An Estimate of The Public Amenity Benefits and Ecological goods Provided by Farmland in Metro Vancouver

AN ESTIMATE OF THE PUBLIC AMENITY BENEFITS AND ECOLOGICAL GOODS PROVIDED BY FARMLAND IN METRO VANCOUVER

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EXECUTIVE SUMMARY

Natural capital consists of the natural resources, environmental and ecosystem resources and land where we live. When you look at the North Shore mountains on a clear crisp spring day or walk the sea wall in Stanley Park or cruise up Indian Arm you know that in Metro Vancouver we are blessed with abundant natural capital. Farmland is part of that natural capital. Many people who drive through the countryside, or purchase food from local farms place a value on having farmland that surpasses the market value of the farm products the land produces. Some also feel there is cultural heritage or endowment value in their local farmland.

While society places a value on natural capital and farmland, this public value is not traded in the market place so it is not included in the market price (private value) of the land. As a result it is currently excluded from the resource allocation and decision making process.

What is the full value of an acre of Stanley Park? The 2006 wind storm that destroyed many trees in Stanley Park gave us a glimpse of how much the public may value our natural capital. Within a short period of time, $10 million dollars in private donations was raised to restore the park. The market value of the trees knocked down was $1 million.

Can we quantify the public value of farmland in Metro Vancouver? This study combined the information gathered from a mail-out survey with the economic theory of valuing natural capital, to estimate the public amenity value and ecological goods provided by farmland in Metro Vancouver.

The methodology used to estimate the collective public value of farmland in Metro Vancouver involved first estimating the value the average household places on farmland and then multiplying the household value by the number of households in Metro Vancouver.

Responses to the mail-out survey indicated the average household in Metro Vancouver was willing to pay $73 per year to preserve 400ha (1000ac) of farmland. This is similar to saying the average household valued preserving 400ha (1000ac) of farmland as much or more than a dinner out for two, once a year. The result falls in the lower end of a range of values estimated by similar studies conducted in North America over the past 20 years.

The results of the estimate of the public amenity benefits of farmland in Metro Vancouver are:

Public Amenity Value of Farmland in Metro Vancouver	
Public Value each year	$ 58,000/acre
Public Value in perpetuity (similar to Market Value)	$ 1,160,000/acre

The market value of farm products produced from farmland in Metro Vancouver in 2006 was $5,750/acre. The estimated public value of $58,000 is ten times the market value of goods and services provided – similar to the Stanley Park restoration example. The building blocks of the estimate are that 95% of households in Metro Vancouver want to preserve farmland and they are willing, on average, to trade $73 per year in other values to achieve that. The following graphic may help put this in perspective.

$73 /year/household

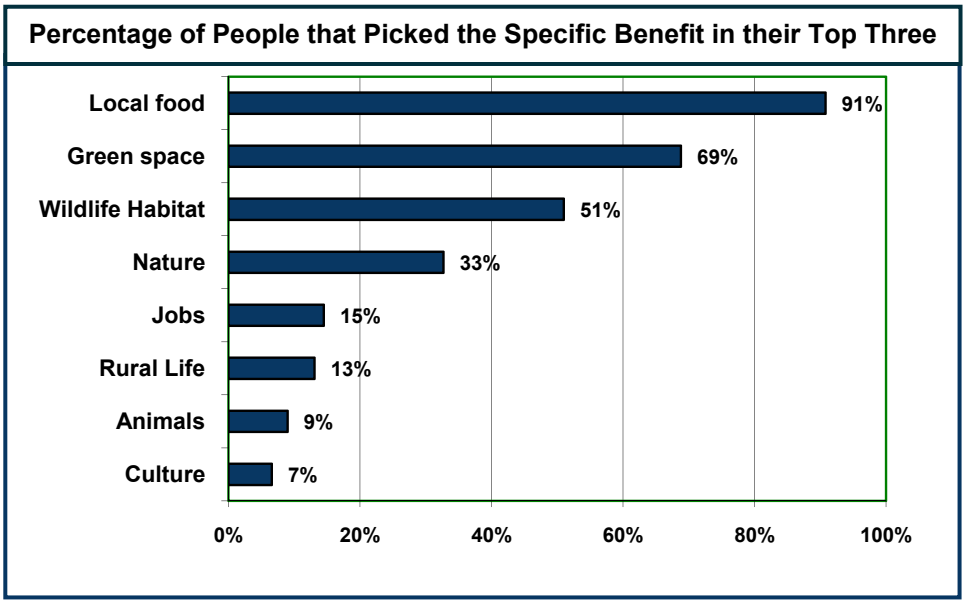
Household value to preserve 400 ha (1000 ac) of farmland

795,130 households in Metro Vancouver

Annual Public Value $58,000/acre

Public Value if preserved in perpetuity $1,160,000/ac

Why do people value farmland and how do they rank those values? When asked to identify the three most important benefits of farmland, households responded as follows:



Over 90% of households felt having local food production was one of the top three benefits of having farmland in Metro Vancouver. Greenspace, wildlife habitat and nature followed as major benefits. The perspective was confirmed by focus group sessions following the survey. The collective perspective coming from the focus groups was that for farmland, food production was the priority but, while at the same time, greenspace and habitat values should be maximized.

What does this mean? In the absence of a quantitative estimate of the public value of farmland and urban development land, land use planners and decision makers often default to private values established in the market place. This report suggests that the public values of farmland in Metro Vancouver may be much higher than the private values currently used in land use policy discussions.

To embrace the idea that the public value of an acre of farmland in Metro Vancouver is

$1.16 million

one only has to accept that, on average, households in Metro Vancouver value preserving 400 ha (1000 ac) as much or more than a nice dinner out for two, once a year.

Protection of habitat to support migratory birds in Delta has been recognized as an important public value. The Delta Farmland and Wildlife Trust administers a program that pays farmers up to $300/acre to temporarily set-aside farmland for wildlife habitat. Responses to the mail-out survey indicated the public value of set-asides for wildlife habitat is $3,200/acre.

It is interesting to note that in the three public valuations of natural capital, one a direct response from the public and the other two estimates from a mail-out survey, the public value exceeded the private market value by a factor of 10.

Type of Natural Capital	Private/Market Value	Public Value
Stanley Park Windfall	$1 million	$10.1 million
Farmland	$5,700	$58,000
Wildlife Habitat set-asides	$300	$3,200

While the absolute numerical value estimates can be debated, it is clear that in highly urbanized areas like Metro Vancouver, the **public** value of the remaining natural capital is much greater than the **private/market** value currently used to value it.

It is hoped the information provided by this study will help land use planners and decision makers in their decision making process. It is also hoped that this report will stimulate discussion and research on the public value of urban developed land. In the end, more information will lead us to more informed land use planning decisions that include the public value as well as the private value.

OUTLINE

1.0 INTRODUCTION

Farmland in the Fraser Valley has one of the best combinations of soil, climate and available water in North America. Its moderate climate and a wide variety of sport and recreation opportunities also make it an attractive place to live. With an increasing population, a question that confronts many communities and regions is how can urban development and the need for local food production and green space be managed to create a long term sustainable community?

Land use planners and decision makers are tasked with making land use allocation choices that support the broad public interest. To date there has not been a **quantitative** measure of the public value of land use as farmland or as urban development use. In the absence of a quantitative measure of its public value, land use decision makers often default to the quantitative measure of the private value of land; the market value. This private value is the measure used to support what is often termed the 'highest and best use' of the land. If the public value of land, both for farmland and urban use was used, perhaps the 'highest and best use' would be different than when the private or market value alone is used to make that determination.

This study estimates the public value, which includes both amenity values and ecological goods, provided by farmland in Metro Vancouver. It is hoped that this information will aid land use planners and decision makers in making more informed land use decisions. It is also hoped that this report will stimulate discussion and the estimation of the public value of specific urban development land uses.

The study involves three phases. First, an intercept study[1] was undertaken to establish the urban perceptions of the value of farmland in Metro Vancouver. Information from the intercept study was combined with current economic theory to design a mail-out survey to elicit the general public's willingness to pay to support farmland preservation. Following the mail-out survey three focus groups were conducted, with willing respondents, to further explore perspectives that were identified in the mail-out survey. The general public's willingness to pay for farmland preservation was used to estimate how the population as a whole values farmland.

Section 2 of the report provides background information on the types of values people receive from the natural environment and the history of how researchers have attempted to quantify those values. Section 3 outlines the general approach taken in this study and Section 4 describes the precise methodology and develops the economic model used in estimating the public value of farmland.

Section 5 provides the results and Section 6 explores the potential bias that may exist within the estimate. Section 7 and 8 explore two parallel aspects of the estimation procedure and Section 9 discusses the results.

The appendix includes the results of the intercept study, the complete list of write-in comments, a computer printout of the model results and the analysis of the data.

[1] An 'intercept' study is explained in Section 3.2, page14.

2.0 BACKGROUND ON PUBLIC VALUES OF NATURAL CAPITAL

2.1 PUBLIC VALUES AND FARMLAND

The public has made it clear over the last few decades that they value our forests for more than simply the ability to supply logs to our mills. Non-market values of forests include wildlife habitat, carbon dioxide - oxygen exchange, fisheries resource and others.

In the same way, the public values farmland for more than just the market value of the food and fiber it produces. Kline (1996) identified some of these values as habitat preservation, groundwater recharge, local food production capacity, agricultural heritage, scenic vistas and urban growth containment.

What is meant by public values? Private values are established in the market place. It is the value that one person places on a good or service and demonstrates that value through the exchange of money. Once the good or service is purchased it belongs to that individual. Public values differ from private values in two ways. Firstly, they are not traded in the market place so their value cannot be determined by monetary exchange. You cannot buy units of benefit in having farmland in the community. Secondly, and more importantly, for estimating the total value of public benefit, because no individual can own public benefits no one can exclude another from receiving the benefits.

Economists describe this as a 'non-excludable' benefit. An example of this would be the view of the North Shore mountains. If people receive some benefit/value, say amount X, from having the North Shore mountains present, and no person can exclude another person from that benefit, the total benefit to society is the amount X times the number of people in the area. So the cumulative public value of a natural asset is directly related to the population that receives benefit from it.

Different from estimating the public value of environmental services, estimating the incremental ecological goods provided by farmland is a market based analysis. If one asks, *how many more fish are produced per hectare of farmland as compared to urban land,* the answer will be in units of fish and the value will be the market value of those extra pounds of fish[2]. This is very different from the description of public values, or what is often termed ecological services. Ecological goods are a function of the land base and the market based value of the incremental goods produced. Public amenity benefits, or ecological services, are a function of how much people value the benefit and how many people receive the benefit.

[2] If there are social benefits of fish production these values should be captured in the amenity value estimate. One could argue that the social benefits from incremental fish production extend beyond the residents of Metro Vancouver. This is true and is a shortcoming of the estimation technique.

2.2 TYPES OF PUBLIC VALUES/BENEFITS

Public benefits can be grouped as *use* values and *non-use* values. Use values can be active or passive. Active use values are those benefits that people experience directly – visiting a farm market or roadside stand or attending agri-tourism events, sipping wine at an estate winery or playing in a corn maze. Passive use values include scenic views, greenspace and nature. Non-use values include food security, maintaining an agrarian cultural heritage, and community sustainability. An example of a non use public benefit, outside of the farmland context, is support for preservation of killer whales. Many people never see a killer whale in their natural environment but gain benefit from knowing they exist. Non-use values are also referred to as existence values and people feel the existence of these natural assets is part of their natural endowment.

The difference between use and non-use values is an important consideration when estimating the public value of farmland. Metro Vancouver residents are the main beneficiaries of the use values of farmland in the region. On the other hand all residents of B.C. benefit in some way from the non-use values. This project only estimates the public value of farmland to urban residents in Metro Vancouver, however, it is important to recognize that this excludes the non-use values enjoyed by people living outside the Metro Vancouver boundaries.

Before preparing a survey to ask urban residents of Metro Vancouver how much they valued farmland in their community, an intercept study was conducted to identify what characteristics of farmland they valued most. When asked for positive associations with farmland, urban residents of Metro Vancouver identified local fresh produce, green space, nature, farm animals and sustainability.

2.3 GENERAL APPROACHES TO QUANTIFYING THE PUBLIC VALUE OF FARMLAND

In this study we ask if there is an equivalent market value we can attach to the public benefits urban residents in Metro Vancouver receive from having farmland in their region.

Early work on estimating the value of amenity benefits of natural capital focused on identifying market based choices that revealed an individual's value of natural capital. These approaches are termed 'revealed preference' methods. An example of this is the additional price people pay for a home with a scenic view as compared to one with no scenic view. Another example is the travel cost people incur to take advantage of fishing, camping and hunting opportunities. This approach has limited application as there has to be a closely associated market based activity, and there are challenges in separating the benefit of the natural capital from other factors that affect the choice to buy or trade.

To overcome the need to have a close market based proxy, researchers developed an approach where a hypothetical market situation is presented to an individual and they are asked how they would respond. This method is termed a 'stated preference' method. Some of the early work using this method was by Bishop and Heberlein (1979) studying the public value of goose

hunting permits in Wisconsin. They asked hunters how much they would be willing to pay for a hunting license and, if they had already purchased a hunting license, what they would be willing to accept to sell the license. This approach to estimating the value of a public benefit is termed WTP (willingness to pay) and WTA (willingness to accept) studies and they fit under the broad category of 'contingent valuation' studies.

Contingent valuation (CV) studies have much broader application than revealed preference studies. One important advantage of CV studies is that they can include a broader range of values including non-use values. But CV studies are not without their challenges. Economists prefer to observe how people actually behave in a market rather than state how they would behave. Researchers have found in other studies, particularly product launch studies, that stated behavior does not always translate directly into actual behavior.

The effort to quantify the environmental damage from the Exxon Valdez oil spill in 1989 resulted in many CV studies and many critiques of those studies. In 1993, in an effort to develop a set of best practices around contingent valuation studies, the National Oceans and Atmospheric Agency (NOAA) engaged a panel of experts to review the literature surrounding contingent valuation. Their report has acted as a reference document for subsequent contingent valuation work.

More recent discussions around the appropriate use of CV in estimating non-market values has focused on when it is appropriate to ask people what they are WTP for a public value or what they are WTA for loss of a public value. In economic theory the difference is expected to be small, however, in practice it has turned out to be quite large.

The existence of the Agriculture Land Reserve (ALR) in B.C. makes the method used to estimate the public value of farmland an important consideration. It is discussed in more detail in Section 8.

3.0 GENERAL APPROACH TO ESTIMATING PUBLIC AMENITY BENEFITS

The study involved four separate elements. The main element was a choice experiment[3] undertaken through a random mail-out survey of **urban** households in Metro Vancouver. The mail-out survey was supported by a pre-survey intercept study of the perceptions of farmland held by individuals in Metro Vancouver and a post-survey focus group study of survey respondent perceptions of the survey questions and specific issues uncovered by the survey. A parallel telephone survey in Pitt Meadows was undertaken to compare the results of a telephone survey method with the mail-out survey method.

The different characteristics of the communities in the region was recognized and considered in the study. Communities were grouped as to those with a lot of farmland, those with a little farmland and those with no farmland. These groupings could also be loosely considered as rural,

[3] Choice experiments are explained in footnote 12, page 19.

suburban and urban communities. The three types of communities were sampled and analyzed separately.

This study only estimates the public value to urban residents. ALR land owners were excluded because farmland preservation initiatives are primarily funded by urban residents and farmers can potentially receive a large personal benefit if land use decisions affect their property.

The Delta Farmland and Wildlife Trust pays farmers to temporarily set-aside farmland for wildlife habitat - primarily to support the migratory bird population in Delta. A choice experiment, similar to the farmland preservation question, was included in the mail-out survey to estimate the public value of set-asides for wildlife habitat.

3.1 MAIL-OUT SURVEY

The general approach of contingent valuation methodology is to create a market like scenario that the respondent can relate to and then ask if they would be willing to pay a specific amount for their preferred outcome. The premise is that individuals allocate their funds to where they get the most value or 'utility'. For example, if the preferred outcome was more valuable to the respondent than say a night out at the movies, the respondent would be willing to pay a value equal to a night at the movies for the desired outcome.

In the mail-out survey, the scenario presented was that a local government had proposed the use of 400 ha (1000 ac) of farmland for urban development – primarily to increase the tax base. Respondents were asked if they preferred to keep the 400 ha (1000 ac) as farmland and, if so, if they would be willing to pay a specific amount annually for this to happen. A referendum style format was used[4] where the amounts where varied between different respondents. If the value they were asked to pay for farmland preservation is greater than the value they would receive if they purchased something else with their money, they will agree to pay and vote yes. If not, they will vote no. This approach is seen as a less complicated question than an open ended or payment card question as all that is required is a simple yes/no answer.

The key valuation question was surrounded with some general questions as to which attributes of farmland they valued, how often they bought local produce and some questions related to their individual characteristics.

The survey also asked respondents to provide their postal code. The postal code provided an approximate distance the respondent lived from farmland and with that, gave some insight into whether people close to farmland value farmland differently than people that live father away from farmland.

The survey provided an opportunity for respondents to add their comments. The comments are included word for word, and summarized by theme in Appendix 11.2, page 66.

[4] Early approaches to CV used either open ended questions or a list of potential responses that the respondent could choose from. Both of these methods have been shown to potentially bias the response.

Wildlife habitat is identified as an attribute of farmland in Metro Vancouver and particularly for migratory birds in Delta. There are currently programs to pay farmers to temporarily set-aside farmland for wildlife habitat. Respondents were asked if they supported these programs, and if so, if they would be willing to pay a specific amount annually to support these programs. The amount was varied between respondents.

14,200 surveys were mailed to random households in Metro Vancouver. The full survey and cover letter are in Appendix 11.1, page 61.

A telephone survey of 100 residents in Pitt Meadows, using the same questions as the mail-out survey, was conducted at the same time as the mail-out survey to compare results of the two survey methods. Concerto Research was contracted to do the telephone survey.

3.2 PRE-SURVEY INTERCEPT STUDY

The pre-survey intercept study was designed to identify the 'top of mind' perceptions regarding farmland in the community. The feedback obtained from the intercept study was used to ensure the full mail-out questionnaire asked relevant questions in terms familiar to the respondents.

The intercept survey also acts as a check on the randomness of the responses received from the mail-out survey. It is believed that an intercept study offers less opportunity for individuals to self-select by not responding.

3.3 FOCUS GROUP STUDY

Focus group studies involve inviting a small group of people together to discuss a specific topic under the guidance of a facilitator. Respondents to the mail-out survey were invited to attend the focus group sessions. For this project the focus group was able to provide feedback on how the scenario presented in the mail-out survey was interpreted and provide input on issues that arose from responses to the survey.

Three focus groups were held, two in Burnaby and one in Surrey.

3.4 PITT MEADOWS TELEPHONE SURVEY

The NOAA Expert Panel on contingent valuation suggested that, when possible, one-on-one surveys are preferred over telephone surveys, which are preferred over self administered mail-out surveys. The rational is that individual contact with the surveyor provides the respondent with an opportunity to clarify any confusion with the scenario presented. A telephone survey, using the key questions in the mail-out survey, was conducted in Pitt Meadows the week following distribution of the mail-out survey. Responses to the telephone survey, compared directly with mail-out survey responses, provided a comparison of the two survey methodologies.

3.5 POTENTIAL BIAS IN CONTINGENT VALUATION ESTIMATES

Despite the acceptance of CV as an appropriate method to estimate the value of natural capital, and the NOAA panel recommendations, there remains several areas of potential bias in the methodology. The following are potential sources of bias with a comment on what was done in this study to minimize those biases.

3.5.1 QUESTION BIAS

When using the contingent valuation method, the clearer the question and more realistic the scenario, the more likely it is that the respondent can accurately place a value on the specific benefit. For the farmland preservation question, the scenario for respondents to consider involved the removal of 400 ha (1000 ac) 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 is likely very familiar to local residents. The issue of removal of land from the ALR for other uses has been in the public forum for many years. Recent examples include the application to remove the Garden City lands from the ALR, the removal of ALR lands for condominiums on a golf course in Tsawwassen, and the loss of ALR land for the South Fraser Perimeter Road extension in Delta. The quantity of land, 400 ha (1000 ac), was chosen as it is the size of Stanley Park, which is one of the most well known landmarks in Metro Vancouver.

The payment vehicle is also a potential for bias. The Abbotsford Pilot Study (BCMAL, 2008) found that although some people have a strong negative tax bias, the general public trusted government to protect land better than other mechanisms such as land conservancy trusts or restrictive covenants on the land.

3.5.2 QUESTION ORDER BIAS

Researchers have reported that the order in which questions are asked in a survey can influence the response[5]. To test for question order bias, the farmland preservation question was placed first for one half of the surveys and the wildlife habitat preservation question was placed first for the other half of the surveys.

3.5.3 SURVEY DISTRIBUTION, SELF SELECTION AND RESPONSE BIAS

The Metro Vancouver communities were divided into three types, relative to the amount of ALR in their community: those with a lot, those with a little and those with none. Representative communities in each of the groups were then sampled randomly using mailing lists from Land Sense[6], a provider of addresses for mailing lists. Surveys were addressed to the occupant rather than the registered land owner in an effort to capture responses from renters.

[5] Bibliography. Section 10.
[6] Land Sense obtains residential address information from BC Assessment records

Self administered mail-out surveys with no follow-up reminders has the potential for self-selection bias. People not interested in farmland simply do not respond. The intercept survey results, telephone survey results and findings from other studies will be used to assess the degree of self-selection bias in this study.

