future property tax increases.

4.1 Would you prefer that the 1000 acres remain as farmland?

☐ Yes

If you answered yes to question 4.1, what is the most you would be willing to pay **each year** in additional property taxes to preserve the 1000 acres as farmland?

- | | |
|---------------------------------------|---|
| <input type="checkbox"/> \$0 | <input type="checkbox"/> \$31 to \$40 |
| <input type="checkbox"/> \$1 to \$10 | <input type="checkbox"/> More than \$40 |
| <input type="checkbox"/> \$11 to \$20 | (how much?) |
| <input type="checkbox"/> \$21 to \$30 | \$ _____ |

☐ No

If you answered no to question 4.1, what is the **primary** reason why?

- ☐ Farmland is not important to me
☐ I don't think I should have to pay for farmland preservation
☐ Other reason (please explain)

4.2 Suppose that 50% of the current farmland in Abbotsford has already been lost to urban development. What is the most you would **now** be willing to pay each year in additional property taxes to prevent the loss of the 1000 acres of farmland?

- | | | |
|---|--|---|
| <input type="checkbox"/> a. \$0 | <input type="checkbox"/> c. \$11 to \$20 | <input type="checkbox"/> e. \$31 to \$40 |
| <input type="checkbox"/> b. \$1 to \$10 | <input type="checkbox"/> d. \$21 to \$30 | <input type="checkbox"/> f. More than \$40 (how much?) \$ _____ |

4.3 Suppose the 1000 acres of farmland was the **only** remaining farmland in Abbotsford. What is the most you would **now** be willing to pay each year in additional property taxes to prevent the loss of the last 1000 acres of farmland?

- | | | |
|---|--|---|
| <input type="checkbox"/> a. \$0 | <input type="checkbox"/> c. \$11 to \$20 | <input type="checkbox"/> e. \$31 to \$40 |
| <input type="checkbox"/> b. \$1 to \$10 | <input type="checkbox"/> d. \$21 to \$30 | <input type="checkbox"/> f. More than \$40 (how much?) \$ _____ |

Section 5: About You

5.0 How long have you lived in Abbotsford?

- | | |
|---|---|
| <input type="checkbox"/> 0 to 5 years | <input type="checkbox"/> 16 to 20 years |
| <input type="checkbox"/> 6 to 10 years | <input type="checkbox"/> More than 20 years |
| <input type="checkbox"/> 11 to 15 years | |

5.1 What is the highest level of education you have completed?

- | | |
|--|--|
| <input type="checkbox"/> Less than high school | <input type="checkbox"/> Bachelor degree |
| <input type="checkbox"/> High school graduate | <input type="checkbox"/> Graduate degree |
| <input type="checkbox"/> College diploma | |

5.2 Are you: ☐ Male ☐ Female

5.3 Do you rent or own the home where you live?
☐ Rent ☐ Own

5.4 Does anyone in your household work in a farm-related industry?
☐ Yes ☐ No

5.5 Does anyone in your household work in commercial, industrial or residential land development?
☐ Yes ☐ No

5.6 Which age range do you fit within?
☐ 19 to 24 ☐ 35 to 44 ☐ 55 to 64
☐ 25 to 34 ☐ 45 to 54 ☐ 65 and above

5.7 How many people live in your household?

5.8 What is your postal code?

5.9 What range does your gross annual household income fall under?

- | | |
|---|--|
| <input type="checkbox"/> Under \$20,000 | <input type="checkbox"/> \$60,000 to \$79,999 |
| <input type="checkbox"/> \$20,000 to \$39,999 | <input type="checkbox"/> \$80,000 to \$99,999 |
| <input type="checkbox"/> \$40,000 to \$59,999 | <input type="checkbox"/> Greater than \$99,999 |



Section 6: It's Your Turn

Please share any additional comments you have about farmland in Abbotsford.

Thank you for completing this survey!