The demographic characteristics of respondents were compared to the average demographics in Metro Vancouver to test if the responses came from a representative sample of the population.

Communities sampled were Pitt Meadows, Langley, Surrey, Delta and Richmond as communities with a lot of ALR, Burnaby and Coquitlam as communities with a little ALR and Vancouver[7] and North Vancouver as communities with no ALR.

Only urban residents were sampled. Rural residents, particularly near urban centers, can have a significant financial interest in urban rural land use policy. Exclusion of rural residents will bias the estimate downward by 1.8%.[8]

3.5.4 AGRICULTURAL LAND RESERVE BIAS

British Columbia is one of two few jurisdictions in North America that has a farming area protected by provincial legislation. The 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 1973 and has a high degree of awareness and support among residents in urban areas.[9]

The presence of a relatively strong regulatory mechanism may impact 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.

The ALR has added costs to residential development by effectively forcing new residential development to upland areas, which is more expensive to develop than flat farmland.

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[7] Vancouver has some ALR in the Southlands area. This is primarily an equestrian enclave in the city and was considered differently than the intensive vegetable production along Southwest Marine Drive in Burnaby.

[8] Assuming the same WTP as urban residents and given that 14,394 of the 809,425 (1.8%) households in Metro are in the ALR.

[9] 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. Also 2008 Ipsos Reid. *Poll of Public Opinions Toward Agriculture, Food and Agri-Food Production in B.C.* http://www.gov.bc.ca/al/attachments/iaf_survey_final_report_dec_17.pdf

It is expected 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 protest votes – those respondents that do not feel they should pay for farmland preservation.

3.5.5 BIAS DUE TO CHANGING SOCIAL/POLITICAL ENVIRONMENT

The economic downturn in the fall of 2008 changed many individual's financial situation and could reduce their willingness to pay additional taxes. The survey was distributed in the 3rd week of September with a request to respond by October 31. The economic downturn was underway at this time so responses reflect a WTP in uncertain economic times. Municipal elections were held in November of 2008. There is no anticipated bias related to the changing economic times or specific political issues outside of a heightened sensitivity to tax increases.

4.0 METHODOLOGY

4.1 PREVIOUS WORK

The concern for loss of farmland to urban development in the US in the 1970's prompted the introduction of legislation in many states that enabled the purchase of private property development rights for the preservation of farmland[10]. This lead to a body of work focused on estimating the public value of farmland preservation to support farmland conservation initiatives and further exploring the impact of the 'scarcity' of farmland on the value for preservation[11].

The early work on valuing the amenity benefits of farmland is captured by Halstead (1984), Bergstrom et al. (1985), Beasley et al. (1986) and Bowker and Didychuk (1994). These studies estimated a household WTP for preserving farmland and most estimated the WTP over different quantities of farmland preservation. The results for the various scenarios ranged from $6/year to $176/year. Table 4.1 contains a brief summary of their location, approach and results.

[10] For example, the Massachusetts Agricultural Preservation Restriction Act (Chapter 780), Farmland Protection Policy (FPP) in the 1981 Agricultural and Food Policy Act. In addition the 2002 Farm Bill provided funds for conservation easements.

[11] Economic theory suggests that as the quantity of a product becomes scarce the WTP will increase.

Table 4.1 Summary of Early Research on WTP for Farmland Preservation

Author	Location	Approach	Result
Halstead (1984)	Massachusetts	* WTP for development rights to protect farmland * 3 levels of development intensity and 3 communities with different quantities of farmland * one on one interviews	* $28/yr to $60/yr based on intensity of urban development * $50/yr - $90/yr based on level of farmland in the community
Bergstrom et al. (1985)	South Carolina	* WTP for protection of 4 different quantities of farmland * mail survey * payment option given	* $5.70/yr for the smallest quantity * $8.94/yr for the largest quantity.
Beasley et al (1986)	Alaska	* WTP to protect against different types/levels of development * one on one interviews	* $76/household for moderate development
Bowker and Didychuk (1994)	New Brunswick	*WTP for protection of 4 quantities of farmland * one on one interviews * payment into a tax exempt trust	* $49/yr for the smallest quantity * $86/yr for the largest quantity

Results from Bergstrom et al. are an order of magnitude lower than Halstead, Bowker and Didychuk and Beasley et al. In the discussion of results, Bergstrom 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'.

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

The NOAA report in 1993 became the benchmark from which the quality of much of the contingent valuation methodology is now measured. A critical point was the suggestion that choice experiments were a preferred approach to payment cards or open ended valuation questions[12].

More recent farmland preservation work has focused on estimating the public's willingness to pay for preserving different types of farmland and different types of farming activity on farmland.

In 2003 Bergstrom and Ready published a paper titled *What Have We Learned from 20 years of Farmland Amenity Valuation Research?* In commenting on where the work is leading, they pose the question of optimization of land use allocation based on public good. In a community with a limited land base, as population rises and farmland is used for urban development, the public value of the remaining farmland rises. Once an urban core is established, the marginal public benefit of additional urban lands decreases[13]. This creates 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?[14] This issue is explored in the discussion of results Section 9.4, page 55.

The only work identified to date that explores how this generalized model works in practice is by Fleisher and Tsur (2004). They incorporated the amenity values of farmland into a model designed to estimate the socially optimal allocation of land between urban and rural use in northern Israel. In Israel much of the land is owned by the state and leased for private sector use. The rental rate for industrial land was used as a proxy for the public benefit of urban development land. The study suggested that in the town studied, the socially optimal balance of urban and rural land was 50% urban land and currently 55% of the land is being used as urban development land.

This study closely follows the NOAA criteria for contingent valuation studies. For the WTP question for farmland preservation and wildlife habitat protection, a choice experiment with a $0 bid option is used. The WTP question was asked via a self directed mail-out survey. Budgetary constraints prevented the use of a telephone survey for the entire Metro Vancouver area, however, as a comparison of survey methods, a telephone survey was done in Pitt Meadows at the same time as the mail-out survey.

[12] Choice experiments involve asking a respondent if s/he is WTP a specific amount and then varying the amount across respondents. The payment card approach offers a series of values and asks the respondent to pick one. It is felt that the choice experiment provides the simplest question for the respondent and is similar to the questions people are asked in local referendum.

[13] Due to congestion, pollution and the cost of urban sprawl.

[14] 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.

4.2 ECONOMIC MODEL FOR THE CHOICE EXPERIMENT

4.2.1 GENERAL MODEL

The economic model used is a utility theoretical referendum model developed by Hanemann (1984, 1989) and further discussed by Vaughn (1999).

Economic theory assumes that individuals use their income (Y) to purchase a package of goods and services to maximize their utility (or welfare) based on their individual characteristics and preferences (X). Individuals also receive utility from the existence of non-market goods, such as farmland (F), that are not traded in the market place. The general construct for an individual's utility function (u), for this study, can be characterized as follows:

$$u(Y, X, F) \qquad (1)$$

An individual's utility contains elements that are observable, for example age, gender, education, and elements that are not observable. When considering the utility of the *i* th individual in a population, the general equation (1) can be expressed as follows:

$$u_i = v\,(Y_i, X_i, F_i) + e_i \qquad (2)$$

where $v(Y_i, X_i, F_i)$ represents a function of observable elements of the individuals utility and e_i is a traditional error term that represents the non-observable elements of the individuals utility. $v(Y_i, X_i, F_i)$ is often termed the 'utility index'.

In a utility maximizing environment, individual *i* will only vote yes to trade \$A for the utility received from preserving farmland if:

$$v_i(\,Y_i - \$A, X_i, F^o) + e^1 \;>\; v_i(Y_i, X_i, F^1) + e^o \qquad (3)$$

Where F^o is the original quantity of farmland and F^1 is the reduced quantity of farmland.

The probability of the *i* th individual voting yes (Pr(1)) can then be written as:

$$\Pr(1) = \Pr\{\, v_i(\,Y_i - \$A, X_i, F^o) + e^1 \;>\; v_i(Y_i, X_i, F^1) + e^o \,\} \qquad (4)$$

or

$$Pr(1) = Pr\{ e^1 - e^0 > v_i(Y_i, X_i, F^1) - v_i(Y_i - \$A, X_i, F^o) \} \quad (5)$$

Or in the more general form of :

$$Pr(1) = Pr\{ e^1 - e^0 > \Delta v \} \quad (6)$$

Where $\Delta v = v_i(Y_i, X_i, F^1) - v_i(Y_i - \$A, X_i, F^o)$. Assuming the error difference $(e^1 - e^0)$ follows a logistic distribution, the probability of a yes response can be expressed as a random utility model.[15]

$$P(1) = \frac{e^{\Delta v}}{1 + e^{\Delta v}} \quad (7)$$

And the probability of a no response P(0) is:

$$P(0) = 1 - P(1) = \frac{1}{1 + e^{\Delta v}} \quad (8)$$

If the probability of a yes response is divided by the probability of a no response, the result is termed the odds ratio.

$$\frac{P(1)}{P(0)} = e^{\Delta v} \quad (9)$$

Taking the natural log of both sides gives.

$$\text{Ln}\ \{P(1)/P(0)\} = \Delta v \quad (10)$$

Or the natural log of the odds ratio is linear in the utility index.

[15] Random Utility is a general categorization of discrete choice models where individuals choose between options. The models are designed to estimate the probability of an individuals choice.

When the error term of the utility index follows the logistic distribution, these models are termed logit models. Logit models are most frequently estimated by the Maximum Likelihood Estimation method. The likelihood function for this estimation method is formed as:

$$L = \prod_{i} \frac{e^{\Delta v}}{1 + e^{\Delta v}} + \prod_{j} \frac{1}{1 + e^{\Delta v}} \qquad (11)$$

where i refers to those that voted yes and j refers to those that voted no.

It is important to note that a unit change in the estimated coefficients of the utility index do not represent a marginal impact in the probability of a yes response[16]. The marginal impacts of the estimated coefficient are also not constant for all values of the utility index.

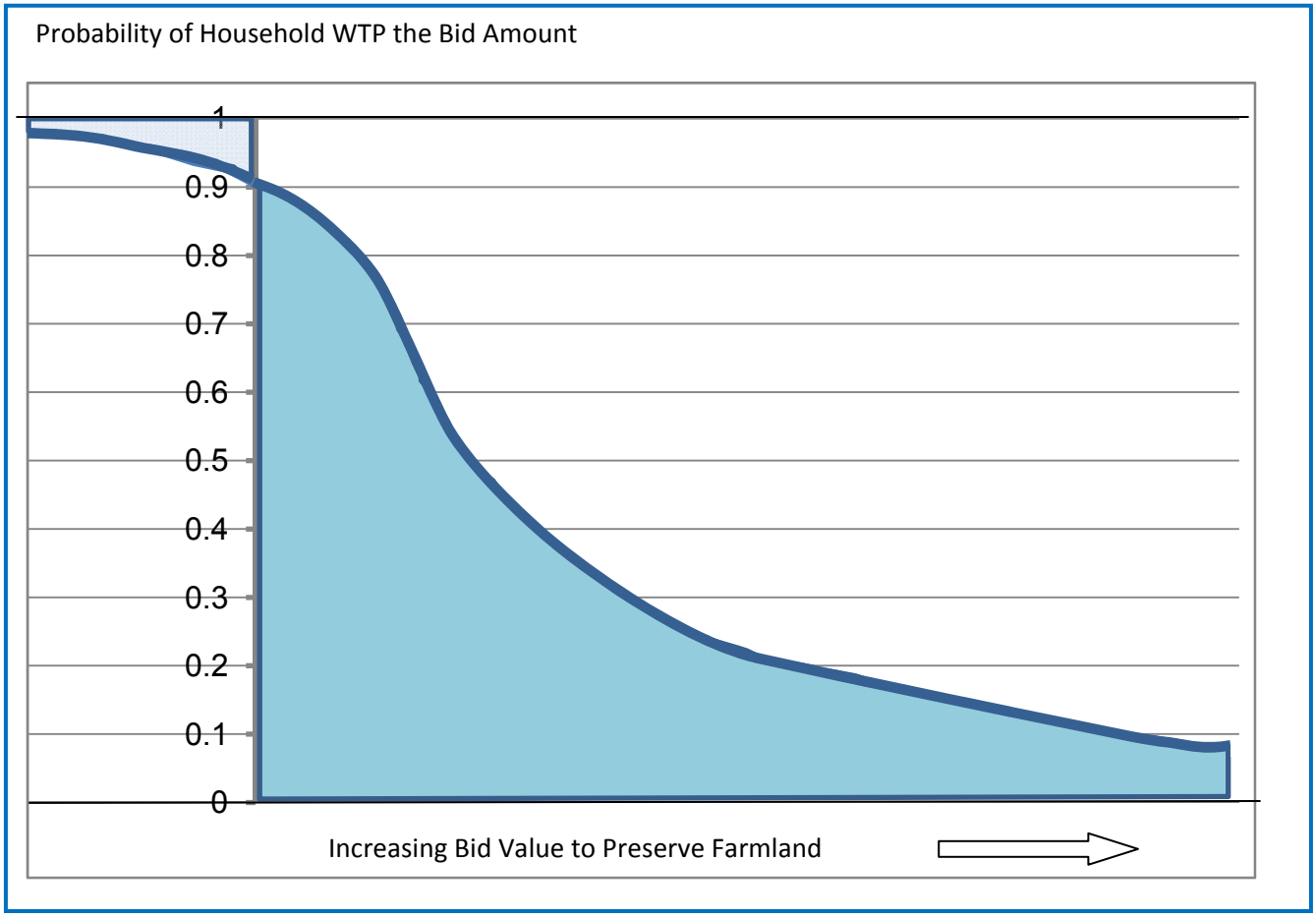
4.2.2 WELFARE MEASURES

The goal of the project is to estimate the public benefit or 'welfare' gain by the urban residents from having farmland in their community.

When the parameters of Δv have been estimated, the probability of voting yes (y axis) can be plotted against the bid amount (x-axis). This provides a cumulative density curve of the general form as described in Hanemann, 1989, figure 1.

[16] Marginal impacts are the partial derivative of the expression for prob(y=1) with respect to x_i. For the logit model this is $\beta_i e^{x\beta}(1+ e^{x\beta})^{-2}$ which varies with values of x.

Figure 4.2.2 Hanemann's (Figure 1) General Welfare Measure Curve



The area under the curve for values greater than zero (dark blue area) represents the welfare benefit to society. When aggregating the social welfare gains over the entire population, two questions arise; should the mean or median be used as the average measure of welfare and should the negative responses (light blue area) be considered?

The mean will tend to be greater than the median as it includes the asymptotic tail of the logistic function - if not truncated. To minimize this impact, the right hand tail of the logistic function will be truncated at the maximum WTP amount offered in the responses. Both mean and median will be reported. It is anticipated that not including the asymptotic tail of the curve past the highest bid amount in calculating the mean value will result in the mean being less than the median.

In cases where the benefit being estimated has no logical negative impact, researchers only consider positive WTP responses. In this study respondents are asked to choose between farmland and urban development land. Some individuals may value urban development land more than farmland. To include these responses in the welfare estimate, the area under the negative tail of the WTP probability function is subtracted from the area under the positive tail of

the WTP probability function to obtain a mean WTP used to estimate the net welfare benefit to society. The left hand tail of the logistic function is truncated at the first potential incremental negative bid (-$25). It is important to note that the welfare estimate of the positive responses are limited to the range of bids asked while the estimate of the negative responses is an extension of the model into an area where there were no bid responses.

The median is calculated by finding the bid value (X) that satisfies equation (7) when the estimated parameter values are used and the probability of a yes vote is 0.5:

$$0.5 = \frac{e^{\Delta v}}{1 + e^{\Delta v}} \qquad (12)$$

The mean is calculated by taking the integral of the cumulative density function evaluated over the desired bid range; -$25 to $125.

$$\text{Mean} = \int_{-25}^{125} \frac{e^{\Delta v}}{1 + e^{\Delta v}} \qquad (13)$$

And when integrated takes the form:

$$\text{Mean} = \left| \frac{\text{Ln}(1 + e^{\Delta v})}{b} \right|_{0}^{125} - \left| \frac{\text{Ln}(1 + e^{\Delta v})}{b} \right|_{-25}^{0} \qquad (14)$$

4.2.3 ESTIMATING THE UTILITY INDEX

For this study, data was collected to estimate a 'utility index' function for farmland preservation as follows:

$$WTP = \alpha + \beta_1 A_i + \beta_2 G_i + \beta_3 EDU_i + \beta_4 Y_i + \beta_5 H_i + \beta_6 INDA_i + \beta_7 INDC_i + \beta_8 F_i + \beta_9 R_i + \beta_{10} DIST_i + \beta_{11} BIDF_i + \beta_{12} ORDER_i$$

Where:

A	Age of the respondent
G	Gender of the respondent
EDU	Level of education achieved by the respondent

Y Household income

H Home owned (1) or rented (0)

INDA Respondent works in agriculture industry (1), or not (0)

INDC Respondent works in commercial or industrial land development (1), or not (0)

F Family size

R Time of residency in Metro Vancouver

DIST Distance of respondent's residence from the ALR boundary.

BIDF Amount respondent was asked to pay to preserve 400 ha (1000 ac) of farmland

ORDER The order the WTP questions were asked, farmland first (1) or wildlife habitat first (0)

Data was also collected to estimate a WTP for wildlife habitat preservation as follows:

$$WTP = \alpha + \beta_1 A_i + \beta_2 G_i + \beta_3 EDU_i + \beta_4 Y_i + \beta_5 H_i + \beta_6 INDA_i + \beta_7 INDC_i + \beta_8 F_i + \beta_9 R_i + \beta_{10} DIST_i + \beta_{11} BIDW_i$$

Where:

BIDW Amount respondent was asked to pay into a fund to conserve 2,428 ha of low use farmland for wildlife habitat.

For the estimate of the public value of farmland it will be assumed that the sample is a perfect random sample where the demographics of the sample perfectly match the demographics of the population of Metro Vancouver. In this situation the model simplifies to:

$$WTP = \alpha + \beta\ BIDF \quad (15)$$

The full model will be estimated to identify which demographic characteristics are significant and, if the sample varies from the population demographics, how much the sample error impacts the estimation.

4.3 ESTIMATE OF ECOLOGICAL GOODS

In this study ecological goods are viewed as the **goods** provided by the land over and above the products of farm activities. The estimate of ecological goods is limited to fish production from riparian habitat and groundwater retention from impervious surfaces because there are market estimates of their value and data available regarding their contribution relative to urban areas. Other ecological goods, such as storm water protection, have been attributed to farmland. In Metro Vancouver farmland does not play a significant role in storm water protection.[17]

It is recognized that the value of healthy fish stocks goes beyond the market value of the production. The social and cultural aspects of maintaining fish habitat are captured in the estimate of ecological **services.**

Knowler et al. (2003) estimated the value of fish habitat on farmland in the interior of BC to be between $1,300/km and $7,200/km of stream length. Stream mapping by local governments provides a good estimate of the stream density in urban areas as compared to farming areas. Use of GIS with recent aerial photos of urban and rural areas provides an estimate of proportion of each area that has been converted to an impervious surface.

A similar methodology was used as described on page 39 to 43 of the Abbotsford Pilot Project (BCMAL, 2008).[18]

4.4 ESTIMATION METHOD FOR WILDLIFE HABITAT

Previous work on the public WTP for wildlife set-asides include the findings by Christie et al. (2004) that the WTP for set-asides 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.

In the Abbotsford Pilot study respondents were willing to pay $11 per household to preserve 1,000 acres for wildlife habitat.

The focus groups following the Abbotsford mail-out survey indicated that they had a very difficult time separating the different attributes of farmland and allocating the amount they would be WTP between the different attributes. To help overcome this challenge the question in this study focused specifically on set-asides and for a specific amount of land.

The methodology used to estimate the WTP for wildlife habitat set-asides is identical to that used to estimate the public value of farmland preservation as described in Section 4.4. The bid amounts and response for WTP to preserve farmland are replaced with the bid amounts and WTP to contribute to a fund for wildlife set-asides.

[17] Much of the farmland in Metro Vancouver is under formal drainage and dyking systems that manage the water year round for drainage and irrigation.
[18] http://www.agf.gov.bc.ca/resmgmt/sf/publications/Public_Amenity_Benefits_report.pdf

5.0 RESULTS

The general results of the three phases of the study are presented, including the detail calculations involved in estimating the public amenity benefits of farmland in Metro Vancouver.

5.1 PRE MAIL-OUT SURVEY INTERCEPT STUDY

Concerto Research was contracted to undertake an intercept study to identify the top of the mind perception of farmland in the region. The complete report is in Appendix 11.5, page 103. Two key pieces of information provided by the intercept survey are the 'top of mind'[19] benefits of farmland in the Metro Vancouver region and the proportion of urban residents in Metro Vancouver that do not value farmland.

The intercept survey obtained responses from 256 individuals evenly distributed between the three types of communities.

The key top of the mind benefits of having farmland in Metro Vancouver are displayed in Table 5.1.

Table 5.1 Top of the Mind Benefits of Farmland in Metro Vancouver

Benefit	% Respondents
Local, fresh produce	42%
Greenspace / nature	17%
Less expensive produce	6%
Others	35%

When asked if it was a benefit to have farmland in your community, 95% said yes and 5% said no. This response is similar to a 2008 Ipsos Reid poll that explored the public perceptions of farmland. [20]

5.2 RESPONSE TO MAIL-OUT SURVEY

The communities in Metro Vancouver were divided into three types based on the quantity of farmland, and representative communities within those groups were selected for sampling.

The communities sampled, number of surveys distributed and number returned are detailed below in Table 5.2.

[19] Top of the mind benefits refers to the first thing people say when asked about a topic. This is different than the mail-out survey where people are asked to pick the three most important benefits out of a list of potential benefits.
[20] http://www.gov.bc.ca/al/attachments/iaf_survey_final_report_dec_17.pdf

Table 5.2 Mail-out Survey Response Rates from Different Communities

Community	Sent	Return to Sender	Net Sent	House holds	Households / net surveys sent	Useable Responses	
						#	%
Area 1 - Large amount of farmland, rural communities							
- Pitt Meadows	500	8	492	5737	11.7		
- Langley	960	18	942	39655	42.0		
- Surrey	1350	19	1331	119976	90.1		
- Delta	960	10	950	29456	31.0		
- Richmond	960	13	947	60009	63.4		
-Sub-Total	4730	68	4662	254833	54.7	265	5.7%
Area 2 – Small amount of farmland, suburban communities							
- Burnaby	2375	46	2329	60929	26.2		
- Coquitlam	2375	24	2351	37163	15.8		
- Sub-Total	4750	70	4680	98092	21.0	262	5.6%
Area 3 – No farmland, urban communities							
- Vancouver	3950	131	3819	164145	43.0		
- North Van	770	9	761	42710	56.1		
- Sub-Total	4720	140	4580	206855	45.2	295	6.4%
Total	14200	278	13922	559780	40.2	822	5.9%

The return rate from the communities with no ALR (6.4%) was greater than the other communities (5.6%). The number returned in all areas is more than adequate for statistical analysis. Respondents were willing (90%) to provide their postal code and this indicated that responses were not concentrated in any one area of the communities.

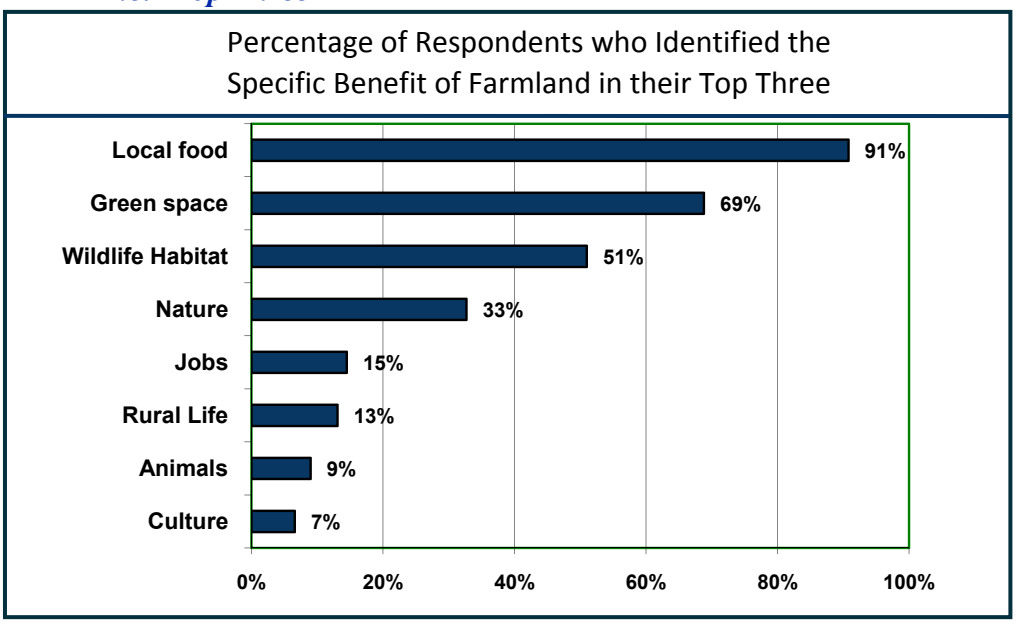
Responses from the three different types of communities are analyzed separately to see if the responses are significantly different. The responses for the different types of communities will be used to aggregate up the total value of farmland in Metro Vancouver. It is important to keep in mind that for all communities only the **urban residents** were sampled.

5.3 PERCEPTIONS OF AND INTERFACE WITH FARMLAND IN THE COMMUNITY

5.3.1 GENERAL PERCEPTION OF THE BENEFITS OF FARMLAND IN METRO VANCOUVER

The responses to the question *what are the three most important benefits of farmland in your community,* are presented graphically in figure 5.3.1.a:

Figure 5.3.1.a Percentage of Respondents Selecting Specific Farmland Benefits in Their Top Three



Local food was the dominant characteristic, mentioned in the top three by over 90% of the respondents. This was followed by 'green space' at 69% and wildlife habitat at 51%.

The breakdown between the different attributes and different areas is presented in table 5.3.1.b

Table 5.3.1.b Different Perspectives of Farmland Benefits in Different Areas

Attribute	Total	Area 1	Area 2	Area 3
Local Food	**90.8%**	90.8%	89.4%	92.2%
Green Space	**68.8%**	65.8%	70.5%	70.1%
Wildlife Habitat	**51.0%**	55.0%	53.1%	45.6%
Nature	**32.7%**	27.3%	33.5%	36.7%
Jobs	**14.5%**	11.2%	15.4%	16.7%
Rural Life	**13.1%**	17.3%	12.2%	10.2%
Animals	**9.0%**	9.6%	8.3%	9.2%
Culture	**6.6%**	5.0%	7.9%	6.8%
Chi Test		***.796***	*.999*	*.954*

Across all attributes of farmland there was no significant difference in the valuation in the urban and suburban communities. The general responses in the rural communities (area 1), across all attributes, were different from the urban and suburban communities[21]. This suggests that the urban residents in rural communities value farmland in their community a little differently than people in the urban and suburban communities.

On individual attributes, rural life was valued less by urban residents of rural communities than residents of urban communities and 'nature' was valued more by residents of urban and suburban communities than urban residents of rural communities. This does make some intuitive sense as people who value a rural life style would be expected to locate in the more rural communities.

5.3.2 INTERACTION WITH FARMING AND FARMLAND

Table 5.3.2 summarizes the responses to questions regarding how often individuals visit local farms, agri-tourism sites and buy from farmers markets – all interactions with the local farm community.

[21] See chi test numbers in bottom row. The chi test tests the hypothesis that the variance in the set of numbers is attributed to random chance. The value can loosely interpreted as the confidence level in accepting the hypothesis that the attributes are valued the same in all areas.

Table 5.3.2 Different Levels of Interaction with Farms in Different Areas

	Area 1	Area 2	Area 3	Total	Abby*
Buy local**/times per year	12	7	7	8	12
Visit agri tourism/times per year	4.5	3	3	3.5	4.2
Distance travelled to buy local (km)	23	27	25	25	9.4
Price premium for local corn on the cob***	$0.85	$0.78	$0.80	$0.80	$0.91
* Results from 2008 pilot study in Abbotsford					
** Times respondents bought products from local farms or farmers markets					
*** Premium respondents would pay per dozen for local corn compared to California corn					

The results suggest that people living in areas with more farmland tend to interact with the farms more frequently. The results pose the question, is there an unmet demand for local food in the urban and suburban areas? More detailed analysis is needed to answer this question.

5.4 ESTIMATE OF THE PUBLIC AMENITY VALUE OF FARMLAND IN METRO VANCOUVER

The mail out survey asked respondents directly if they would prefer to keep approximately 400 ha (1,000 acres) as farmland rather than convert it to urban use. If they said yes they were asked if they would be willing to pay a specific 'bid' amount annually in property tax to preserve the land as farmland. Bid levels of $25, $50, $75 or $100 were presented directly to the respondents in the survey. A $ 0 bid was imbedded in the introductory question that asked respondents if they would prefer the land remain as farmland compared to urban development. Respondents that responded yes to the $100 bid were asked if they would pay more. The level of respondents that were willing to pay greater than $100 provides an estimate of the probability of a yes response to the next incremental bid level of $125.

Respondents that said no to preserving farmland were asked why. If they responded that farmland was not important to them, or a similar comment, they were included as a no response. If they responded that they did not think they should have to pay for farmland preservation they were not included in the analysis. If people reject the scenario, it is unclear if they do not support farmland or they do support farmland preservation but do not think they should have to pay for it. Other studies have termed this a protest vote. The level of protest vote was 3 %, which is similar to the Abbotsford Pilot Study but much lower than many other similar studies[22].

890 mail-out surveys were returned. Some responses to the graduated loss of farmland were not rational. If a respondent replied yes to a WTP $25 to preserve 400 ha (1000 ac) at the current level of farmland it is not rational for that person to not be WTP when half the farmland is gone and then WTP again if it is the last farmland.

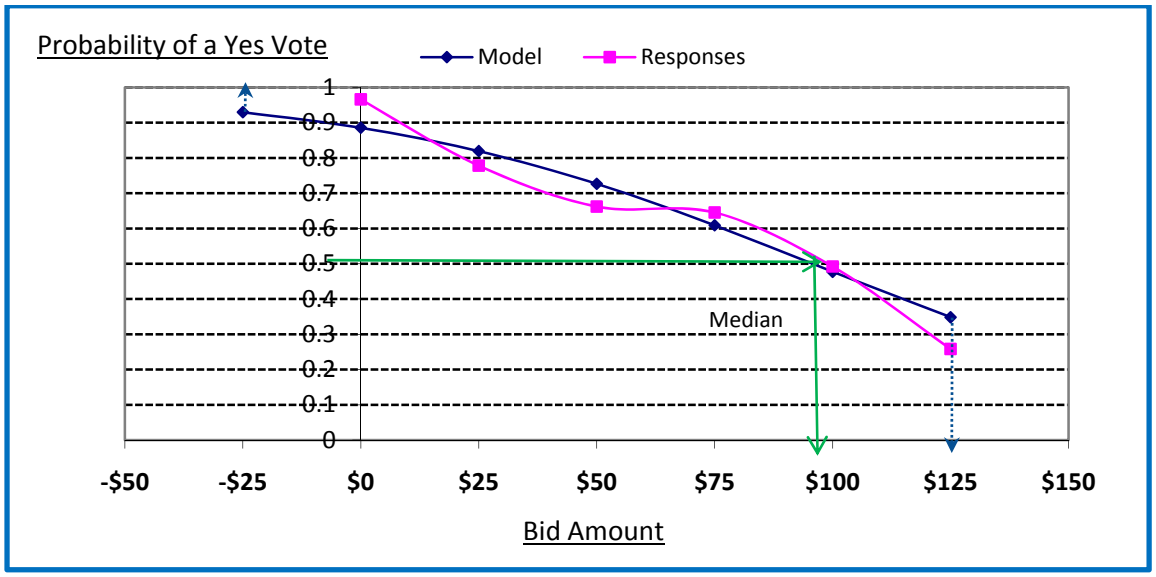
[22] For example, Beasley et al. (1986), 20%; Androkovich et al. (2008),40%.

A total of 68 or 7.6 % of the surveys returned were rejected due to irrational responses (30), protest responses (27) or incomplete surveys (11). This would be considered low compared to other studies using a similar survey methodology.

A logit model was estimated for each scarcity level within each area as described in Section 4.

There are no standard measures of fit for logit models. For this study a way of looking at the closeness of fit is to graph the model and compare it to the actual survey data used to generate the model. As an example, the estimated model and the actual survey responses, between the bid levels being evaluated, for the current level of farmland and Area 1 are presented below in Figure 5.4:

Figure 5.4 Actual Responses to Bid Offers Compared to the Model Estimation (Area 1, Current Level of Farmland)



The model estimates a higher probability of yes vote at the $125 bid but a lower probability of yes vote at the $ 0 Bid. The model estimates the probability of a 'yes' vote for the '$0' bid at 88%.

The median is the bid amount where the probability of a yes response is 50%. This is represented by the bid amount corresponding to .5 on the vertical axis. The value on the horizontal axis corresponding to the .5 value on the horizontal axis is $96 and is represented by the green line. The mean, or the average WTP, was estimated by evaluating the area under the model line from $0 to $125 and subtracting the area above the model line from -$25 to $0 as per equation (14). The estimated mean is $59. As per discussion in the methodology section the (truncated) mean is expected to be less than the median.

The response to the $0 bid is an important component to the estimation of the public value as it is an estimation of the number of people that value urban land over farmland. Other studies suggest that over 90% of the public support farmland preservation yet the model estimates the yes response to the '$0' bid at 88%. Using the model to estimate the welfare measure will

overestimate the value of those that favour urban development and thus underestimate the net public value of farmland.

Table 5.4.a Yes Response to the '$0' Bid in the Different Areas

Area	% Yes to $ 0 Bid
1 - Lots of ALR	96.6%
2 - Some ALR	95.8%
3 - No ALR	96.3%
All Metro	**96.2%**

The estimated intercept, parameter value (as per equation 15), mean and median for the three scarcity values and the 3 areas are presented in Table 5.4.b below:

Table 5.4.b Estimated Mean and Median Values for the Nine Scenarios[23]

Area	Scarcity	Alpha	Beta	Mean*	Median
1 - Lots of ALR	Current	2.045580	-.021380	$ 59	$ 96
1 - Lots of ALR	Half	2.279620	-.018193	$ 85	$ 125
1 - Lots of ALR	Last	2.862173	-.019756	$ 100	$ 145
2 - Some ALR	Current	1.631714	-.021975	$ 51	$ 74
2 - Some ALR	Half	1.635309	-.018215	$ 62	$ 90
2 - Some ALR	Last	2.920795	-.026700	$ 75	$ 109
2 - No ALR	Current	2.273167	-.024539	$ 61	$ 90
No ALR	Half	2.840216	-.027583	$ 70	$ 103
No ALR	Last	3.620950	-.032584	$ 77	$ 111

*Truncated mean – from bids of $-25 to $125

The logit model print outs and detailed analysis are in Appendix 11.3.1, page 81.

[23] Alpha and Beta refer to the variables in equation 15, page 25.

5.4.1 MEAN WTP BY SCARCITY AND TYPE OF COMMUNITY

To obtain an aggregate public value of farmland for Metro Vancouver, the mean willingness to pay from table 5.4.1 must to be weighted over the scarcity of farmland and the different types of communities.

For each area the relationship between the WTP and scarcity was determined (WTP= f(Scarcity)) and the integral over the range of scarcity was calculated. Figure 5.4.1 shows the relationships for Area 1:

Figure 5.4.1 The Relationship Between WTP and Quantity of Farmland for Area 1

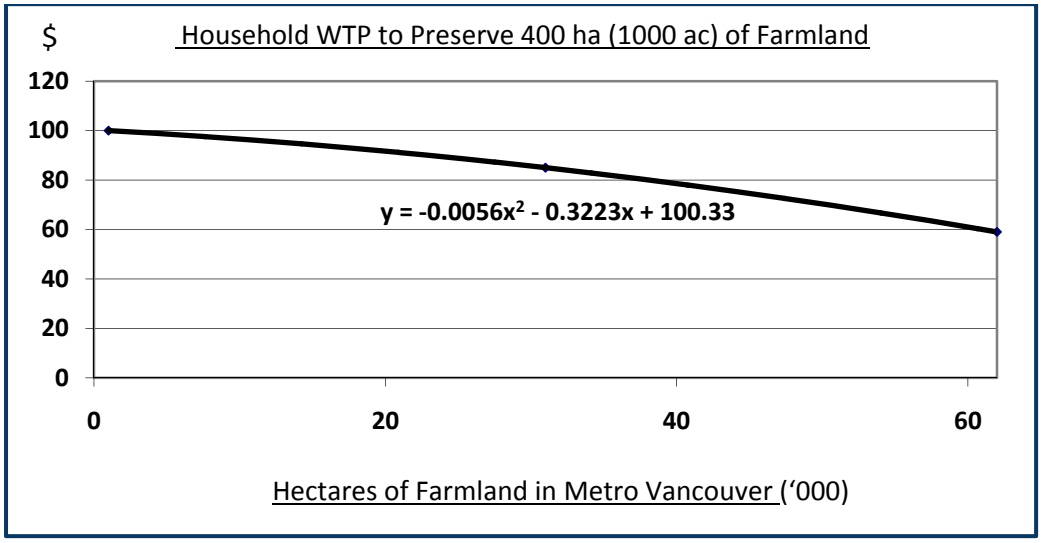


Table 5.4.1 presents the mean and median WTP for the three areas. The calculations done to weight the mean and median WTP over different scarcity amounts are in Appendix 11.3.2, page 93.

Table 5.4.1 Summary of Mean and Median WTP for the Different Areas

Area	Mean WTP	Median WTP
Area 1	$83	$ 124
Area 2	$63	$ 91
Area 3	$69	$ 102

5.4.2 ESTIMATE OF THE PUBLIC AMENITY BENEFITS OF FARMLAND IN METRO VANCOUVER

Each area has a different urban population. To estimate the mean WTP for Metro Vancouver, the mean WTP per area is weighted by the population in the specific area.

Table 5.4.2 Mean WTP Weighted by Population in Different Areas

Area	Mean WTP/ Household	Median WTP/ Household	Households	Total Public Value (mean)	Total Public Value (median)
1	$ 83	$ 124	287,028	$23,823,324	$35,591,472
2	$ 63	$ 91	138,772	$ 8,742,636	$12,628,252
3	$ 69	$ 102	369,330	$25,483,770	$37,671,660
Total/Av[24]	***$ 73***	***$ 108***	795,130	$58,049,730	$85,891,384

The weighted **mean** annual WTP to preserve 400 ha (1,000 ac) of farmland in Metro Vancouver is estimated at $73 per household and the weighted **median** WTP is $108 per household.

5.4.2.1 COMPARISON TO THE ANNUAL PUBLIC BENEFITS OF FARMLAND TO THE PRIVATE MARKET VALUE OF LAND

Farmland provides goods and services to the community. A common market based measure of this activity is termed 'farm gate sales', the annual market value of goods and services produced from the land. For Metro Vancouver, the farm gate receipts reported in the 2006 census of agriculture were $5,748/acre [25]. The estimated **annual** public value of having farmland in the community, from table 5.4.3, is $58,050/acre [26]. This is approximately 10 times the value of market based goods and services produced. Interestingly this is a similar multiple as the public contributions received for the Stanley Park restoration over the market value of the timber salvaged.

[24] The average is the weighted average over the 3 areas. The weighted mean and median (in green) are calculated by dividing the estimated total public value of $58,049,730 (mean) and $85,891,384 (median) by the total households in Metro Vancouver.

[25] Statistics Canada, Census of Agriculture. $708 million in farm gate receipts divided by 127,000 acres.
[26] Table 5.4.2 is the valuation of 1,000 acres so the public value per acre is the total of $58,049,730 divided by 1,000

5.4.2.2 COMPARISON TO THE LONG TERM PUBLIC BENEFITS OF FARMLAND TO THE (LONG TERM) MARKET VALUE OF LAND

When people purchase land they pay a price that reflects the value they receive from that land, not just for one year but, in perpetuity. The market value is in essence the present value of that stream of benefits in perpetuity. A comparison to the public value would be the present value of receiving the annual public value in perpetuity. The present value[27] of receiving the estimated annual public value of farmland in perpetuity in Metro Vancouver is $ 1.16 million per acre.

How can the public value of an acre of farmland exceed $1 million? It is based on two things – the estimated value the average household places on preserving 400 ha (1000 ac) of farmland and secondly on how many households there are in Metro Vancouver:

Public Value of Farmland	=	Av. Household Value To Preserve Farmland	X	# of Households

To accept that the public value of an acre of farmland in Metro Vancouver is $1.16 million, one only has to accept that on average a household in Metro Vancouver places the same or higher value on preserving 400 ha (1000 ac) of farmland as a nice dinner out for two, once a year. Figure 5.4.2.2 provides a graphic to help explain this.

[27] Using a discount rate of 5%.

Figure 5.4.2.2 Basis of Estimating the Public Value of Farmland

$73/yr

Household value to
Preserve 400 ha (1000 ac)
of farmland

795,130 urban households

in Metro Vancouver

Annual
Public Value
$58,000/acre

Public Value if
preserved in
perpetuity
$1,160,000/ac

5.5 WILDLIFE HABITAT

Analysis of the mean willingness to pay to support wildlife set-asides paralleled the method used for estimation of the mean willingness to pay to preserve farmland. The payment method was the same but the quantity of land for set-asides was set at the estimated total amount available on farmland in Metro Vancouver.

The mean willingness to pay into a trust fund that would pay farmers to set-aside up to 2,428 ha (5,827 ac) of hard to farm land for wildlife set-asides was $24, $23 and $25 for areas one, two and three respectively.[28]

Over all households in Metro, a mean WTP of $24/year amounts to approximately $19 million / year or $7,860/ha ($3,275/acre)/year.[29]

The Delta Farmland and Wildlife Trust has a program in place to pay farmers to set-aside land for wildlife habitat for up to 4 years. Farmers have taken advantage of the program and incorporated it into their crop rotation schedule. Currently farmers are paid $300 per acre in the first year and $250/acre in year two to four.

5.6 QUALITATIVE RESULTS

At the end of the mail-out survey respondents were given an opportunity to provide any other comments they had on farmland in Metro Vancouver. They were also given the opportunity to attend a focus group[30] session to further discuss farmland in Metro Vancouver.