8.2 SOURCE DATA TABLES

Raw Data
Output- Frequency Tables

Table1- Zone		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	blue	115	30.7	30.7	30.7
	green	120	32.0	32.0	62.7
	pink	140	37.3	37.3	100.0
	Total	375	100.0	100.0	

Table 2- Version

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	127	33.9	33.9	33.9
	2	121	32.3	32.3	66.1
	3	127	33.9	33.9	100.0
	Total	375	100.0	100.0	

Table 3- 1.1a What do you think are the 3 most important benefits of having farmland in Abbotsford?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	scenic views	70	18.7	18.8	18.8
	farm animals	61	16.3	16.4	35.2
	job opportunities	89	23.7	23.9	59.1
	rural lifestyle	77	20.5	20.7	79.8
	cultural heritage	14	3.7	3.8	83.6
	local food	59	15.7	15.9	99.5
	green-space	2	.5	.5	100.0
	Total	372	99.2	100.0	
Missing	99	3	.8		
Total		375	100.0		

Table 4- 1.1b What do you think are the 3 most important benefits of having farmland in Abbotsford?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	scenic views	1	.3	.3	.3
	farm animals	6	1.6	1.6	1.9
	job opportunities	24	6.4	6.6	8.5
	rural lifestyle	64	17.1	17.5	26.0
	cultural heritage	32	8.5	8.8	34.8
	local food	164	43.7	44.9	79.7
	green-space	73	19.5	20.0	99.7
	wildlife habitat	1	.3	.3	100.0
	Total	365	97.3	100.0	
Missing	99	10	2.7		
Total		375	100.0		

Table 5- 1.1c What do you think are the 3 most important benefits of having farmland in Abbotsford?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	scenic views	1	.3	.3	.3
	job opportunities	1	.3	.3	.6
	rural lifestyle	4	1.1	1.1	1.7
	cultural heritage	3	.8	.8	2.5
	local food	90	24.0	25.3	27.8
	green-space	148	39.5	41.6	69.4
	wildlife habitat	98	26.1	27.5	96.9
	otther	11	2.9	3.1	100.0
	Total	356	94.9	100.0	
Missing	99	19	5.1		
Total		375	100.0		

Table 6- 1.2 How many times a year do members of your household buy farm products directly from local farms, farmers markets, or roadside stands in Abbotsford?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 times	7	1.9	1.9	1.9
	1 to 5 times	98	26.1	26.4	28.3
	6 to 10 times	85	22.7	22.9	51.2
	11 to 15 times	47	12.5	12.7	63.9
	16 to 20 times	38	10.1	10.2	74.1
	21 times or more	96	25.6	25.9	100.0
	Total	371	98.9	100.0	
Missing	99	4	1.1		
Total		375	100.0		

Table 7- 1.3 How many times a year do members of your household visit an Abbotsford farm for recreation (e.g. for farm tours, corn mazes, farm petting zoos, etc.)?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 times	125	33.3	33.5	33.5
	1 to 5 times	211	56.3	56.6	90.1
	6 to 10 times	22	5.9	5.9	96.0
	11 to 15 times	5	1.3	1.3	97.3
	16 to 20 times	1	.3	.3	97.6
	21 times or more	9	2.4	2.4	100.0
	Total	373	99.5	100.0	
Missing	99	2	.5		
Total		375	100.0		

Table 8- 1.4 If you visit Abbotsford farms for recreation or farm products, how many kilometres do you travel on each roundtrip on average?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 to 5 km	57	15.2	17.1	17.1
	6 to 10 km	151	40.3	45.2	62.3
	11 to 15 km	82	21.9	24.6	86.8
	16 km or more	44	11.7	13.2	100.0
	Total	334	89.1	100.0	
Missing	99	41	10.9		
Total		375	100.0		

Table 9- 1.5 Suppose you are in a local supermarket and California-grown corn on the cob is on sale for \$2.00 a dozen, next to Abbotsford-grown corn on the cob, which is more expensive. How much more would you be willing to pay for the Abbotsford-grown corn per do

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	\$0	38	10.1	10.2	10.2
	\$0.10 more/doz.	9	2.4	2.4	12.6
	\$0.25 more/doz.	15	4.0	4.0	16.7
	\$0.50 more/doz.	69	18.4	18.5	35.2
	\$0.75 more/doz.	15	4.0	4.0	39.2
	\$1.00 more/doz.	140	37.3	37.6	76.9
	More than \$1.00 more/doz.	86	22.9	23.1	100.0
	Total	372	99.2	100.0	
Missing	99	3	.8		
Total		375	100.0		