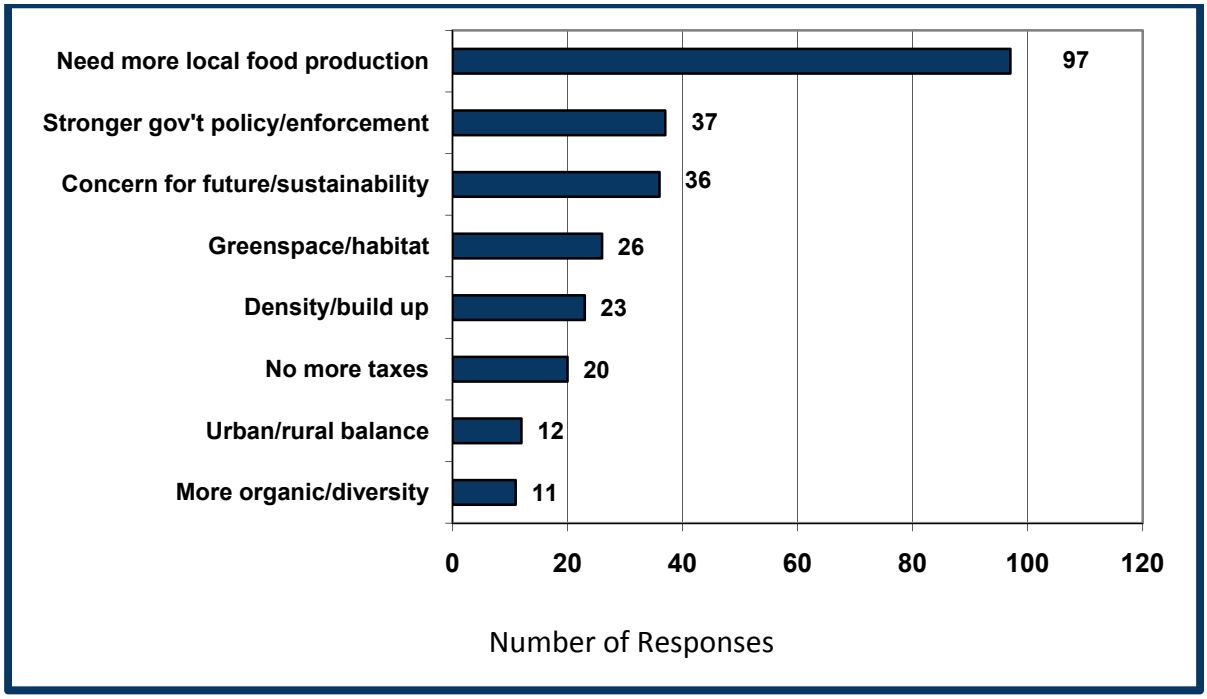
Together the written responses and focus group results provide insight into why individuals are or are not willing to support the preservation of farmland.

5.6.1 WRITTEN RESPONSES ON MAIL-OUT SURVEY

Respondents to the mail-out survey were provided with an opportunity to include written comments in response to the statement 'please share any additional comments you have about farmland in Metro Vancouver'. 330 of the 822 respondents (40%) provided written comments. They are provided word for word in Appendix 11.2, page 66. Responses were grouped into themes and the frequency of comments related to each theme is presented in Figure 5.6.1

[28] Detailed calculations in Appendix 11.3.2, page 96.
[29] The calculation is $24 X 795,130 households / 2428 hectares of land available
[30] A focus group is a small group that is brought together to discuss a topic under the guidance of a facilitator. For this project the goal of the focus group was to explore the underlying values and interests that would support an individual's desire to preserve farmland.

Figure 5.6.1 Summary of Written Feedback



In the written comments, two issues arose that did not appear on the intercept study so had not been included in the mail-out survey:

* government should play a stronger role in preserving farmland, and

* farmland is very important for future generations and is critical for community sustainability.

5.6.2 FOCUS GROUP STUDY

5.6.2.1 BACKGROUND

Three focus groups were held in March 2009, one in Surrey and two in Burnaby. A total of 22 people took part in the focus groups.

The focus groups were composed of people who completed the mail-out survey and volunteered to attend a focus group. They were not selected randomly and likely had a strong bias toward preserving farmland. While this must be taken into consideration in the results, the goals of the focus group were not to have a broad discussion on farmland preservation but to:

* uncover the underlying values that support the desire to preserve farmland, and
* explore any questions of how the survey was interpreted.

The discussion was guided by two general questions:

* When thinking of the benefits/values of farmland in your community, do you rank the values – is there a hierarchy of values?

* What are the underlying values that support preserving farmland? Given that farmland is not important to some people (5%), what might the underlying values be for not supporting farmland preservation?

The focus group sessions were completed with an open discussion on farmland preservation.

5.6.2.2 RESULTS

5.6.2.2.1 HIERARCHY OF VALUES

The concern for food security, both quantity and quality, was seen as the overriding value for preserving farmland. Often participants used the term food sovereignty, not having to rely on imported food, as an overarching principle of food security.

While food security was dominant, respondents wanted food production to be done in a way that maintained as many other values as possible, i.e. green space, habitat.

A participant at the first focus group challenged the group discussion on this issue by sharing that he had recently sold 10 acres of treed ALR land to a blueberry farmer. The land was cleared and blueberries planted. The group, and subsequent groups, were presented with the question – do you support this? Participants struggled with the scenario, trying to find a way that both food production and the other values could be protected.

Some other comments from the focus groups on this subject include:

- farmland is better than urban development for fish
- not all wildlife is compatible with farming – some wildlife can damage crops and livestock.
- when considering jobs associated with farmland – there was little connection to the jobs and services that agriculture supports in the community.

Cultural heritage was not well understood by many when they read the survey but it came out in discussion around the underlying values.

5.6.2.2.2 UNDERLYING VALUES OF FARMLAND IN YOUR COMMUNITY

This section posed the question "why"? Why would someone wish to preserve farmland? The discussion was broad but had several underlying themes:

1) From the food security perspective, a desire for local production was the ability to control the quality (production processes) of local food as compared to imported food.

2) One participant said farmland preservation is inherently long term. The interest in long term sustainability came up several times and in all sessions. This included the interest in maintaining a food production capability for future generations.

3) Farmland supports the feeling of community. This underlying theme characterized many comments. The feeling that without the connection to farmland and food production, the community was poorer for it. The connection to cultural heritage also came up under this theme – the value of working on a farm, the farm culture.

4) "We know instinctively that food production is important". This comment captured the thoughts of many participants.

Some other comments from the focus groups on this subject include:

- urban sprawl has a cost – it is a more expensive form of development
- what would our region look like if there were no farms?
- maintaining/enhancing biodiversity

Focus group participants were asked to speculate on why 5% of the population would have no interest in farmland in the community? Some of their thoughts are presented in Figure 5.6.2.2.2.

Figure 5.6.2.2.2. Possible Reasons for not Valuing Farmland

View	Rational
Speculation.	When farmland is rezoned to urban land there is a large increase in market value of the land.
Right to have access to low cost single family dwelling.	If growth is contained within a fixed urban boundary, the cost of a single family detached home will rise and more people will reside in multifamily developments.
Localization of production is counter to the trend toward globalization.	Competitive economics should be the driver.
We can grow food without land.	A view that urban agriculture (roof top, balcony and backyard gardens) and high rise agriculture can meet our food needs.
Lack of understanding of the risk of imported food.	If other countries have food shortages they may not be prepared to sell to us at any price.
An overall disconnect with their source of food.	Only 1.4 % of the B.C. population lives on working farms.
Only support an idyllic view of agriculture.	For example organic farms over conventional farms.
Subsidies in other countries are working against our farmers.	If global subsidies persist, farming in the Fraser Valley may not be economically viable.

5.7 ESTIMATE OF ECOLOGICAL GOODS

Detailed calculations for estimates of the ecological goods provided by additional riparian habitat and contribution to groundwater reserves are in Appendix 11.3.2, page 98.

5.7.1 RIPARIAN HABITAT

A similar methodology as used in the Abbotsford Pilot Study (BCMAL,2008) was adopted to estimate the ecological goods provided by riparian habitat on farmland in Metro Vancouver.

The impact of farmland, as compared to urban land, on fish production is estimated for Langley, Maple Ridge and Surrey. Farmland in Pitt Meadows, Delta and Richmond are primarily lowlands that are managed as part of a drainage and dyking system. These are highly managed systems and it is unclear what the impact may be on fish production[31]. The estimate of the value of fish production from the incremental riparian habitat on farmland is summarized in Table 5.7.1.

Table 5.7.1. Estimate of the Benefit of Incremental Riparian Habitat on Farmland

	Area in ALR(ha)	Area in Urban(ha)	Stream Density ALR (m/ha)	Stream Density Urban (m/ha)	Extra Stream Length ALR (m)	Extra Production ALR ($)	Extra Production ALR ($/ha)
Langley	23422	6581	15.73798	9.96	135274.08	$758,617	$32
Maple Ridge	3790	6414	12.65409	13.24	-2236.93	-$12,545	-$3
Surrey	9298	20290	22.42773	5.83	154359.89	$865,650	$93
						$1,611,723	

The annual incremental provision of fish productive capacity by farmland in Metro Vancouver is $1,611,723[32], and on a per hectare basis (1,611,723/52,000), $31/hectare or $12.60/acre.[33]

5.7.2 CONTRIBUTION TO GROUNDWATER RESERVES

Groundwater is an important source of drinking water and irrigation water in many communities. Groundwater is fed from infiltration of rainwater through pervious areas. Urban development is characterized by the presence of many impervious areas. Impervious areas direct rainwater to surface water flows that do not add to groundwater reserves.

[31] Surrey is a mix of lowland and upland farming. There are some fish values in the lowland streams and ditches but rather than try to prorate them , Surrey was included in the calculation to pick up the fish values from the drainage and dyking districts in other parts of Metro Vancouver.
[32] Knowler, Duncan et al.(2003). See Bibliography page 59.
[33] Maple Ridge has a large area of undeveloped land outside the ALR. This is likely why there is little difference between the stream density in urban and ALR.

The limited ground water reserves under the lowland areas in Delta, Richmond, Pitt Meadows and Surrey are of little public value. A similar methodology to the Abbotsford Pilot Study (BCMAL, 2008) was used to estimate the incremental contribution to groundwater from ALR land as compared to urban development land in Langley and Maple Ridge. The results are displayed in Table 5.7.2.

Table 5.7.2 Estimate of the Benefit of Incremental Impervious Surface on Farmland

	Area in ALR (ha)	Extra impervious surface	Extra surface in sq meters	Effective precip* in m/year	Quantity of groundwater	Price/ cubic meter**	Value of groundwater
Langley	23422	15693	156927400	0.517	81131466	$0.40	$32,452,586
Maple Ridge	3790	2539	25393000	0.517	13128181	$0.40	$5,251,272
							$37,703,859

*Effective precipitation is the portion of precipitation that is added to soil moisture. The value for Langley was obtained from the Farmwest.com website.

The annual value of the incremental water retention on farmland compared to urban land in Metro Vancouver is $37 million or approximately $725/hectare or $291/acre.

When compared to the $58,000/acre in public amenity benefits (or ecological services), the value of ecological goods at $303/acre is relatively small. This is not surprising as the value of ecological services is driven in large part by the local population while the value of ecological goods is driven by the land base. If a similar study was done in a more remote area of the province the ecological goods may be larger than the ecological services.

6.0 POTENTIAL BIAS

It is important to recognize both the strengths and limitations of the estimate of the amenity benefits of farmland. This section explores the potential bias, either upward or downward, on the estimates.

6.1 CONTINGENT VALUATION QUESTION BIAS

As per section 3.5.1 there is little bias inherent in the contingent valuation scenario. Based on the general resistance to increased taxes, the use of property tax as the payment mechanism will have a downward bias on the WTP.

6.2 SURVEY METHOD

As a comparison between using a mail-out survey or a telephone survey, a localized telephone survey was conducted in Pitt Meadows and compared to the Area 1 results[34]. The telephone survey results were different than the mail-out survey results in that the number of rejected surveys was double (15%) the mail-out survey, and the valuation of the benefits of farmland and the WTP to preserve responses showed less range than the mail-out survey. The demographics of the telephone respondents were similar to those of the mail-out survey respondents.

Table 6.2.1 Summary of Responses from the Different Survey Methods

Sample Size	Area 1 264	Tele. 87	Diff.	Order Presented on the Survey Form	
Renters	10.5%	2.3%		Benefit	Diff.
Benefits					
Local Food	92%	76%	-16	Nature	-2
Greenspace	66%	65%	-1	Jobs	14
Wildlife	55%	48%	-7	Culture	9
Nature	27%	25%	-2	Greenspace	-1
Rural Life	17%	35%	18	Animals	5
Jobs	11%	25%	14	Rural Life	18
Animals	10%	15%	5	Local Food	-16
Culture	5%	14%	9	Wildlife	-7
Probability of yes vote					
			diff. (Tele. - Area 1)		
Bid 0	97%	93%	-4		
Bid $25	79%	79%	0		
Bid $50	65%	80%	15		
Bid $75	62%	83%	21		
Bid $100	52%	52%	0		
Demographics (mean of survey respondents)					
Av. Education	3	3.4			
Farm Industry	0.1	0.1			
Av. Age	4.2	4.2			
Gender	0.4	0.4			

The responses to the benefits of farmland were more evenly distributed in the telephone survey than the mail-out survey. The top category (local food) had fewer responses and the bottom

[34] Area 1 was used as a comparison because only 35 mail-out surveys were returned from Pitt Meadows and this was viewed as too small a response to do a comparison.

category (culture) had more responses in the telephone survey as compared to the mail-out. On the left hand column the benefits are listed according to their ranking in the mail-out survey. On the right hand side the benefits are listed as to the order they were presented to respondents in the telephone survey. The order the benefits were presented did not seem to impact the difference in the responses. Responses were more evenly distributed over the benefits in the telephone survey.

In the WTP to preserve farmland question, the probability of a yes vote on the $50 and $75 bid were much higher in the telephone survey than the mail-out survey. The telephone survey responses are less consistent with economic theory that suggests as the bid price increases the probability of a yes response will decrease.

The differences in the telephone survey and the mail-out survey cannot be explained by sample demographics as they are similar for both surveys.

While there were no significant differences in the response of renters and owners in the mail-out survey, it is interesting to note that in the telephone survey a much lower percentage of renters were surveyed, likely due to the cell phone effect.[35]

The results from the test telephone survey in Pitt Meadows do not suggest there is any advantage over the mail-out survey. More detailed comparison, over a larger sample, is required to better understand the potential difference in the two survey methods for this type of choice experiment.

A potential reason the telephone survey may not work well for the survey design used in this study is that the questions asked and the scenario offered are relatively complex and may require some time to reflect. A telephone survey only provides the respondent with a brief time period to make a choice, and no visual to review the different options. It was clear on some of the mail-in surveys that people started the WTP questions, then after reading it through understood the question better, and adjusted their response.

6.3 QUESTION ORDER BIAS

Researchers have found that the order questions are asked can have an impact on the WTP for a specific scenario. The mail-out survey had two questions eliciting a WTP from the respondents, farmland preservation and wildlife habitat set-asides. One half of the surveys had the farmland preservation question first and one half had the wild habitat question first. A dummy variable was used in the analysis to test for question order bias. The analysis indicated there was a positive, and significant, impact on the WTP for farmland preservation if the question was asked before the WTP for wildlife habitat preservation.

The bias, estimated at the mean, was 29%. A positive question order bias means that the results are biased down compared to if the survey had asked only one WTP question.

[35] Renters often use a cell phone for all phone needs and do not have a land line. Telephone surveys usually rely on the telephone directory for drawing a sample.

6.4 SURVEY DISTRIBUTION BIAS

To accommodate different perspectives from communities close to or distant from farmland, the communities in Metro Vancouver were divided into 3 groups, surveyed separately and analyzed separately. The differences between communities, described in section 5, are incorporated into the results.

The willingness of respondents to provide full postal codes, initially designed to explore another issue, enabled a check on the distribution of responses within the communities.

The exclusion of the households within the ALR is the only survey distribution bias and will bias the results down 1.8%[36], assuming the WTP in the ALR households is similar to the urban average.

6.5 SELF SELECTION BIAS

Mail-out surveys with no follow-up reminders are subject to self selection bias – people not interested in the subject simply do not respond.

The percentage of responses to the mail-out survey that indicated 'farmland is not important to me' was 4.6%. Table 6.5 compares this level of disinterest in farmland to the Abbotsford Pilot Study, the intercept study and the recent Ipsos Reid survey done in the Lower Mainland.

Table 6.5 Comparison of No Response to the '$0' Bid from Different Studies

Study	Farmland Not Important (no response to $0 bid)
Abbotsford Intercept Study – '07	3.0%
Metro Intercept Study – June '08	6.0%
Ipsos Reid – Fall '08	5.0%
Current Study – Fall '08	4.6%

A study done in Connecticut in 2000 found that over 90% of people in the State supported farmland preservation.[37]

There is no evidence of self selection bias from the respondents to the mail-out survey.

[36] See footnote 8, page 16.
[37] *Attitudes Toward Farmland Preservation – A Survey of Connecticut Residents*. Center for Survey Research and Analysis. University of Connecticut. 2000.

Given that the model estimates a lower response to the $'0' bid than the data, extending the model into the negative area, where no data points exist, will tend to underestimate the mean and bias the estimate downward.

6.6 RESPONSE BIAS

The valuation estimate was done on the simplified model – assuming the sample matched the actual Metro Vancouver population.

When the model was run with all demographic variables, several were significant; age, gender income and education. Table 6.6.a below compares the sample and Metro Vancouver statistics for the four significant demographic characteristics.

Table 6.6.a Comparison of Sample and Population for Significant Demographics

Demographic	Sample Population	Metro Vancouver	Sample Difference
Ann. Household Income	$ 67,400	$ 63,003	$ 4,400 higher
Education Level	57% University Degree	20% University Degree	3 X more University Degrees
Average Age	45	45	0
Gender	43.2% male	48.9% male	5.7% lower

It is well documented that education and income are closely correlated. In the analysis it is appropriate to use one but not both. In comparing the demographics of the response population to the general Metro Vancouver population the household income of the sample was slightly higher than the Metro average yet the number of respondents with university degrees was three times the Metro average. It is unclear why this would be the case given the age of the respondents is similar to the Metro population and there is a bias toward females.[38] Given that the education response seems inconsistent with the corresponding demographics, household income will be used.

One possible reason for the education difference is that the mail survey requires some thought and consideration. For this reason the survey may have gravitated to the household member with the most education. The highest level of education within a household would normally be higher than the average education level within the region.

In the logit model, the coefficients of the parameters do not represent the marginal change per unit change in bid amount. The impact of the coefficients change as the bid amount changes –

[38] Today we have gender equality in education, however, the older demographic females, on average, had a lower level of education than males.

the impact is not linear in the bid amount. A common approach is to evaluate the impacts at the bid amount associated with the mean WTP. The marginal probabilities evaluated at the mean bid ($73) for the three significant demographic variables are shown in Table 6.6.b.

Table 6.6.b Impact of Demographic Differences on Estimated Mean WTP for Farmland

	Marginal Probability	Impact on Probability of yes response at mean WTP ($73)	Impact of Response Demographic on Results
Average Age (per 10 years)	.0601	+.60 %/year of age difference	0
Ann. Household Income (per $20,000)	.0779	+.39%/$1,000 in annual Household income	+ 1.6%
Gender (per % male)	-.1840	-18% if male	+ 1.0%
Order – if first	.2883	+ 29% if only question	- 15%

The response bias resulted in a -12.6% underestimation of the public value.

In the WTP for wildlife habitat preservation question, gender and income were significant demographic variables. Interestingly education was not significant while owning a home as compared to renting was.

The potential impact on the WTP for wildlife habitat, evaluated at the mean WTP ($24) are displayed in table 6.6.c

Table 6.6.c Impact of Demographic Differences on Estimated Mean WTP for Habitat

	Marginal Probability	Impact on Probability of yes response at mean WTP ($24)	Impact of Response Demographic on Results
Own Home	.2046	+ 20 % if own	+ 5.0%
Average annual Income (per $20,000)	.0324	+.16%/$1,000 in annual Household income	+ .65%
Gender (per % male)	-.1183	-12% if male	- .66%

The methodology in the study is not precise, however the impact on the estimate of the WTP for wildlife habitat set-asides, caused by an underrepresentation of renters, needs noting and should be taken into consideration in future work.[39]

6.7 POLITICAL/ECONOMIC BIAS

As per section 3.5.5 the political/economic climate during the survey period would likely bias the estimate downward.

6.8 SUMMARY OF SURVEY DISTRIBUTION AND RESPONSE BIAS

Table 6.8 Summary of Potential Bias in the WTP Estimate for Farmland Preservation.

Attribute	Potential Bias on Estimate
C.V. Scenario Bias	Low
Question Order Bias	Down 15%
Survey Distribution Bias	Down 1.8%
Response Self Selection Bias	Low/down
Response Bias - Income	Up 1.6%
Response Bias - Gender	Up 1.0%
Political/Economic Environment	Low
Agriculture Land Reserve Bias	Down

The aggregate bias of the survey methodology used is to underestimate the public value of farmland and wildlife habitat set-asides.

[39] 10.5% of the respondents to the mail-out survey were renters as compared to 35% of the Metro Vancouver population that are renters.

7.0 AREA DIFFERENCES AND DISTANCE FROM FARMLAND

The intercept study identified that there were significant differences in how people in the three different areas viewed the value of farmland in their community. This was confirmed in the mail-out survey.

Previous studies[40] identified a difference in WTP for farmland based on its proximity to the urban/farmland boundary. To test if this was the case in Metro Vancouver, respondents were asked to provide their postal code. Almost 90% provided full postal codes. Using the central point for each postal code area, an average distance to the ALR from the postal code area was used to test if the distance from the ALR edge had a significant impact on the WTP to preserve farmland.

The mean WTP to preserve farmland from the three areas is shown in Table 7.0.

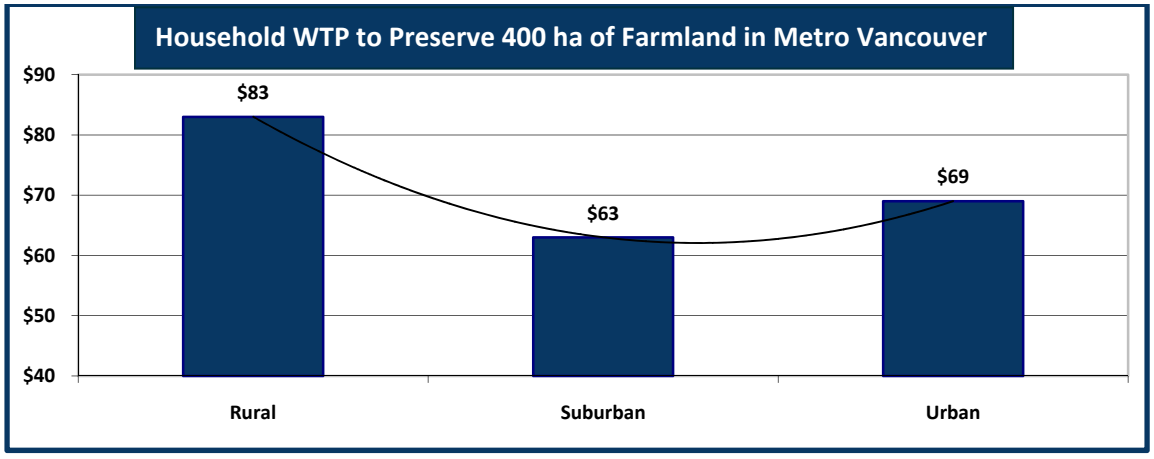
Table 7.0. Mean WTP to Preserve Farmland for Different Areas

AREA	MEAN WTP
Area 1- rural	$83
Area 2 – suburban	$63
Area 3 - urban	$69

The results of the full model indicate that distance from the ALR edge did not have a significant impact on the respondents WTP. The mean WTP from the different areas suggests a non-linear relationship between distance from the ALR and WTP to preserve farmland may exist. Figure 7.1 shows the mean WTP to preserve farmland in the 3 areas.

[40] For example Beasley et al (1986)

Figure 7.1 The Relationship Between Mean WTP and Distance from Farmland



People in rural communities value farmland more than people in suburban and urban communities. The higher WTP in the urban communities as compared to suburban communities suggests another dynamic may come into play as people get more distant from farmland. Endowment values, bequeathment values and values along the theme of ensuring we retain our food production capability and connection to our source of food become more important.

The difference in how people living in urban, suburban and rural communities view farmland preservation deserves more study in the future.

8.0 CHOICE EXPERIMENT DESIGN AND THE ENDOWMENT EFFECT

When developing a choice experiment to elicit valuations of public goods the question presented can be structured in two different ways. It can ask the respondent what they would be willing to pay (WTP) for an enhancement to their wellbeing or it can ask the respondent what they would be willing to accept (WTA) to compensate for a loss in wellbeing.

In economic theory these values are considered to be close enough that within the accuracy of the broader contingent valuation methodology the choice of approach, WTA or WTP, is not important. In practice this has not been the case. Knetsch (2007) provides a summary of the issue with the conclusion that the choice of measure, WTP or WTA, does matter.

Knetsch argues that in situations where the respondent clearly receives an enhancement, WTP is the appropriate measure. For example what would you be willing to pay for a fishing license? In situations where the respondent will lose a value or benefit they already enjoy then WTA is the more appropriate measure. For example, what would you be willing to accept to permit (some specified) environmental loss?

Knetsch suggests that a review of the literature indicates the use of WTP measures where WTA measures are more appropriate can result in a two to three fold underestimation in the valuation.

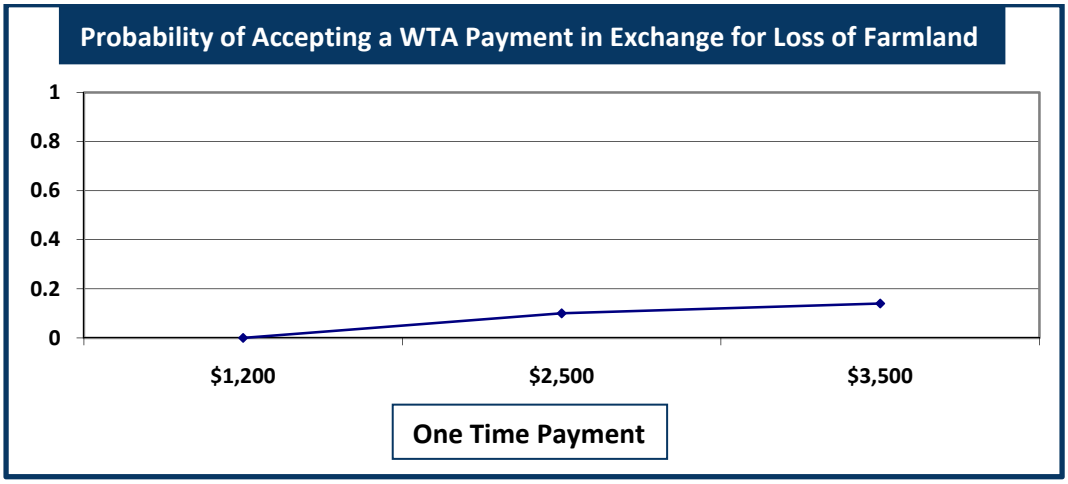
Knetsch argues that the reason for the difference is what has been termed the endowment effect – people are much more reluctant to give up something they have than purchase something they do not have.

Much of the previous work using choice experiments to value farmland preservation has taken place in the U.S. where property rights are entrenched in the Constitution. Preserving farmland is an **enhancement** over the status quo so use of the WTP measure is appropriate. In BC, where property rights are not entrenched in the Constitution and the public has paid to have specific land set-aside in an Agriculture Land Reserve, conversion of farmland to urban use would be considered a **loss** and a WTA measure would be more appropriate.

In this study the WTP measure was used in part to enable comparison with the existing body of work.

To explore the potential impact of the choice of measure, attendees at the focus group sessions were presented with a WTA choice experiment. The sample was small and the population obviously biased. The WTA questionnaire is included in Appendix11.4, page 101. The WTA questionnaire asks respondents if they would accept a one-time payment of $2,500 to support the use of 400 ha (1000 ac) of farmland for urban uses. If they said yes, the subsequent question asked if they would accept a one-time payment of $1,200. If the answer was no the subsequent question asked if they would accept a one-time payment of $3,500. The payment values are based on $1,200 being close to the present value of the mean value from the WTP measure, $2,500 twice the WTP value and $3,500 roughly 3 times the WTP value.

Figure 8.1 Probability of Accepting an Amount to Convert Farmland to Urban Use



The respondents at the focus group all participated in the WTP measure yet none would accept the mean WTP value when structured as a WTA offer.

Written comments on the mail-out survey suggest there is a sense of 'endowment' when it comes to farmland in Metro Vancouver. This warrants further study as the theory suggests the estimate of the public value of farmland could be over twice the current estimation if the WTA approach was used.

Another advantage of the WTA approach is that it eliminates the protest vote from people that do not feel they should have to pay to protect farmland. Their 'value' of farmland has not been included in the WTP estimate but would be included in the WTA approach. The WTA approach also simplifies the scenario.

9.0 DISCUSSION OF RESULTS

9.1 COMPARISON OF METRO VANCOUVER WTP TO OTHER COMMUNITIES

The results obtained in this study for the mean WTP to preserve farmland in Metro Vancouver fits in the range of values obtained by a variety of studies conducted throughout North America over several decades. The estimated WTP, adjusted for inflation and $Can/$US exchange is presented below in Table 9.1.

Table 9.1 Range of WTP Responses from Historical Studies Adjusted to $2008

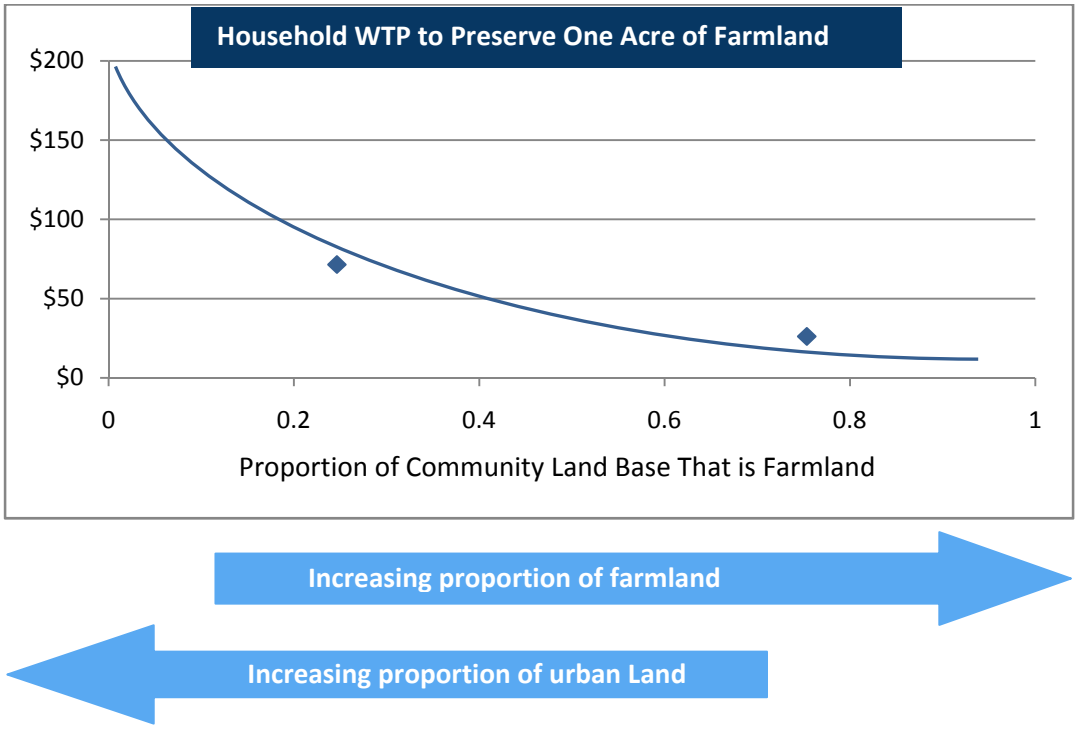
	Range of WTP Estimates at Current Canadian $														
Researcher	Yr	10	20	30	40	50	60	70	80	90	100	110	120	130	140
Halstead	1984														
Bergstrom et al.	1985														
Bowker & Didychuk	1994														
Chang	2005														
BCMAL	2008														
Androkovich et al	2008														
Metro Van	2008														

9.2 RELATIONSHIP BETWEEN SCARCITY OF FARMLAND AND WTP

Comments from researchers[41] suggest that in areas where the farmland is more threatened the estimated WTP for farmland preservation is higher.

This suggests there may be a relationship between the relative quantity of farmland in a community and the public value of that farmland. Figure 9.2 presents this concept graphically:

Figure 9.2 The Relationship Between the Public Value of Farmland and the Quantity of Farmland in a Community



Within a community, land use can be broadly divided into land used for farmland or land used for urban uses. The range on the horizontal axis moves from all land used as farmland on the right to all land used as urban on the left. We currently have two estimates on this curve. One for Metro Vancouver with 21% of the land base designated farmland and one for Abbotsford with 74% of the land base designated as farmland.

As more land is shifted from farmland use to urban use the household value (represented as household WTP) to preserve the remaining farmland increases on a per acre basis.

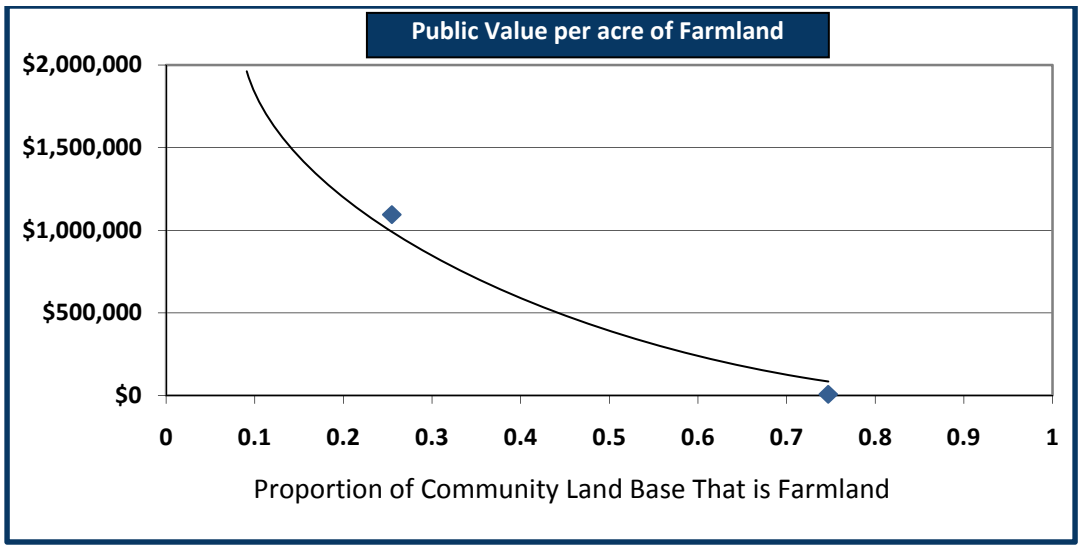
[41] Bowker and Didychuk (1994) and Bergstrom (2003) summary

9.3 RELATIONSHIP BETWEEN PUBLIC VALUE AND SCARCITY OF FARMLAND

The public value of farmland is the product of the average household's value to preserve farmland and the number of households in a community. Generally the more that farmland has been converted to urban uses the higher the population base.

If we convert figure 9.2 above by replacing WTP per household on the vertical axis with the public value of farmland we get a much steeper curve. Figure 9.3 below is the result. Note the change in scale on the vertical axis.

Figure 9.3 The Relationship Between Public Value of Farmland and Quantity of Farmland

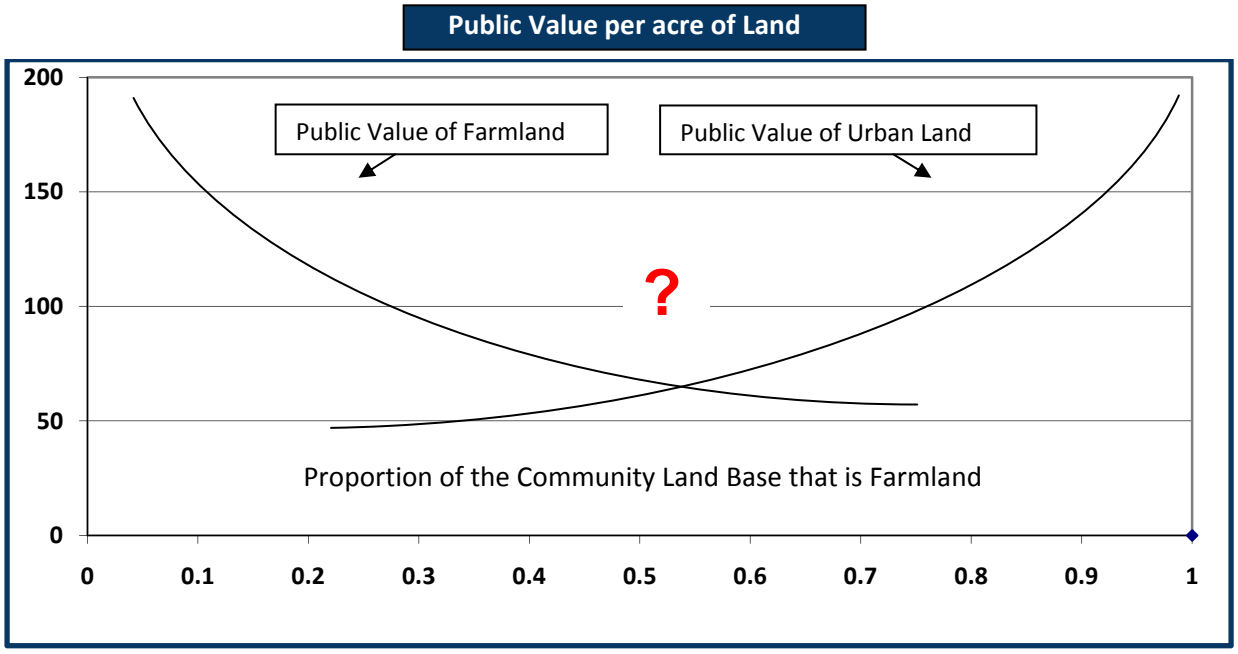


9.4 OPTIMIZING PUBLIC BENEFIT IN LAND USE DECISIONS

If farmland has a public value distinct from the market value, one would expect that urban development land would also have a public value distinct from the private market value.

If a community had all farmland and no urban land there would be a public value in having land for urban housing and commercial/industrial development. This public value of urban lands would decrease as more land was converted from farmland to urban land. Figure 9.4 uses figure 9.3 as a base, and adds a possible 'public value of urban land' curve. The result suggests there is an optimal allocation of urban and farmland based on the value of the land to the public as compared to the current default practice of using market value.

Figure 9.4 Theoretical Optimization of Land Use Using Public Value



9.5 NON-USE VALUES

While the focus of this study was to estimate how urban residents of Metro Vancouver value farmland in their community it is important to recognize that the non-use values of farmland in Metro Vancouver are enjoyed by residents outside the boundaries of Metro Vancouver.

While analyzing farmland in one community simplifies the analytical procedure, and provides a good estimate of the **use-values** of farmland, it by no means suggests that the public value of farmland ends at municipal or regional borders.

9.6 ECOLOGICAL GOODS AS COMPARED TO ECOLOGICAL SERVICES

The term ecological goods and services is commonly used to refer to the public benefits received from natural capital. When considering farmland, it is appropriate to separate them out because their relative value varies dramatically depending on where the farmland is located.

The amount of ecological goods people receive from farmland is a function of the characteristics of the land and the quantity of the land. The ecological services people receive from farmland is a function of how much individuals value the services and the number of people in the community.

Consequently, for large urban centers the ecological services provided by farmland are typically very high relative to the ecological goods provided. For more remote communities the value of the ecological goods is often greater than the value of the ecological services.

9.7 A FACTOR OF 10

It is interesting to note that in the three valuations of natural capital in Metro Vancouver, noted in this report, the public value exceeded the private market value by a factor of 10.

Type of Natural Capital	Private/Market Goods Value	Public Value
Stanley Park Windfall	$ 1 million	$ 10.1 million
Farmland	$ 5,700	$ 58,000
Wildlife Habitat set-asides	$ 300	$ 3,200

There is no technical reason for this to be the case, but it is an interesting note with which to wrap the discussion of this study on the public amenity benefits of farmland in Metro Vancouver.

While the absolute numerical value estimates used in this study can be debated, it is clear that in highly urbanized areas, the **public** value of the remaining natural capital, is much greater than **private/market** value currently used to value it.

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11 APPENDIX

11.1 SAMPLE SURVEY FORM AND COVER LETTER

This project is a research undertaking. Questions raised should in no way imply potential policy or taxation considerations of any level of government.

The Metro Vancouver region is made up of 22 member municipalities covering 287, 736 hectares of land in the western Fraser Valley.

Approximately 61,000 hectares (21%) of the land in Metro Vancouver is designated as Agriculture Land Reserve (ALR) where the primary land use is agricultural production (See Map-green areas represent ALR).

Section 1: General Questions

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

☐ Nature ☐ Job opportunities ☐ Cultural heritage ☐ Green-space
☐ Farm animals ☐ Rural lifestyle ☐ Local food ☐ Wildlife habitat
☐ 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 Metro Vancouver?

☐ 0 times ☐ 6 to 10 times ☐ 16 to 20 times
☐ 1 to 5 times ☐ 11 to 15 times ☐ 21 times or more

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

☐ 0 times ☐ 6 to 10 times ☐ 16 to 20 times
☐ 1 to 5 times ☐ 11 to 15 times ☐ 21 times or more

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

☐ 1 to 15 km ☐ 16 to 30 km ☐ 31 to 50 km ☐ 51 km or more

1.5 Suppose you are in a local supermarket and California-grown corn on the cob is on sale at $4.00 for a dozen. Next to the Californian grown corn is locally-grown corn, which is more expensive. How much **more** would you be willing to pay for the locally-grown corn per dozen cobs?

☐ $0 more/doz. ☐ $0.25 more/doz. ☐ $0.75 more/doz. ☐ More than $1.00 more/doz.
☐ $0.10more/doz. ☐ $0.50 more/doz. ☐ $1.00 more/doz. (how much?) $_____ more/doz

Section 2: Wildlife Habitat Preservation

Some farmland is not easy to farm and can be set aside as wildlife habitat with minimal impact on farm operations. It is estimated that approximately 5 % of the ALR in Metro Vancouver (2428 hectares) may meet this criteria. One mechanism to ensure privately owned farmlands are protected for wildlife habitat is to pay farmers to set the land aside for wildlife habitat through a legally binding contract.

2.1 Do you support mechanisms to pay farmers to set aside a portion of farmland to protect wildlife habitat?

☐ Yes

If you answered yes to question 2.1, would you be willing to pay $40 **annually** into a fund to pay farmers to permanently set aside 400 hectares of farmland for wildlife habitat?