Table 10- T1 If a farmland trust existed in Abbotsford, would you be willing to make an annual donation to it?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	232	61.9	62.4	62.4
	yes	140	37.3	37.6	100.0
	Total	372	99.2	100.0	
Missing	99	3	.8		
Total		375	100.0		

Table 11- Ta.1 If you answered yes to question 2.1, what is the largest amount you would be willing to donate annually to this type of trust for one or all purposes? Purchase 1000 acres of farmland.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		269	71.7	71.7	71.7
	\$0	3	.8	.8	72.5
	\$1 to \$10	18	4.8	4.8	77.3
	\$11 to \$20	26	6.9	6.9	84.3
	\$21 to \$30	11	2.9	2.9	87.2
	\$31 to \$40	33	8.8	8.8	96.0
	more than \$40	15	4.0	4.0	100.0
	Total	375	100.0	100.0	

Table 12- Ta.2 If you answered yes to question 2.1, what is the largest amount you would be willing to donate annually to this type of trust for one or all purposes? Protect 1000 acres of wildlife habitat.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		264	70.4	70.4	70.4
	\$0	2	.5	.5	70.9
	\$1 to \$10	14	3.7	3.7	74.7
	\$11 to \$20	30	8.0	8.0	82.7
	\$21 to \$30	12	3.2	3.2	85.9
	\$31 to \$40	32	8.5	8.5	94.4
	more than \$40	21	5.6	5.6	100.0
	Total	375	100.0	100.0	

Table 13- Ta.3 If you answered yes to question 2.1, what is the largest amount you would be willing to donate annually to this type of trust for one or all purposes? Reduce odours on 1000 acres of farmland.

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	288	76.8	76.8	76.8
\$0	14	3.7	3.7	80.5
\$1 to \$10	13	3.5	3.5	84.0
\$11 to \$20	23	6.1	6.1	90.1
\$21 to \$30	6	1.6	1.6	91.7
\$31 to \$40	27	7.2	7.2	98.9
more than \$40	4	1.1	1.1	100.0
Total	375	100.0	100.0	

Table 14- Ta.4 If you answered yes to question 2.1, what is the largest amount you would be willing to donate annually to this type of trust for one or all purposes? Other (please explain).

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	371	98.9	98.9	98.9
\$11 to \$20	1	.3	.3	99.2
\$31 to \$40	1	.3	.3	99.5
more than \$40	2	.5	.5	100.0
Total	375	100.0	100.0	

Table 15- Tb If you answered no to question 2.1, what is the primary reason why?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	150	40.0	40.0	40.0
Farmland is not important to me.	1	.3	.3	40.3
I don't think I should have to pay for farmland preservation.	163	43.5	43.5	83.7
Other	61	16.3	16.3	100.0
Total	375	100.0	100.0	

Table 16- S1 Do you live in a home that has a view of farmland?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid no	247	65.9	66.2	66.2
yes	126	33.6	33.8	100.0
Total	373	99.5	100.0	
Missing 99	2	.5		
Total	375	100.0		

Table 17- Sa If you answered yes to question 3.1, what is the most you would be willing to pay each year in additional property taxes to prevent losing the farmland you can see from your home to urban development?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	251	66.9	66.9	66.9
\$0	36	9.6	9.6	76.5
\$1 to \$10	12	3.2	3.2	79.7
\$11 to \$20	9	2.4	2.4	82.1
\$21 to \$30	8	2.1	2.1	84.3
\$31 to \$40	28	7.5	7.5	91.7
more than \$40	31	8.3	8.3	100.0
Total	375	100.0	100.0	

Table 18- Sb If you answered no to question 3.1, what percentage more would you be willing to pay, over the market value of your current house, to purchase an identical house that has a view of farmland?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	136	36.3	36.3	36.3
0%	126	33.6	33.6	69.9
1% more	17	4.5	4.5	74.4
5% more	37	9.9	9.9	84.3
10% more	38	10.1	10.1	94.4
15% more	12	3.2	3.2	97.6
20% more	8	2.1	2.1	99.7
more than 20%	1	.3	.3	100.0
Total	375	100.0	100.0	

Table 19- F1 Would you prefer that the 1000 acres remain as farmland?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid				
no	62	16.5	16.7	16.7
yes	310	82.7	83.3	100.0
Total	372	99.2	100.0	
Missing	99	.8		
Total	375	100.0		

Table 20- Fa If you answered yes to question 4.1, what is the most you would be willing to pay each year in additional property taxes to preserve the 1000 acres as farmland?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	68	18.1	18.1	18.1
\$0	72	19.2	19.2	37.3
\$1 to \$10	43	11.5	11.5	48.8
\$11 to \$20	45	12.0	12.0	60.8
\$21 to \$30	30	8.0	8.0	68.8
\$31 to \$40	64	17.1	17.1	85.9
more than \$40	53	14.1	14.1	100.0
Total	375	100.0	100.0	

Table 21- Fb If you answered no to question 4.1, what is the primary reason why?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	314	83.7	83.7	83.7
I don't think I should have to pay for farmland preservation.	38	10.1	10.1	93.9
Other reason.	23	6.1	6.1	100.0
Total	375	100.0	100.0	

Table 22- F2 Suppose that 50% of the current farmland in Abbotsford has already been lost to urban development. What is the most you would now be willing to pay each year in additional property taxes to prevent the loss of the 1000 acres of farmland?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid \$0	90	24.0	24.7	24.7
\$1 to \$10	33	8.8	9.0	33.7
\$11 to \$20	47	12.5	12.9	46.6
\$21 to \$30	43	11.5	11.8	58.4
\$31 to \$40	80	21.3	21.9	80.3
more than \$40	72	19.2	19.7	100.0
Total	365	97.3	100.0	
Missing 99	10	2.7		
Total	375	100.0		

Table 23- F3 Suppose the 1000 acres of farmland was the only remaining farmland in Abbotsford. What is the most you would now be willing to pay each year in additional property taxes to prevent the loss of the last 1000 acres of farmland?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	\$0	83	22.1	23.0	23.0
	\$1 to \$10	22	5.9	6.1	29.1
	\$11 to \$20	28	7.5	7.8	36.8
	\$21 to \$30	25	6.7	6.9	43.8
	\$31 to \$40	72	19.2	19.9	63.7
	more than \$40	130	34.7	36.0	99.7
	f.	1	.3	.3	100.0
	Total	361	96.3	100.0	
Missing	99	14	3.7		
Total		375	100.0		

Table 24- 5.0 How long have you lived in Abbotsford?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 to 5 years	50	13.3	13.3	13.3
	6 to 10 years	43	11.5	11.5	24.8
	11 to 15 years	58	15.5	15.5	40.3
	16 to 20 years	69	18.4	18.4	58.7
	more than 20 years	155	41.3	41.3	100.0
	Total	375	100.0	100.0	

Table 25- 5.1 What is the highest level of education you have completed?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	less than high school	16	4.3	4.3	4.3
	high school graduate	100	26.7	26.8	31.1
	college diploma	125	33.3	33.5	64.6
	bachelor degree	85	22.7	22.8	87.4
	graduate degree	47	12.5	12.6	100.0
	Total	373	99.5	100.0	
Missing	99	2	.5		
Total		375	100.0		

Table 26- 5.2 Are you?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	211	56.3	56.4	56.4
	Male	163	43.5	43.6	100.0
	Total	374	99.7	100.0	
Missing	99	1	.3		
Total		375	100.0		

Table 27- 5.3 Do you rent or own the home where you live?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	360	96.0	96.5	96.5
	Rent	13	3.5	3.5	100.0
	Total	373	99.5	100.0	
Missing	99	2	.5		
Total		375	100.0		

Table 28- 5.4 Does anyone in your household work in a farm-related industry?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	331	88.3	88.5	88.5
	yes	43	11.5	11.5	100.0
	Total	374	99.7	100.0	
Missing	99	1	.3		
Total		375	100.0		