☐ Yes ☐ No

☐ No

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

☐ Wildlife habitat preservation is not important to me

☐ I do not think I should have to pay for wildlife habitat Preservation

☐ Other (Please explain)_____

_____

Please turn over…

Section 3: Loss of Farmland

Local governments play a major role in determining land uses within a community. Imagine a situation where there is a proposal to use 400 hectares (approximately the size of Stanley Park) of farmland for urban development. One reason for changing the land use is to increase the tax revenues. Tax revenues generated from industrial and commercial development are more per hectare than farmland. The increased tax revenues may postpone a future increase in residential property taxes.

3.1 Would you prefer that the 400 hectares remain as farmland?

☐ Yes

If you answered yes to question 3.1, would you be willing to pay $100 **each year** in additional property taxes to preserve the 400 hectares as farmland?

☐ Yes ☐ No

If you are willing to pay more than $100, how much _____ ?

☐ No

If you answered no to question 3.1, 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)_____

3.2 Suppose there are 30, 000 hectares of farmland (50% of the current farmland in Metro Vancouver has already been developed for urban use). Would you be willing to pay $100 each year in additional property taxes to prevent the additional loss of the 400 hectares of farmland?

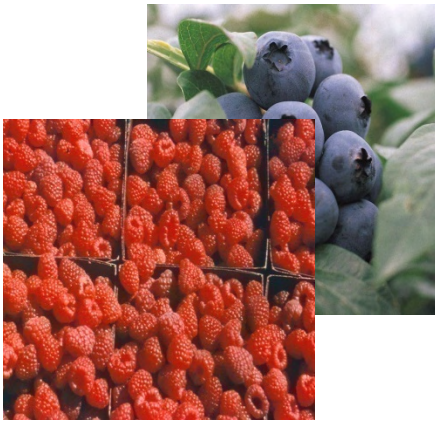
☐ Yes ☐ No If you are willing to pay more than $100, how much _____ ?

3.3 Suppose the 400 hectares of farmland was the **only** remaining farmland in Metro Vancouver. Would you **now** be willing to pay $100 each year in additional property taxes to prevent the loss of the last 400 hectares of farmland?

☐ Yes ☐ No If you are willing to pay more than $100, how much _____ ?

Section 4: Your Area

To help us better understand the perspectives of the different areas of Metro Vancouver please provide your postal code_____



Section 5: About You

5.0 How long have you lived in Metro Vancouver?

- ☐ 0 to 5 years
- ☐ 6 to 10 years
- ☐ 11 to 15 years
- ☐ 16 to 20 years
- ☐ 21 or more years

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

- ☐ Less than high school
- ☐ High school graduate
- ☐ College diploma
- ☐ Bachelor degree
- ☐ Graduate degree

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
- ☐ 25 to 34
- ☐ 35 to 44
- ☐ 45 to 54
- ☐ 55 to 64
- ☐ 65 and above

5.7 How many people live in your household? _____

5.8 What range does your gross annual **household** income fall under?

- ☐ Under $20,000
- ☐ $20,000 to $39,999
- ☐ $40,000 to $59,999
- ☐ $60,000 to $79,999
- ☐ $80,000 to $99,999
- ☐ Greater than $100,000

Section 6: It's Your Turn

Please share any additional comments you have about farmland in Metro Vancouver.

_____

_____

_____

_____

_____

Thank you for completing this survey!

Please return survey in postage paid envelope

(PO Box 9999 Stn Prov Govt, Victoria BC V2W 9Z9)

Dear Metro Vancouver Resident,

Agriculture is an essential component of a sustainable community. It provides fresh local food, contributes to the economy, and maintains a land base that offers public benefits like aesthetic landscape, wildlife habitat, and flood control. To further understand the importance of agriculture to the region the Fraser Basin Council, Simon Fraser University and the Ministry of Agriculture and Lands are working together to study how the urban population of Metro Vancouver values farmland.

As the population of Metro Vancouver continues to grow, farmers are expanding their production to meet the increasing local food needs. Commercial and residential development must also expand to meet the needs of the growing population. In a valley bounded by an ocean, mountains and an international border, growth presents many land use challenges on both sides of the urban-rural edge. If communities are to continue to develop in a sustainable way, land use decisions must take into account the public benefits that various land uses provide.

Enclosed is a short survey that asks for your opinions on farmland and urban development. Your household was randomly selected to participate in this survey and all of your responses will remain anonymous. Your responses are important and will assist land use decision makers by providing better information on the public benefit of farmland to the urban community.

After you have completed and returned your survey, you are invited to take part in a follow-up discussion group. If you are interested in participating, simply provide your contact information on the enclosed yellow slip and return it with the completed survey or send it in separately to maintain anonymity of your survey responses.

Please use the enclosed postage-paid envelope and return the survey by October 31, 2008. If you have any questions, please do not hesitate to contact me. Thank you for taking the time to participate in this study.

Sincerely,

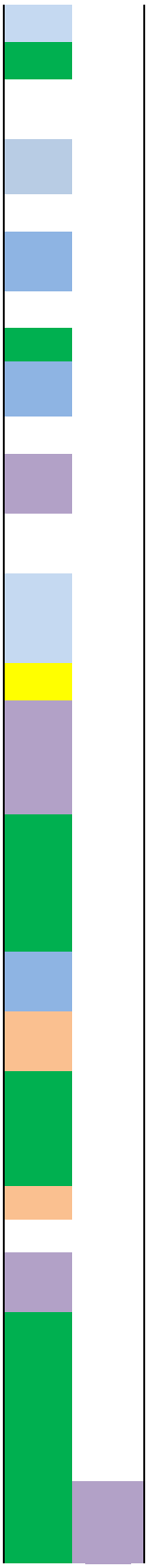
Project Team
For more information contact:
Mark Robbins

11.2 DETAILED WRITE-IN COMMENTS

The colour codes are part of the summary at the end of the written comments. The colour on the left is the first concept mentioned and the one on the right is a secondary comment, if there was one.

Written Comments

Colour Code	Summarized Comment	Total Comment
	Save it. Stronger government	Freeze the ALR. Do not allow land swaps that remove prime ALR land in return for marginal ALR.
	Habitat equally important	Wildlife habitat is equally important.
	Farmland a priority	Farmland is priority over urban use - no farm no food.
	Save it. Greenspace	Everyone loves the green! Keep it.
	Save it	Keep it.
	Save it. Greenspace	I enjoy greenspace. It is vital to what makes Vancouver attractive. Too much development is hurting wildlife.
		Should determine the ability of farmland to support local needs.
	Save it. Greenspace	It is important to keep green space as once they have been urbanized they almost never get turned back.
	Save it	The people should not have to pay to retain farmland because politicians and business owners see more profit in developed land. Our food supply globally is already strained. Leave the farmland alone.
	Save it. No more development	Any further development must be on non-farmland or re-development of existing land.
	Save it. Stronger government	Stop farmland development, preserve our green spaces and farmland, stop urban sprawl, government needs to make land preservation a priority in the future, it's a crime to remove land from the ALR, don't develop farm lands for tax grabs and short term profits for greedy developers.
	Save it. Stronger government	Government should respect the ALR and not alienate it for any purpose.
	Save it. Save more	More protected farmland, more organic, strict guidelines on growing, an action plan to make this more affordable.
	Save it. Densify	I feel so sad to see farmland lost i.e. along Marine Way in Burnaby. How many Canadian Tire, More Sense, Pet Smarts do we need?
	Need more local food production	A promise and contract of production should be laid out to meet the increasing local food needs for survival in emergency situations.
	Save farmers	Farming appears to be a dying occupation and I would like to see it preserved. It is a government responsibility. Local farms should be encouraged and supported.
	Save it. Sustainability	Farmland is a key to local sustainability in case of disaster. I value development up in clusters around skytrain hubs. Keep farms farming.
	Tax payers shouldn't carry burden	I am opposed to taxpayers carrying the burden. Farmland is important but so is putting food on my table and paying living expenses.
		Before gas price increase I would go to local farms more often.
	Save it - local food	Living in Richmond I am so happy that I have such diverse landscape to enjoy. I love buy blueberries from my local farms and enjoy wildlife preserves. Want to keep it this way.
	Save it - sustainability	Saving farmland is extremely important anywhere but especially close to larger urban areas. Produce grown close by saves our clean air as trucks don't have to haul it over long distances.



No more taxes	Can't afford more taxes.
Buy local	Let’s support our farmers. Buy local.
Developers should preserve habitat	Developers of land should be required to set aside land for wildlife habitat - not just farmers.
Save it. No more taxes	I'm in support of retaining farmland in the region, however I am against increasing taxes.
Save it	Please save the farmland.
Save it. Stronger government	Farmland and wildlife are not going to last much longer if government keeps developing it. They need to lead by example and tax payers will be more positive.
Save farmers	Farming should be made more profitable - lower taxes.
More local food production	Would like to see more land in Langley/Abbotsford used for food production.
Save it. Stronger government	There has to be a limit on how much individuals have to subsidize. Farmland cannot be replaced-governments need to understand this.
Save it	It is a slippery slope letting it go - it never comes back.
Save it. Densify	I am always concerned when farmland is used for urban development. Development should be aimed towards unfarmable land.
Survey seems slanted	Survey results stem from the way questions are positioned and the type of questions asked - survey seems slanted.
Taxes should be shared more fairly	I would expect property taxes to be allocated more fairly. If we were all expected to pay for farmland preservation I agree that it needs funding but know that I pay incredibly high taxes let's share the load more fairly.
More organic	More organic farming.
Save it. Densify	Leave the farmland alone. Start changing existing cities to higher density living and greater tax revenue.
Save it. Densify	Saving farmland is very important. Changing city zoning to allow for multi-type living is essential to stopping urban sprawl. It also helps with flooding.
Local food	I take advantage of local farming primarily by purchasing produce at farmers markets in Vancouver.
Save it. Local food	I think it is shortsighted to sacrifice farmland for development when farmland is so scarce. We need more local produce and less dependence on imported even if it is more expensive.
Save it. Stronger government	Please protect the richest agricultural land in the world . We have already turned part of paradise into a parking lot.
Save it. Sustainability	Farm land protection should be linked to global sustainability especially with the impact of food transportation on the globe.
Save it. Local foods	Once farmland is developed it's gone. We need to have a closer connection to our food sources. We need to support and encourage our local farms.
Save it. Local foods	The loss of farmland must be stopped. BC should not be 100% dependent on outside agriculture products.
Save it. Sustainability, future	Preserving farmland is a must for our future generations.
	I don't understand why locally grown produce is more expensive.
Save it. Densify	More than 40% of Surrey's budget goes to policing and greater density means greater crime. Until we resolve this issue why allow more ALR land to developers.
Save it. Local food	Why destroy some of the best, close at hand, food producing land to add more development and then have to import food from a far away country. Support farming practices. The cost for transporting food and resulting environmental impact should be avoided at all cost. You can't eat Asphalt and concrete.
Save it. Local food	Too much land has been lost to single family dwellings in Metro Vancouver. If there is no farmer organization to promote local merchandizing, one is needed.
Save it. Local food, densify	It is important to retain land so people can buy local food and not become reliant on importing food from around the world. Development should go up not out onto more land.

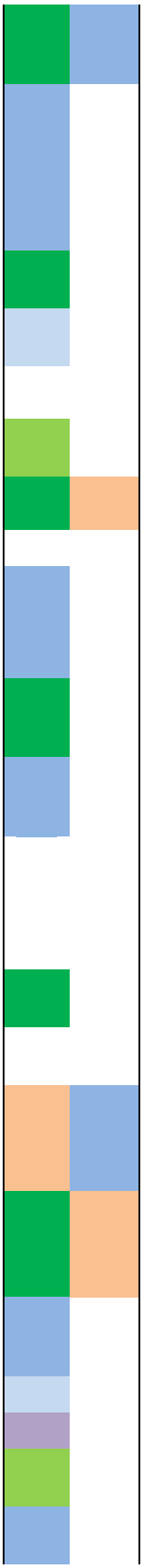
Save it. Local food, stronger government	We need to stop the greed of politicians and developers so my kids can grow up and eat locally grown food and play in something other than a concrete jungle.
Save it. Densify, local food	Please protect our farmland from urban use. We need food. It is more important than more apartments and black top.
Save it. Densify, local food	Think long term. Buying locally is healthy and cheaper (less transport). Limit the city size not the farmland.
Save it. Future, local food	Farmland must be preserved for future generations. No one person should have the right to take this away. It might one day be the only source by which we can grow food independently.
Save it. Stronger government /keep rules	The farm land owners accepted the ALR terms and conditions way back when. To get lower taxes they must be held to the terms and conditions they agreed to. No instant millionaires should be made by adjusting the ALR rules.
Save it. Future, local food	Every acre counts. Once it is gone, it's gone.
Encourage farmers	Not only preserving land but farmers - aging way of life. Encourage young farmers to farm. Create a publically funded farmland bank to increase viability.
More farm diversity	Way too many blueberry farmers - need better diversification pesticide concerns galore.
Save it. Local food, habitat	Greater respect needed for disappearing farmland. This also results in protecting groundwater quality, wildlife habitat and sustaining local food supplies. More provincial money is needed to protect wildlife habitat and farmland.
Save it. Future	We should never lose what farmland we have left. Thanks for doing this survey.
Save it. Future	Once it is gone, it is gone forever. Population has to be controlled: stop child benefits and immigration.
Enforce existing rules	Our taxes should cover farmland preservation.
Save it. Future	I love going to farmer's markets and buying local. Please preserve the farm lands as heritage for future generations.
Save it. Local food	Development of ALR is very short-sighted. We are going to need every hectare possible to feed upcoming populations and climate change also will pay a big role regarding supply of food.
Save UBC farm	Save the UBC farm.
Save it. Local food	What are we going to eat when all the farmland is golf courses, malls and homes?
More local food available	I would be willing to pay more for locally grown food if it were available beside the California, Chile, Mexico products.
Save it	The removal of farmland from the ALR only for increasing tax revenues is a 'no go' and I would vote any party out of office at any level for proposing this.
Save it, local food and habitat.	Farmland for food to be grown locally and wildlife habitat are essential. We cannot survive in a concrete jungle.
Save it. Local food, greenspace	I love the greenbelt. I support slow food movement and love local B.C. produce. Our local farms stop the ugly sprawl and are a joy. England saves its greenspaces and is much more crowded than we are.
Save UBC farm. Promote urban agriculture	Preserve the UBC farm. Expand/support more school tours to local farms. Create more community gardens. Get a BC logo that goes on all the BC fruit and veg. Create some commune farms.
More diversity	We like to see more, smaller mixed farms, not just large single focus farms.
Save it. More organic	We already do not have enough farmland to feed our population. More organically grown food for less would be a positive step forward.
Save it. Government stronger	All 3 levels of government should be responsible to protect existing farmland and to create more. It shouldn't be done at taxpayer's expense - careful fiscal planning is necessary.
Local food should = lower prices	Less transport for local produce should equal same or lower price as imports.
Save it. Environmental	Preservation of ALR and other green space is vital to combat the effects of global warming and to give us relief from the concrete jungle which surrounds many of our communities.

Save it	Farmland must be preserved. Any future urban development must not be on farmland. There are ample examples in our area of underdeveloped city lots which could be used for housing. There must be better transit and the sins of earlier commissions should be brought home to them.
Save it. Future	Once it is gone it won't come back. Farmland should be saved as much as possible.
Stop sprawl	Stop sprawl and increase density.
Save it. Local food	Let's keep what we have. We don't need more housing, we need more farmland producing food locally.
Over taxed	Churches and corporations need to be taxed to pay for urban homeless. The working drones are over taxed. Tax rich churches and corps.
Save it. Greenspace	Enjoy having green space/natural habitats - a lot more pleasing than concrete.
Save it and habitat	I believe it is vitally important to continue to protect farmland and wildlife habitat and accept that there is a cost of doing so.
Save it. Future	I would do anything to ensure the preservation of farmland. It is irreplaceable. A condo is not a suitable replacement.
WTP conditional on outcome	WTP if farm status not just for tax benefit and if habitat supports endangered wildlife and salmon.
Save it. Local food	I believe it is essential to preserve existing farmland and create strategies to supply adequate food to Lower Mainland residents - more plants less animals.
Save it, local food	Local produce is essential to maintaining a healthy community. I will always pass up American produce to support local growers.
Small parcels hurt farming	Many 5 acre parcels have been ruined for agricultural purposes by house placement on the lot. No ag. value left.
Save it. Stronger government	Need better management - say no sometimes.
Save it. Local food	Government has a responsibility to the farmers and citizens to preserve farmlands and access to local affordable food sources. Let the developers fend for themselves and stop manipulating the rules.
Save it. Greenspace	We should be saving all the remaining farmland. We should be showing the rest of Canada and the world that we are preserving the beauty of the Lower Fraser Valley.
Save it. Future	So important! A changing world requires we take care of ourselves.
Save it. Greenspace	Vancouver is a green city. Keep it so!
Save it. Greenspace	I believe that we need to preserve green space. I don't think it should drop below 15%
Save it. Local food	It is very important to have local food and thus not rely on imported food. It also cuts down on pollution to grow locally over imports.
	I have a plot in a community garden - 15 years.
Save it	I grew up in Pitt Meadows and this exact scenario is occurring. A section of agricultural land is being designated for an industrial park and I find this very disturbing. I hope this study can in some way persuade the public to help preserve our agriculture reserve.
Save UBC farm	I am very concerned about the possible loss of the UBC farm. Surely we can manage to save such a unique place that is only 45 hectares, from development.
Save it. Livability	Farmland is a big part of what keeps Metro livable – let's keep it that way.
Save it. More diversity	Yes to preservation, contingent on types of farms.
Save it. Government stronger	ALR needs to be protected, but this cost should be paid by the municipalities. Business have been streamlining and cutting costs. The city needs to learn how as well, not always passing the costs on to the tax payer.
	Sadly municipal and local governments quietly replace those on the councils and ALR boards until the developer get what they want, i.e. the future of Garden City Lands and Tsawwassen.
Save it	Farmland is very important resource for everybody, but we should develop it rationally. The harm of overdevelopment is a crime.

Save it, local food and habitat	We need to protect our environment and our crops. As well as keeping nature intact with all wildlife. I would be willing to definitely pay to help preserve life on earth.
Save it. No taxes	Translating the value of farmland to dollars per year is very challenging. The principles behind the ALR are still valid. There should be other mechanisms for municipalities to manage their tax needs without resorting to leveraging new taxes from ALR lands. This is the thin edge of the wedge.
Save it. Local food	Farmland, greenspace, parks, and forests should not be looked at as a loss of revenue for the municipality. That needs to be replaced. We as a individuals should not have to pay to keep farmland, greenspace, etc from being developed. The taxes will keep going up as development pressures increase. what happened to just saying no. The ability of our country to grow our own food is more valuable than money.
Save it , local food	Local agriculture should be one of the ways in which we begin to reduce our global environmental footprint.
Save it. Increase density	Increase density to keep farmland.
Need a balance between farm and urban	Farm lands are very important part of urban growth. I'm not necessarily pro development but can you show the benefits and prove value of farmland in the search for a good balance?
Save it. - local food - s/b more in stores	I think stores would be required to have local products. It makes me angry when I have to buy USA vegetables when we could be buying local - but I don't want to have to drive to the farm market every time.
Save it. Save the farmers	Just how much I value and appreciate farmers and I would support them as much as possible.
ALR limits growth	The ALR is significantly repressing economic growth and artificially increasing real estate prices.
Save it. Local food	Producing food locally within such a big population area as Metro Vancouver is high priority.
Save it. Stronger government	I believe farmland preservation should be a societal obligation and shared by all residents of Metro.
Save it, local food	It is very important to protect farmland. We have to be able to grow our own food locally.
No More Taxes	No more taxation please.
Save it, local foods	We only have a limited area for local farmland. We need to preserve it without paying to do this.
Save it. Promote local food	I am very concerned about the loss of this land. I also feel we need to support the use of local products.
Save it, Greenspace	I think it is important to maintain some rural areas. Intensive development leads to a greater tax base but there is a huge cost to provide infrastructure services. I wonder how much we gain at what cost.
Save it. Not taxes	I believe it is very important to have farmland so that there is something other than steel and concrete to look at. I don't however feel that only home owners are always the ones to pay. People who do not own homes should also have to pay.
Save it. Local food	As a matter of survival we should strive to meet our local food needs with local produce as much as possible.
Save it, Greenspace	I feel because the combined nature reserves back dropping Metro Vancouver, that is what adds to the healthy sustainable lifestyle we enjoy and must preserve for future generations. Big cities destroy our health and mental health.
Save it. Local food	It is imperative to preserve local farmland for local sustainability not having to rely on other regions/countries for our food. It provides a habitat for local wildlife.
Save it. Future	Preservation is a one way street. Once farmland is gone it cannot come back.
Save it. Local food, habitat	Please do not rezone land that can be used to grow produce and/or grass for livestock food and/or wetlands for birds and animals.
Make corporations pay	There are other ways to pay for preserving farmland - corporate taxes.
Save it. Local food	Need to keep as much farmland as possible. Climate change may make our imported food hard to come by.