Table 29- 5.5 Does anyone in your household work in commercial, industrial or residential land development?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	325	86.7	86.9	86.9
	yes	49	13.1	13.1	100.0
	Total	374	99.7	100.0	
Missing	99	1	.3		
Total		375	100.0		

Table 30- 5.6 Which age range do you fit within?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 19 to 24	4	1.1	1.1	1.1
25 to 34	47	12.5	12.5	13.6
35 to 44	86	22.9	22.9	36.5
45 to 54	102	27.2	27.2	63.7
55 to 64	98	26.1	26.1	89.9
65 and above	38	10.1	10.1	100.0
Total	375	100.0	100.0	

Table 31- 5.7 How many people live in your household?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 1	26	6.9	7.0	7.0
2	134	35.7	36.0	43.0
3	66	17.6	17.7	60.8
4	84	22.4	22.6	83.3
5	34	9.1	9.1	92.5
6	19	5.1	5.1	97.6
7	7	1.9	1.9	99.5
8	1	.3	.3	99.7
23	1	.3	.3	100.0
Total	372	99.2	100.0	
Missing 99	3	.8		
Total	375	100.0		

Table 32- 5.8 What is your postal code?

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid V2G	1	.3	.3	.3
V2S	162	43.2	45.6	45.9
V2T	94	25.1	26.5	72.4
V3G	94	25.1	26.5	98.9
V3M	1	.3	.3	99.2
V3P	1	.3	.3	99.4
V4S	1	.3	.3	99.7
V4X	1	.3	.3	100.0
Total	355	94.7	100.0	
Missing 99	20	5.3		
Total	375	100.0		

Table 33- 5.9 What range does your gross annual household income fall under?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	prefer not to respond	9	2.4	2.6	2.6
	under \$20,000	6	1.6	1.7	4.3
	\$20,000 to \$39,999	36	9.6	10.3	14.6
	\$40,000 to \$59,999	54	14.4	15.5	30.1
	\$60,000 to \$79,999	82	21.9	23.5	53.6
	\$80,000 to \$99,999	60	16.0	17.2	70.8
	greater than \$99,999	102	27.2	29.2	100.0
	Total	349	93.1	100.0	
Missing	99	26	6.9		
Total		375	100.0		

8.3 INTERCEPT SURVEY REPORT



Knowing Is Better

Ministry of Agriculture Intercept Survey - Summary Report

Completed: May 07, 2007

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KEY FINDINGS

- The vast majority of respondents (98%) feel farmland is a benefit to the community.
- A majority of Abbotsford residents associate farmland with food, produce and animals.
- Of those who have positive associations with farmland, 57% say explicitly (without prompt) that there are no drawbacks to having farmland in the community.
- Of those who have positive associations with farmland, 18% identify smell to be a drawback of having farmland in the community.
- Amongst the minority who have negative associations with farmland, 74% cite local food/produce as being a positive thing.

INTRODUCTION

In April 2007, the Ministry of Agriculture engaged Sensus Research, an independent market research firm located in Vancouver, BC, to conduct a public opinion survey of residents in Abbotsford.

Sensus Research designed a brief intercept survey to be used in collection at two public venues in Abbotsford.

Residents of the Abbotsford were invited to participate in the study during two days (April 28 & 30, 2007). The intercept occurred in the afternoon at the high-traffic public venues of Sevenoaks Shopping Centre (April 30) and the Abbotsford Power Centre (April 28).

Sensus Research employed the use of Personal Digital Assistants (PDAs) to capture on-location the responses of the participants. Furthermore, in addition to data collection, the PDAs enabled the ability for interviewers to record short verbatim responses.

The collected responses were recorded and processed by Sensus Research interviewers, and subsequently compiled to produce the data tables in the section below.

The survey generated a raw sample of 160 respondents, approximately 125 of whom were qualified to participate in the study. The final total was further reduced down to a 113 usable responses. The survey collected responses from a nearly-even split of 57 females and 56 males.