Save it. Local food	N.A. is becoming very dependent on importing food. There is currently a global food shortage as weather changes have affected many different growing regions, including here. We need to become more self sufficient and support our depleting farms and processors.
Urban agriculture	I support the development of urban agriculture production such as high rise greenhouses to reduce transport costs.
	Corn is a terrible example. Consumers don't evaluate food choices that way. Might choose local green beans instead.
Save it. Local food	Local produce tastes the best. I like to pick or buy fresh picked berries.
Densify	No mention of chance to increase pop density instead of increase in per person tax.
ALR is unfair to farmers. We can import	The ALR should not have been put in and was the most unfair act the government has done to farmers by devaluing their land asset and borrowing power. Food comes from all over the world.
	I think this survey is 20 years too late.
Save it. Densify	Farmland should remain. Gov. should build up mountains and tax accordingly
	Would like to be more informed about pesticides/herbicides authorized used in the province including city parks.
Save it. Local food - pay farmers more	Farmland should be retained but we should not subsidize owners of land through higher taxes. We should be willing to pay higher food costs. Also farmers should pay lower land taxes.
Save it. Stronger government	Protect farmland at all costs. End the political interference with the ALR. End the developers destruction of our food supply.
Subsidize farmers	Government needs to subsidize the Canadian farmer more so their prices at the grocery store look more attractive to shoppers.
Save it. Stronger government	We should not be taking prime farmland in the Fraser delta for storage or the Roberts Bank expansion or greenhouses.
	Save the Marine Drive farms.
	With all the land in Canada why are we packed into areas like sardines.
Save it. Local food	It is more important than ever to return our ability to raise food locally whether by retaining farmland and or community garden space
Save it. Greenspace	Excellent idea. We need to scrutinize any for the condo projects. We need green space and farmland for inner Vancouver.
Save it. Local food, environment	Farmland must be saved not only for produce but for the environment. Forget the carbon tax - save the ALR.
Save it. Local food	I wish we could have more fresh food from local farms.
Save it. Local food	Local farms = local foods = less environmental costs and better nutrition.
Save it. Local food	The delta of the Fraser Valley is a good farmland it would be a shame to cover it with concrete.
Save it. Local food, greenspace	Even I grow vegetables and fruits in my backyard but still to get out in the green land is very important to my family and friends.
Buy local	I buy local produce at weekly farmers market almost every week.
Save it, local food	It is important to have locally grown food choices.
Save Garden City Lands	Keep the Garden City Lands in Richmond. Farmland, greenspace wildlife habitat etc. We don't want another concrete jungle. We need food especially in the future.
	I hope enough people take time to fill this survey. We must preserve what little farm land left in the lower mainland and elsewhere in the province.
	Please keep the existing farmlands providing those people owning the farmland want to farm it.
No more taxes	Cut the military spending - no more taxes.
Save it. Local food	We do not want to end up in a situation where we have to import all our food. It leaves us in an extremely vulnerable position.
Save it	I am profoundly concerned that our ALR is being sold off to commercial and

	residential development.
Save it. Greenspace	Open green undeveloped spaces are essential for a higher quality of living. Urban sprawl may take a toll on one's health due to air quality, congestion, noise, claustrophobic feeling and psyche. Farmland preservation & security of food production is essential for human and community existence.
Save it. Greenspace	The farmland is vital to Vancouver for 'green space' beauty of the city. Hate to see it go.
Save the farmers	I'm more concerned about losing farmers from Metro than farmland.
Densify	Enough farmland has been developed now. Not necessary to develop more. Can't over populate an area.
Save it	I would like the take-over of the farmland and wildlife habitat to stop.
Save it. Stronger government	Locally grown is healthier but I pay too much taxes as is. We need better government.
	Too much good farmland already turned into residential. E.g. Richmond.
Save Garden City lands	Keep Richmond's Garden City Lands within the ALR. Other lands in the ALR should stay as such. Farmland should not be bartered away.
Shouldn't have to pay	There should be a set amount of land that is left for nature/wildlife- without having to pay for it.
Save it. Future	I believe the preservation of agriculture represents our future as there is so little land available already. I would hope that gov't would place value in balancing current tax dollars to support farm and wildlife habitat and in urban areas.
Save it. Future	Short term gains from property tax cannot justify permanent loss of farmland and subsequent environmental damage.
Save it. Densify	It is disappearing too quickly. Farmland is more important than cookie cutter developments. Save the farms.
Save it. Local food	I'm concerned at the amount of land presumably prime arable land that is now covered in greenhouses. Surely we should use the soil not just the land space.
Save it. Future	Far too many hectares have already been developed. This will be to our detriment in terms of our food supply.
Save it. Local food	Please save our farmland. In a disaster we have only 3 days of food in the Lower Mainland. We must be more self-sufficient, use less gas to get food here, the food can be picked riper, etc.
Save it. Future	I would like to see all current farmland and green space preserved permanently.
	We need a plan that utilizes how much farmland we need to meet local demands. Then people need to understand the relationship. Your numbers seem inflated.
ALR stole land from farmers	It important to realize that the ALR was created in 1972. Government basically stole a portion of the value of farmer's property with the stroke of a pen. If preserving farmland for future generations is an important concept why penalize a small portion of the population, namely farmers for the so-called greater good. It would have been better to compensate farmers.
Stronger government	The decision making process must be changed. The pressure on municipal governments will always be to increase tax bases so the ALR will always decline. The only question will be at what rate.
Balance between ALR and urban	Farmland is important but can be reduced gradually and responsibly to allow for other industries and urban growth.
ALR exclusion should go to referendum	I absolutely agree with the ALR. I believe that we public should have a say by referendum when a large parcel of ALR is being petitioned out of the ALR or for rezoning.
Save it. Green space	We need more greenspace preserved.
Save it. Local food. Future	I believe there are always possibilities to turn land into houses but almost impossible to turn houses into farmland. Just this month we visited Italy and really noticed the rules and respect they have for preserving the land - and you can tell in the food!!!
Save it. Greenspace	Save our greenspace, farms, gardens and nature.

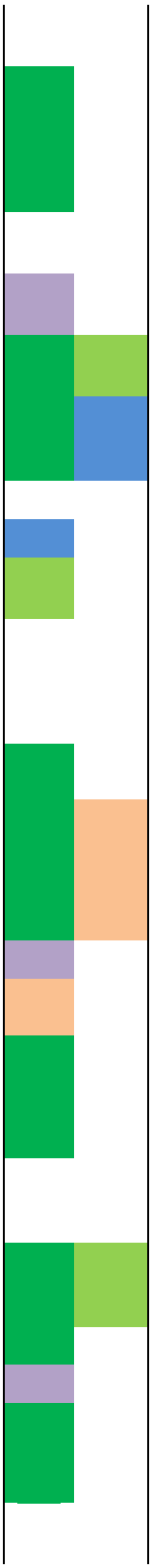


Save it. Local food, stronger government	Preservation of ALR needs to be a priority with government as locally grown produce will become increasingly important in the coming years. Taxes need not be raised. Review how and where $ are spent.
Strengthen ALR	Strengthen and improve the ALR - farmland is important - maybe land should become government land with long term leases and salaries to farmers. We (the public) need education.
Save it. Stronger government	Prov and local levels of gov't should be working to preserve, not only farmland, but environmentally sensitive ecosystems. More green development and less urban sprawl. Campbell Heights development in Surrey - what a shame.
Save it. Local food	People don't understand the full impact of continued loss of farmland. Even I don't fully know. We need the land to grow our food.
No more taxes	It is difficult to commit to paying additional taxes without clarity on how the funds will be managed and supervised.
	Balance - development and green spaces have bike lanes and clean air for our kids and animals.
Save it. Greenspace	Protect our farmland. We need the green space protected as Vancouver will become even more densely populated.
Save it. Local food, future	Farmland should be kept at whatever cost. The earth is forever - man needs for food, good food, is required. Cities which preserve farmland should receive carbon credits.
Save it. Stronger government	It is time to put an end to developers encroaching on ALR lands. We put them aside for a reason and they're only going to increase in importance in the future. Why shoot ourselves in the foot.
Save it. Stronger government	The real discussion is setting limits on urban municipalities.
Save it. Local food	Farmland is a capital resource for our daily lives and sustainable future. As energy costs rise we will be impoverished in direct relation to the distance our goods must travel. Local food is critical. I expect governments to protect it urgently.
Save it. Stronger government	Check soil and put houses on crappy soil and introduce farming or keep farms on the great and good growing soils. Introduce legislation that new developments cannot be on farmable soils. I am concerned about the effects of large scale commercial farms being given subsidies and benefits that could potentially undermine any farm protection plan. Family farms should be protected through inheritance benefits for continuance and for keeping properties from being subdivided to a point where they cannot have economic feasibility.
More local food in supermarkets	Relating to Q1 - I would like to see the local food in local supermarkets rather than special farm markets. I believe many more will buy it then.
Save it	I think that the ALR is one of the greatest assets and that farmers shouldn't be left to carry the financial burden of maintaining it.
Save it. Future, stronger government	Farmers should be supported by government subsidies. Less corporate welfare and more government money should be in the hands of the hardworking farmer feeding us locally. Sustainability is the answer - not more development but not more taxes either - that's short sighted and shows lack of creativity.
Save it. Local food. Future	We need to educate the public to conserving local farmlands for local food production preferably in a non-chemical way. As the energy crisis deepens - lack of water, transportation concerns climate change we need local food production. In order for us to have the capacity to feed ourselves in the long term.
Save it. Stronger government	I think land developers and local government need to set aside more land for farming and greenbelts rather than clear-cut and subdivide –i.e. Walnut Grove and Willoughby.
No more taxes	Residential property taxes should only pay for part of cost of keeping farmland.
Save it. Densify	Stop building on it - use brown sites.
Compensate farmers for greenspace	Farmers should be compensated for providing other benefits e.g. wildlife habitat and water absorption and retention, environmental benefits.
Save it. Stronger government	Farmland should remain as is and not be changed for the greed of government who only waste money.

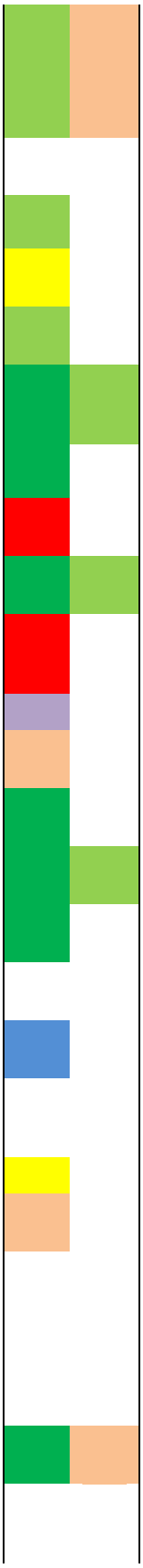
	Questions appear slanted. B.C's best farmland/food supply is in the lower mainland - understood for many years + major bird flyway. Taxes are unrelated.
Save it. Future	Farmland and wildlife habitat is essential to a healthy balanced society.
Save it. Greenspace	Once it is gone it is gone forever. Urban creep is a big problem (loss of green space and habitat).
More organic	Impose all remaining farmland as 'organic only'.
Save it. Densify	ALR land should remain as is taxed on agriculture basis. There remains lots of marginal land for housing. Reduce lot size, build up.
Save it. Local food	We need our farmland - as population pressure rises. California might send us food and it's better to eat local food.
	Seriously limit endless mindless saturation of homo sapiens on the planet and B.C.
Save it. Not through taxes	I don't believe the onus is on us as taxpayers to save farmland. Educate people to buy local product. We pay enough taxes. Find other ways to preserve farmland.
Save it	Please save the farms. They are so important.
Save it. Future	I believe we should be supporting sustainable farming and farmland in the Metro Vancouver for conscious and global reasons. We should be teaching our young how to farm. Is there some way homeless people could be sheltered on farmland and earn a wage while learning to become farm hands?
Save it - densify	We need higher density and more full service, walkable town centre developments and useable attractive parks/recreation area.
Save it. Future	Please keep it for my children and grandchildren to enjoy.
	Wildlife preservation in the city sounds wonderful but the romantic promotion encouragement of large species of deer cause much harm/death to humans and promotion of predators like coyotes and bears wreak havoc to families in areas where no legal way to defend selves. Bird preservation is okay but your proposal promotes dangerous wildlife.
Save it. Stronger government	We're stewards of the best agriculture land in the world. Why is there even any discussion about paving it over? Taxes to support farms? What about making farming user-friendly? Economically feasible?
Save it. Local food	I think maintaining farmland in Metro Vancouver is extremely important. Never like to see it developed. Local food is important for the environment along with nature.
	I am assuming farmland includes greenhouses which are more productive on less land.
Save it. Greenspace	Don't you dare hurt any more of Mother Nature - we've done enough already.
Save it. Local food	Farmland must be preserved - it's a food source, green space and wildlife habitat.
	I work in a sector of the ag. industry involved with environmental farm plans, recycling systems, etc.
Save it. Local food	Stop development. Save the productive farm land for local produce.
	Deletion of farmland to develop for housing creates too much of an impact on a particular area. Fallout in areas of traffic gridlock lack of medical facilities and schools.
	What is wrong with these farmers? Imagine selling land that was virtually given to them years ago for profit. If they don't wish to farm it, give it back and let somebody who will farm it.
Save it. Future	It would be sad to raise my child in an area where there aren't farms. School trips to pumpkin patches, etc should be part of every child's memories.
Save it. No more taxes	I love farmland and wildlife but have no money to pay additional taxes.
Save it. Stronger government	I feel it's the governments place to support the idea financially. They don't need to pay the farmers, just lower their taxes. My funds aren't limitless.
	Local produce should be cheaper than imported - one of the flaws of our food system. I also worry that many people will say they will pay more in surveys but do not follow through with action. Save our farmland.

Save it. Local food, greenspace	I'm very concerned about preserving farmland, greenspace, local food and wildlife habitat.
Save it. Local food and habitat	I feel arable land will be increasingly precious, as will local food products. Saving transport, energy and cost. I also feel the opportunity to view wildlife 'insitu' is very important.
Don't care	Farmland is not necessary for preservation.
Need balance between farmland and urban development	In some cases land set aside for farming could be used for industrial/business to keep people working living in community. To ensure a sustainable fiscal balance for the city there has to be a balance. In Pitt Meadows there is land not being farmed + 85% of the pop commutes. Pitt Meadows has 86% farmland.
More local produce	Important to keep more locally grown produce in grocery stores.
Save it. Future	Let's not wait for development to stop when everything is finally paved over. Stop now. For everyone's well being.
Save it. Stronger government. No more taxes	Why do I have to pay more taxes for keeping farms as is. Just keep them as is and don't develop it into residential that's it. Costs nothing.
Save it. Local food	We have already turned too much farmland into industrial or residential land. If we want to be a sustainable region it means we need to be able to feed ourselves.
Save it. Greenspace	Let's preserve nature the best way we can. Urbanization is taking it all away it seems.
Save it. Local food	We must be self sustaining. Poor policy to depend on goods from other countries.
	Preserve it.
Save it. Future	Farmland is so important to future generation - our priorities should not be big business, real estate dev. Keep what little farmland we have - don't destroy it.
Save it. Local food	How dare you. You are cutting down our oxygen supply, killing our rivers and fish, polluting the ocean - now our food supply.
Need a balance	For Metro Vancouver to be sustainable we need farms to feed our population. However, the diversification of our cities may require the loss of farms.
Save it. Stronger government	Why take away any farmland. If it is already marked for farmland houses don't belong. Farmland or wildlife or nothing else.
	A lot of the questions are not cut and dry. Some don't apply to this survey.
Encourage farmers	I think we should encourage more farming in Metro Vancouver especially food crops i.e., fruits and vegetables.
Save it. Local food	I come from a mixed farm - cows, grain, milk, vegetables, wood lots, fruits. Our farmlands are shrinking too fast. We cannot continue to rely on foods from other lands. I want to know how my food is grown.
Save it. Local food	Farmland ensures B.C. local food production and reduces demand for imported foods It is not environmentally sound to import food from great distances.
Balance between ALR and urban	I believe that 90% of the land between Langley and Hope should be ALR but 30,000 hectares in Metro is OK.
Densify	Good farmland should never be rezoned for housing. It should always be in the ALR.
Save it. Local food	I think it's very important to keep locally grown produce available to as many consumers as possible.
	To increase population density, without having an infrastructure to move people is insane. City population/borders should be limited.
Densify	No land should leave the ALR. Garden City in Richmond must be ALR. Why not use the land under hydro lines -plots rented out?
	Farming seems to be a hard lifestyle.
Save it. Stronger government	I think strict government controls need to be kept in place to protect farmland.
Save it. Stronger government	All the development along the #1 Hwy is atrocious, that is good farmland going to waste for the almighty $. Gordon Campbell paying back his supporters.
Save it. Stronger government	Greed (read development) must diligently be kept at bay for the greater good (read local produce).
No more taxes	Pensioners cannot afford any more increase to their taxes.
	We must prepare for the prospect of imported basic foods becoming very expensive.

	It is a finite resource, so it is incredibly valuable.
Save it. Community	Farmland should be farmed. If current owners are unwilling to farm land should be purchased and leased to those who can. Look how the energy crisis can affect food supply inspired owners or groups can turn the land around to viable and or niche markets that strengthen the community. Your survey offers explicit opportunity to explain the rational for no answers but not for 'yes' answers. It rather begs the question.
	Please keep the Garden City lands in the ALR.
	If Metro is short of farmland shut down the golf courses.
More organic	Looking for more organic farming. Can we encourage large supermarkets to sell more local produce?
No more taxes	Government should not use the preservation of farmland and wildlife habitat as a means or excuse to increase taxes.
Save it. Greenspace	I support this 100%. Seen the horrible effects on our wildlife and not surprised when wolves/coyotes prey on cats in White Rock.
	Do not allow removal of Garden City Lands.
Save it. Local food	It is shameful how much farmland has been developed. We will be in serious trouble – food wise - if it is not stopped.
Save it. Future	We need to preserve farmland now - or our children will not have a Westham Island or Reifel to escape to. Keep it all.
Save it. Future	Preserving and promoting local agriculture is an important aspect of reducing carbon emissions, preserving traditions and knowledge related to food production.
Save it. Future	Too much has left agricultural use already - preservation of agricultural land for the future is essential.
No more taxes	Rather than property tax increase I would prefer further consumption taxes eg tolls, PST, water, gas, etc.
Save it. Local food	I've seen many changes in the Metro Vancouver over the past 70 years, from my childhood when all fresh food was produced locally to the present when we are being fed by imported foods. We are being very short sighted if we destroy our farm land in this time of climate change.
Save it. Stronger government	Arable land should not be wasted on non-agricultural uses. The $75 yearly fee is already built into land value.
No more taxes	Seems like middle class people who can barely afford their mortgages, hydro, gas, property tax, home insurance etc. I may be homeless soon. How much more can you tax us? Look at gas prices. Government wants to give themselves big raises. What about the rest of us? farmers who meet certain environmental criteria - organic, low polluting - should get rewarded financially.
Balance between ALR and urban	Each proposed change in zoning should be evaluated on an individual basis.
Save it. Local food	We need to consider the cost of fuel to transport produce to metro Vancouver in the future. We need to be able to be self supporting to provide for our communities in the future. If this is related to the Garden City Lands then my answer is if the land is not in the ALR now it should be developed.
Save it. Local food	The presence of farmland reminds us of the importance of food production.
Save it. Densify	Please stop urban sprawl. High density urban living is better in the long run as energy costs increase. Protect farmland now or lose it forever.
Save it. Greenspace. Local food	Prefer to eat local and direct from farmer but often too far and takes too long to get to. Highly supportive of habitat preservation for wildlife.
	If the 400 hectares is anywhere by Burnaby I will not pay higher taxes to keep it. The 400 ha must be within 5 km of my house.



	We had no corn this year because Vancouver stopped corn trucks from selling same-day picked corn at road edges and I'm not guessing how old store corn is.
Save it. Local food	Producing our own food needs to be a priority. We can't eat tax revenues. If you want farmers then offer fair enough compensation to get it. Don't steal it like the Ontario government does.
Save it. Local food	Local farmland is our security that amid soaring fuel costs and global economic uncertainty we'll still be able to eat.
	All the farmland should be protected and fully used. A responsible government should be able to do this without further taxation.
Densify	If more residential building is a must start with high rises and eliminate absentee ownership. Rapid rail transport is a must (ground level).
Save it. Local food and greenspace	Farmers feed the world and we need green free spaces for future generations and our wildlife is the indicator of how well our civilization will survive.
Save it. Local food. Government support	There should be a focus to produce inexpensive locally grown seasonal organic foods. Local zoning laws should have to be stringently preserved in the ALR to supply Metro Vancouver with local food supply.
	The government locally, provincially and federally should pay not the tax payer.
Save it. Stronger government	Make the ALR non-negotiable unless it is to be increased.
Save it. Greenspace	Agricultural farmland in Metro Vancouver is an integral part of the regions ecosystem and should not be so easily removed from the ALR for profit.
	Use our tax laws to encourage farming.
	Local corn should be cheaper.
	The local food farmers should lower their food prices so it will be competitive to the American grown food. So more people will be willing to support local food.
Save it. Local food	We need all the farm land we can especially in terms of `food security' and buying locally (environmental).
Save it. Local food. Sustainability	Local farming is a part of sustainable living, would have most benefit if what's produced is consumed locally. I'm curious what % is consumed in SW BC, rest of BC, Washington etc. Local food often means higher nutrition left in produce. This and other points should be drilled into population here so they can justify paying higher prices potentially.
Save it. Densify	To save farmland increase density of housing, up not out.
Save it. Future	I value the essential agricultural base of our society and feel it is worth cherishing and preserving.
Save it. Local food	Will be interesting to be here 25 years from now when there are no farms, only high rise apartments. Where will food come from? Who's going to supply our population?
Save it. Local food	Sustainable agricultural land should be available everywhere. Food that's mass produced does hold prices lower but what price do we pay for that?
Densify	This survey is about real estate development and not farms. The hillsides of the Fraser Valley are for development not the farmland of the ALR. We should be a self sustaining country.
Save it. Local food and wildlife	Farmland and wildlife habitat must be protected at all costs. Savings will come from decreased transportation expenses and food from small farms is healthier. Only a small % of land in B.C. is arable.
Save it. Local food	It is very important to keep what farmland we have left as productive as possible.
Densify	Keep farmland for farms and not housing or shopping malls.
Save it. Local food	We should be growing our own food. Farmland must be preserved to do this.
Save it. Local food	I do not want to be held hostage to foreign food producers, with no control over production standards, supply or transport costs.
	I don't think people will be willing to pay to have farmland put aside for wildlife habitat but if it were somehow included in the cost of food, it might be better.