TOP-LINE SUMMARY

1. What first comes to mind when you think about "farmland" within your local community?

	Percent (%)	Counts
Produce / Animals	45.3%	39
Should be preserved / Agricultural Land Reserve / Not enough / Decreasing in amount	22.1%	19
Don't know / not sure / no opinion	8.1%	7
Positive view (general)	5.8%	5
Other	4.7%	4
Nature / lakes / fresh / environment	4.7%	4
Negative view (general)	3.5%	3
Community / Abbotsford / History	3.5%	3
Smell / manure	1.2%	1
Business / Economy / Industry	1.2%	1
	=100%	86

1a. And what would you say are some positive associations you have with "farmland" in your local community?

	Percent (%)	Counts
Local / fresh food / produce	73.9%	17
Don't know	13.0%	3
Cheaper produce	4.3%	1
Green / nature / animals	4.3%	1
Lifestyle	4.3%	1
	=100%	23

1b. And what would you say are some drawbacks of "farmland" in your local community?

	Percent (%)	Counts
No drawbacks	57.1%	36
Smell / manure	17.5%	11
Pollution / Pesticides	9.5%	6
Land could be used for other uses / Urbanization	9.5%	6
Not sure	4.8%	3
Traffic	1.6%	1
	=100%	63

2. In your opinion, is it a benefit to have farmland within the community?

	Percent (%)	Counts
Yes	98.2%	108
No	1.8%	2
	=100%	110

2a. Why do you say that?

	Percent (%)	Counts
Food	52.7%	39
Calmer / less urban / lifestyle	17.6%	13
Other	12.2%	9
Environment/Animals	9.5%	7
Helps economy / support local industry	8.1%	6
	=100%	74

3. In your opinion, is there value in having food grown in your local community?

	Percent (%)	Counts
Yes	97.3%	109
No	0.9%	1
Don't know	1.8%	2
	=100%	112

3a. Why do you say that?

	Percent (%)	Counts
Better quality / fresher	36.4%	24
Local / not foreign	24.2%	16
Helps economy / support local industry	21.2%	14
Better prices	9.1%	6
More environmentally friendly	6.1%	2
Less pesticides	3.0%	4
	=100%	66

4b. Why do you say that?

	Percent (%)	Counts
Less pollution/more environmentally friendly	54.2%	26
Other	16.7%	8
Greener/natural	14.6%	7
Less congestion/more rural/lifestyle choice	6.3%	3
Food	6.3%	3
Economic benefits	2.1%	1
	=100%	48

4. Do you think that farmland has more environmental benefits than urban land?

	Percent (%)	Counts
Yes	97.3%	109
No	0.9%	1
Don't know	1.8%	2
	=100%	112

5a. In your opinion, does farmland contribute to "green space"?

	Percent (%)	Counts
Yes	92.0%	104
No	5.3%	6
Don't know	2.7%	3
	=100%	113

5b. In your opinion, does farmland contribute to "nature"?

	Percent (%)	Counts
Yes	91.2%	103
No	6.2%	7
Don't know	2.7%	3
	=100%	113

6. Would you prefer to live in a community with or without farmland?

	Percent (%)	Counts
With	96.5%	109
Without	0.9%	1
Don't know	2.7%	3
	=100%	113

D1. What is your age?

	Percent (%)	Counts
Under 18	0.0%	0
18 to 20	0.9%	1
21 to 24	3.5%	4
25 to 44	24.8%	28
45 to 54	23.9%	27
55 to 64	21.2%	24
65 to 74	18.6%	21
75 to 84	7.1%	8
85 or higher	0.0%	0
	=100%	113

D3. How long have you lived in Abbotsford?

	Percent (%)	Counts
0-2 years	9.7%	11
3-5 years	7.1%	8
6-10 years	12.4%	14
11-20 years	19.5%	22
More than 20 years	51.3%	58
	=100%	113

D4. Gender

	Percent (%)	Counts
Female	50.4%	57
Male	49.6%	56
	=100%	113

SURVEY INSTRUMENT

Ministry of Agriculture Intercept Survey **April 2007**

SAMPLE PROFILE

GENERAL PROFILE
Residents of Abbotsford
18 years or older
Aim for equal proportions of female and male respondents
Representative sample in terms of age and gender

[INTRODUCTION]

Good morning/afternoon. My name is _____ and I am from Sensus Research. We are doing a short survey today on behalf of the Fraser Basin Council and the Ministry of Agriculture and Lands. Could we ask you a few questions?

SCREENER/QUALIFIERS

To begin the survey we would like to ask you a number of qualifying questions that will help us better understand the results.

QA. Are you currently a resident of Abbotsford?

1. Yes
2. No **[THANK AND END SURVEY]**

QB. Are you 18 years of age or older?

1. Yes
2. No **[THANK AND END SURVEY]**

SURVEY

In this short survey we want to get your thoughts and opinions on the role that farmland plays in your local community, and to start off we would like to ask you:

Q1. What first comes to mind when you think about "farmland" within your local community? **[RECORD VERBATIM / PROBE FOR SOMETHING SPECIFIC IF NECESSARY]**

[IF Q1 IS NEGATIVE:]

Q1a. And what would you say are some positive associations you have with "farmland" in your local community? **[RECORD VERBATIM / PROBE FOR SOMETHING SPECIFIC IF NECESSARY]**

[IF Q1 IS POSITIVE:]

Q1b. And what would you say are some drawbacks of "farmland" in your local community? **[RECORD VERBATIM / PROBE FOR SOMETHING SPECIFIC IF NECESSARY]**

Q2. In your opinion, is it a benefit to have farmland within the community?

1. Yes
2. No

Q2a. Why do you say that? **[RECORD VERBATIM / PROBE FOR SOMETHING SPECIFIC IF NECESSARY]**

Q3. In your opinion, is there value in having food grown in your local community?

1. Yes
2. No

99. DK/NA

Q3a. Why do you say that? **[RECORD VERBATIM / PROBE FOR SOMETHING SPECIFIC IF NECESSARY]**

Q4. Do you think that farmland has more environmental benefits than urban land?

- 1. Yes
- 2. No
- 99. DK/NA

Q4b. Why do you say that? **[RECORD VERBATIM / PROBE FOR SOMETHING SPECIFIC IF NECESSARY]**

[RANDOMIZE Q5a AND Q5b]

Q5a. In your opinion, does farmland contribute to "green space"?

- 1. Yes
- 2. No
- 99. DK/NA

Q5b. In your opinion, does farmland contribute to "nature"?

- 1. Yes
- 2. No
- 99. DK/NA

Q6. Would you prefer to live in a community with or without farmland?

- 1. With
- 2. Without
- 99. DK/NA

DEMOGRAPHICS

Finally, we would like to ask you a few questions that will help us clarify our answers.

D1. What is your age?

1. under 18
2. 18 to 20
3. 21 to 24
4. 25 to 44
5. 45 to 54
6. 55 to 64
7. 65 to 74
8. 75 to 84
9. 85 or higher

D2. What is the postal code of the area you live in?

D3. How long have you lived in Abbotsford?

1. 0 – 2 years
2. 3 – 5 years
3. 6 – 10 years
4. 11 – 20 years
5. More than 20 years

D4. Gender **[DO NOT ASK, CODE]**

1. Female
2. Male

That concludes our survey today. Thank you very much for your time.

Focus Group Study

Respondents to the survey were asked to indicate if they were interested in talking about the issues raised in the survey in more detail. Respondents indicating an interest were invited to attend a focus group session facilitated by a staff member of the Ministry of Agriculture and Lands.

The credibility of contingent valuation exercises lies in how consistently respondents interpreted the questions in the survey. This is particularly important for mail out surveys as compared to personal interviews. The primary goal of the focus group study was to gain insight into how respondents interpreted the survey questions.

The key insights gained from the focus group study were:

- The situation presented in the 'loss of farmland' question, where 1,000 acres was to be converted to industrial land, was very clear and real for the respondents.
- Respondents did not understand the functions of trusts well. This is likely why the proportion willing to support a trust was lower than the proportion willing to support a property tax increase.
- Local food production was reinforced as a key benefit of farmland in the community, however, respondents were not able to clearly describe the benefit or identify an overriding benefit of local food production.
- Focus group participants had great difficulty trying to allocate their WTP for farmland protection over the various benefits they describe.
- The perspective on what a 'view of farmland' meant was consistent with the intent of the question.
- A common comment was that 'the questions made you think'.