Save it. Greenspace. Future	Development of farmland for any other use must stop. Let's take the example of Carmel California. No more people moving into Metro! Too much pollution - too little space. The environment has suffered enough. Take the example of South Delta, what a farce. All that mess of traffic polluting uncontrolled truck traffic - what about nature? You have to stop this madness please. We have revenues in the commercial income but less food and more expensive upon reducing the size of farmland.
Save it. Greenspace	Parks and farmland need protection both for wildlife and us humans for our peace of mind. We need trees.
More organic	Support chemical free farming and provide mechanisms for farm produce to get to the market – i.e. farm markets.
Save it. Greenspace	Once we give it away it's gone. We need to find creative ways of maintaining a much greenspace/wildlife habitat/farming as possible.
Save it. Local food. Habitat	It is crucial that farmland be protected for future generations and to allow people to buy local produce. Animal habitat is also vital. This farmland is some of the best in the world - save it.
Save it. Local food	Food security is a very important issue to me. We must preserve what's left of our agricultural land.
Balance between ALR and urban	The laws of supply and demand will determine the use of farmland. Taxes, incentives subsidies etc will be just wasted.
Save it, food, greenspace. Urban ag	Would encourage roof top farms and gardens as well. More green = more food=better ALR = better life.
Balance between ALR and urban	Farms have to compete for the value of land - blueberries work. If growing strawberries doesn't move where land is less valuable. Legislating land for specific use by subsidy doesn't work.
Densify	It is already at saturation level. Build up into the sky on existing housing area.
Save it. Future	I would like more info and publicity on the issue of preserving farmland and how it can impact the future. I think that the public needs to be more informed.
Save it. Local food	It is scary what Richmond has given away to development. Burnaby is now developing the farmland. Where will we get our food? Our health standards are the best for us.
Save it. Local food habitat	I think that the ALR locally grown food and habitat for migrating birds is only going to become more important and available farmland and habitat should be preserved.
Buy local	More should be done to educate people to buy local, namely Save-On-Foods and Safeway - stop buying apples from the USA.
	I am very disturbed about all the condos and malls being built everywhere. We don't have the facilities to care for such an increase in the population.
Save it. Stronger government	Farmland and wildlife habitat should not be tied to economics. Either we do or don't. European countries manage these spaces but are able to increase urban densities
	Every time we drive down 200th in Langley there is new development. Unending. Developers buy farmland, lobby to remove it from the ALR then reap huge $. None goes to the community.
Crop diversity	We need to diversify which crops we grow - seems like blueberries dominate.
Save it. Sustainability	One of the biggest reasons Vancouver remains 'livable' from an ecological perspective is the mix of suburban farms and greenspace and its remaining balance.
	Key is to balance all types of field rotation crops, greenhouse, fixed crops (blue berries) animal compost and farming.
	Save it.
	Preserve raspberry, blueberry cranberry farms. Increase fresh organic farm eggs. Preserve fresh vegetables that grow well in this climate eggs potatoes brussel sprouts broccoli carrots.
Save it. Local food, sustainability	The loss of farmland will involve the loss of local, sustainable food supply that is secure and safe to eat.
	Farmland is very essential but we have to compete with highly subsidized farming from the USA and other countries. We are taxed to death on all fronts in Canada with little or no return for our money.

No more taxes	I pay too much in taxes now.
Save it. Local food	Farmland in any conservation is necessary both from the point of view of market gardening services (fresh produce), which has strategic significance in the event of shortages or political issues. It has to be maintained for it to have value. As it is used up, So the remaining remnants have less significance.
Save it. Local foods	We need more affordable easily accessible variety of local foods.
Save it. Local food	Keep the ALR until it's economically viable to increase food production - stop population explosion, no more houses-condos. ALR designations are not accurate. My parents live on non-farmable land stuck in the ALR. While great farmland a mile away was converted into townhouse developments. Great work - keep it up!
Save it. Local food	You can't eat urban development.
Stronger government	It is disgusting to me that so much farmland has already been lost.
Stronger government	Need a new policy to reinforce the importance of local agriculture land.
More organic	Of more concern is all the chemicals/pesticides that are used in the farming process.
Save it. Sustainability	I do not see farming as a green practice but rather a necessary food security practice
	I live in Kits and it is out of my way to go to these farms. If in each municipality it would be more convenient.
Urban agriculture	Keep it and more allotment gardens.
Save it. Future	If farmland is not set aside forever we will continually erode it and will end up with a population density similar to Europe - it's unhealthy and unsustainable in the long run. Any acre of land that can be saved for farmland is a very important bonus.
	We must preserve all farm and wildlife habitat we can, but there will be future development. Does this survey include aboriginal lands. Maybe there lies an answer to pursue It breaks me up to see the land along Marine Way cleared for industry.
	Please keep and expand the farmland. I would pay.
	$75 per household is several million per year, at least. Where is the 400 hectares you're trying to justify? Need more info. I whole heartedly support preserving farmland in Metro Vancouver and throughout B.C.
Save it. Future	We are losing good soil and farmland really fast in Surrey. Once it is paved it is gone.
Save it. Local food	We need it to feed ourselves.
	Keep it fresh.
	Everybody benefits from preserving farmlands - more farmland please.
Stronger government	I observed the unregulated development by greedy municipal leaders, north of Greater Toronto, which destroyed farmland for rural ghetto suburbs in the 1970's and 1980's.
Local food - greenspace	Farmland is very defined- forest is also important – Dev. depends on quality of both for farm and park.
Save it. Stronger government	Would like farmland that is left, to stay farmland. Should not have to pay extra as our taxes are high enough.
Type of farming	I'm concerned with the amount greenhouses being built on farmland.
Save it. Future	ALR land should remain ALR forever. 2,428 hectares is unused. Something could be grown on it. Food grown locally has to be competitive in the market. It should be cheaper than imported food.
Save it. Greenspace	We need to keep it - for better oxygen to breath, place for animals, it's quiet and not busy with cars - supports local farmers.

SUMMARY		
1st	2nd	Categorization
97	5	Local food — Comments around the need to have a local food supply, food security.
37	4	Stronger government — Comments that suggest government policy for farmland protection should be stronger or enforced more strongly than it has been.
36	6	Future / sustainability — Comments about keeping farmland for future generations and how it contributes to a better community in the future.
26	13	Greenspace/habitat — Comments around the environmental benefits of farmland
23	1	Densify/Build in other areas — Comments that growth should be contained to the urban centers or done on non-farmland
20	1	No more taxes — Comments around the inability to pay more taxes or that they should not have to pay for farmland preservation with taxes or that other sectors should pay the increased taxes
11		More organic/crop diversity — Comments on the type of farming and interested in more sustainable farming activities
12		Balance — Comments around needing to balance farmland with urban development, the economic viability of farming and making decisions on a case by case basis based on balancing different values

11.3 DETAILED ANALYSIS

11.3.1 EVIEWS PRINTOUTS

Farmland Preservation

Area 1, Current

Dependent Variable: WTP
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 03/05/09 Time: 14:01
Sample: 1 300
Included observations: 291
Convergence achieved after 3 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	2.045580	0.305285	6.700549	0.0000
BID	-0.021380	0.004250	-5.030635	0.0000

McFadden R-squared	0.077793	Mean dependent var	0.676976
S.D. dependent var	0.468437	S.E. of regression	0.447483
Akaike info criterion	1.174118	Sum squared resid	57.86966
Schwarz criterion	1.199364	Log likelihood	-168.8341
Hannan-Quinn criter.	1.184231	Restr. log likelihood	-183.0762
LR statistic	28.48423	Avg. log likelihood	-0.580186
Prob(LR statistic)	0.000000		

Obs with Dep=0	94	Total obs	291
Obs with Dep=1	197		

Area 1, Half

Dependent Variable: HALF
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 03/05/09 Time: 14:04
Sample: 1 300
Included observations: 291
Convergence achieved after 4 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	2.279620	0.333155	6.842520	0.0000
BID	-0.018193	0.004509	-4.034334	0.0001

McFadden R-squared	0.055350	Mean dependent var	0.759450
S.D. dependent var	0.428154	S.E. of regression	0.415827
Akaike info criterion	1.056097	Sum squared resid	49.97162
Schwarz criterion	1.081343	Log likelihood	-151.6621
Hannan-Quinn criter.	1.066210	Restr. log likelihood	-160.5484
LR statistic	17.77275	Avg. log likelihood	-0.521176
Prob(LR statistic)	0.000025		

Obs with Dep=0	70	Total obs	291
Obs with Dep=1	221		

Area 1, Last

Dependent Variable: LAST
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 03/05/09 Time: 14:05
Sample: 1 300
Included observations: 291
Convergence achieved after 3 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	2.862173	0.402377	7.113158	0.0000
BID	-0.019756	0.005226	-3.780206	0.0002

McFadden R-squared	0.059990	Mean dependent var	0.831615
S.D. dependent var	0.374852	S.E. of regression	0.363897
Akaike info criterion	0.865989	Sum squared resid	38.26960
Schwarz criterion	0.891235	Log likelihood	-124.0014
Hannan-Quinn criter.	0.876103	Restr. log likelihood	-131.9149
LR statistic	15.82711	Avg. log likelihood	-0.426122
Prob(LR statistic)	0.000069		

Obs with Dep=0	49	Total obs	291
Obs with Dep=1	242		

Area 2, Current

Dependent Variable: WTP
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 03/05/09 Time: 14:08
Sample: 1 299
Included observations: 288
Convergence achieved after 3 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	1.631714	0.291709	5.593642	0.0000
BID	-0.021975	0.004018	-5.468793	0.0000

McFadden R-squared	0.086320	Mean dependent var	0.555556
S.D. dependent var	0.497769	S.E. of regression	0.470998
Akaike info criterion	1.269215	Sum squared resid	63.44587
Schwarz criterion	1.294652	Log likelihood	-180.7669
Hannan-Quinn criter.	1.279409	Restr. log likelihood	-197.8449
LR statistic	34.15597	Avg. log likelihood	-0.627663
Prob(LR statistic)	0.000000		

Obs with Dep=0	128	Total obs	288
Obs with Dep=1	160		

Area 2, Half

Dependent Variable: HALF
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 03/05/09 Time: 14:09
Sample: 1 299
Included observations: 288
Convergence achieved after 3 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	1.635309	0.293438	5.572936	0.0000
BID	-0.018215	0.003946	-4.615708	0.0000

McFadden R-squared	0.060905	Mean dependent var	0.611111
S.D. dependent var	0.488347	S.E. of regression	0.470634
Akaike info criterion	1.268987	Sum squared resid	63.34798
Schwarz criterion	1.294424	Log likelihood	-180.7341
Hannan-Quinn criter.	1.279181	Restr. log likelihood	-192.4556
LR statistic	23.44289	Avg. log likelihood	-0.627549
Prob(LR statistic)	0.000001		

Obs with Dep=0	112	Total obs	288
Obs with Dep=1	176		

Area 2, Last

Dependent Variable: LAST
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 03/05/09 Time: 14:11
Sample: 1 299
Included observations: 288
Convergence achieved after 3 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	2.920795	0.395095	7.392640	0.0000
BID	-0.026700	0.004858	-5.495919	0.0000

McFadden R-squared	0.111159	Mean dependent var	0.743056
S.D. dependent var	0.437709	S.E. of regression	0.408591
Akaike info criterion	1.026877	Sum squared resid	47.74664
Schwarz criterion	1.052314	Log likelihood	-145.8702
Hannan-Quinn criter.	1.037070	Restr. log likelihood	-164.1129
LR statistic	36.48538	Avg. log likelihood	-0.506494
Prob(LR statistic)	0.000000		
Obs with Dep=0	74	Total obs	288
Obs with Dep=1	214		

Area 3, Current

Dependent Variable: WTP
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 03/05/09 Time: 14:13
Sample: 1 328
Included observations: 317
Convergence achieved after 3 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	2.219384	0.311371	7.127770	0.0000
BID	-0.024539	0.004597	-5.337812	0.0000

McFadden R-squared	0.083028	Mean dependent var	0.687697
S.D. dependent var	0.464165	S.E. of regression	0.442484
Akaike info criterion	1.151371	Sum squared resid	61.67439
Schwarz criterion	1.175086	Log likelihood	-180.4923
Hannan-Quinn criter.	1.160844	Restr. log likelihood	-196.8351
LR statistic	32.68557	Avg. log likelihood	-0.569376
Prob(LR statistic)	0.000000		
Obs with Dep=0	99	Total obs	317
Obs with Dep=1	218		

Area 3, Half

Dependent Variable: HALF
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 03/05/09 Time: 14:15
Sample: 1 328
Included observations: 317
Convergence achieved after 3 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	2.840216	0.365998	7.760188	0.0000
BID	-0.027583	0.005137	-5.369682	0.0000

McFadden R-squared	0.097813	Mean dependent var	0.763407
S.D. dependent var	0.425662	S.E. of regression	0.403318
Akaike info criterion	0.999829	Sum squared resid	51.23951
Schwarz criterion	1.023545	Log likelihood	-156.4729
Hannan-Quinn criter.	1.009302	Restr. log likelihood	-173.4373
LR statistic	33.92880	Avg. log likelihood	-0.493605
Prob(LR statistic)	0.000000		
Obs with Dep=0	75	Total obs	317
Obs with Dep=1	242		

Area 3, Last

Dependent Variable: LAST
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 03/05/09 Time: 14:17
Sample: 1 328
Included observations: 317
Convergence achieved after 4 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	3.620950	0.453585	7.982960	0.0000
BID	-0.032584	0.006018	-5.414285	0.0000

McFadden R-squared	0.123210	Mean dependent var	0.826498
S.D. dependent var	0.379279	S.E. of regression	0.359302
Akaike info criterion	0.821712	Sum squared resid	40.66580
Schwarz criterion	0.845427	Log likelihood	-128.2413
Hannan-Quinn criter.	0.831185	Restr. log likelihood	-146.2623
LR statistic	36.04193	Avg. log likelihood	-0.404547
Prob(LR statistic)	0.000000		
Obs with Dep=0	55	Total obs	317
Obs with Dep=1	262		

Wildlife Habitat

Area 1

Dependent Variable: WTP
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 03/25/09 Time: 14:50
Sample: 1 277
Included observations: 223
Convergence achieved after 4 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	2.502324	0.447114	5.596612	0.0000
BID	-0.039216	0.015316	-2.560389	0.0105

McFadden R-squared	0.033224	Mean dependent var	0.820628
S.D. dependent var	0.384527	S.E. of regression	0.379127
Akaike info criterion	0.927558	Sum squared resid	31.76602
Schwarz criterion	0.958115	Log likelihood	-101.4227
Hannan-Quinn criter.	0.939894	Restr. log likelihood	-104.9082
LR statistic	6.970966	Avg. log likelihood	-0.454810
Prob(LR statistic)	0.008284		
Obs with Dep=0	40	Total obs	223
Obs with Dep=1	183		

Area 2

Dependent Variable: WTP
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 03/25/09 Time: 14:51
Sample: 1 270
Included observations: 204
Convergence achieved after 4 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	1.917499	0.426230	4.498738	0.0000
BID	-0.029280	0.014953	-1.958138	0.0502

McFadden R-squared	0.017858	Mean dependent var	0.764706
S.D. dependent var	0.425226	S.E. of regression	0.422175
Akaike info criterion	1.091310	Sum squared resid	36.00287
Schwarz criterion	1.123841	Log likelihood	-109.3136
Hannan-Quinn criter.	1.104469	Restr. log likelihood	-111.3013
LR statistic	3.975334	Avg. log likelihood	-0.535851
Prob(LR statistic)	0.046171		
Obs with Dep=0	48	Total obs	204
Obs with Dep=1	156		

Area 3

Dependent Variable: WTP
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 03/25/09 Time: 14:52
Sample: 1 304
Included observations: 253
Convergence achieved after 4 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	2.741165	0.476513	5.752555	0.0000
BID	-0.042407	0.017431	-2.432820	0.0150

McFadden R-squared	0.029013	Mean dependent var	0.849802
S.D. dependent var	0.357973	S.E. of regression	0.353726
Akaike info criterion	0.837366	Sum squared resid	31.40557
Schwarz criterion	0.865297	Log likelihood	-103.9267
Hannan-Quinn criter.	0.848604	Restr. log likelihood	-107.0321
LR statistic	6.210693	Avg. log likelihood	-0.410778
Prob(LR statistic)	0.012698		
Obs with Dep=0	38	Total obs	253
Obs with Dep=1	215		

DEMOGRAPHIC and SHIFT VARIABLES - Farmland

1. First Run

Dependent Variable: WTP
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 06/02/09 Time: 08:57
Sample: 1 822
Included observations: 664
Convergence achieved after 5 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-0.684155	0.609550	-1.122393	0.2617
BID	-0.017030	0.003347	-5.088535	0.0000
LIVED	-0.037628	0.074709	-0.503652	0.6145
EDU	0.188676	0.086758	2.174737	0.0296
GENDER	-0.445375	0.170430	-2.613235	0.0090
OWN	0.379163	0.261300	1.451066	0.1468
FARM_IND	0.435841	0.464112	0.939086	0.3477
DEV_IND	-0.563301	0.298167	-1.889213	0.0589
AGE	0.139157	0.070080	1.985689	0.0471
INCOME	0.156535	0.059147	2.646552	0.0081
KM	1.51E-05	2.36E-05	0.640097	0.5221
ORDER	0.805079	0.167379	4.809914	0.0000

McFadden R-squared	0.091881	Mean dependent var	0.641566
S.D. dependent var	0.479902	S.E. of regression	0.455368
Akaike info criterion	1.221262	Sum squared resid	135.1985
Schwarz criterion	1.302556	Log likelihood	-393.4589
Hannan-Quinn criter.	1.252763	Restr. log likelihood	-433.2678
LR statistic	79.61780	Avg. log likelihood	-0.592559
Prob(LR statistic)	0.000000		
Obs with Dep=0	238	Total obs	664
Obs with Dep=1	426		

2. Second Run

Parameters not significant at the 85% level are dropped and the result of the reduced model are:

Dependent Variable: WTP
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 06/02/09 Time: 09:00
Sample: 1 822
Included observations: 710
Convergence achieved after 4 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-0.999869	0.520718	-1.920174	0.0548
BID	-0.015129	0.003179	-4.758412	0.0000
EDU	0.226831	0.081375	2.787463	0.0053
GENDER	-0.433856	0.163931	-2.646582	0.0081
OWN	0.345676	0.245844	1.406077	0.1597
DEV_IND	-0.459158	0.284154	-1.615875	0.1061
AGE	0.140732	0.063874	2.203281	0.0276
INCOME	0.148823	0.056424	2.637603	0.0083
ORDER	0.739372	0.159652	4.631137	0.0000

McFadden R-squared	0.082489	Mean dependent var	0.633803
S.D. dependent var	0.482104	S.E. of regression	0.458952
Akaike info criterion	1.230779	Sum squared resid	147.6566
Schwarz criterion	1.288649	Log likelihood	-427.9266
Hannan-Quinn criter.	1.253134	Restr. log likelihood	-466.3995
LR statistic	76.94578	Avg. log likelihood	-0.602714
Prob(LR statistic)	0.000000		

Obs with Dep=0	260	Total obs	710
Obs with Dep=1	450		

3. Third Run

Income and education are strongly correlated. The model was estimated with income and not education and then with education and not income. Education had the higher probability statistic, however as per discussion in section 6.6 income was considered the preferred variable to use. Education was dropped. Own home was also dropped.

Dependent Variable: WTP
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 06/02/09 Time: 09:04
Sample: 1 822
Included observations: 711
Convergence achieved after 4 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-0.083080	0.425025	-0.195470	0.8450
BID	-0.014654	0.003146	-4.657759	0.0000
GENDER	-0.450515	0.163299	-2.758836	0.0058
DEV_IND	-0.499270	0.281878	-1.771225	0.0765
AGE	0.143748	0.062072	2.315828	0.0206
INCOME	0.193638	0.054058	3.582012	0.0003
ORDER	0.715171	0.158602	4.509234	0.0000

McFadden R-squared	0.071575	Mean dependent var	0.634318
S.D. dependent var	0.481960	S.E. of regression	0.461843
Akaike info criterion	1.238931	Sum squared resid	150.1627
Schwarz criterion	1.283892	Log likelihood	-433.4401
Hannan-Quinn criter.	1.256299	Restr. log likelihood	-466.8551
LR statistic	66.82994	Avg. log likelihood	-0.609620
Prob(LR statistic)	0.000000		

Obs with Dep=0	260	Total obs	711
Obs with Dep=1	451		

4. Fourth Run – Final Model

Association with the development industry is not significant at the 90% level but not at the 95% level so is dropped for the final model.

Dependent Variable: WTP
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 06/02/09 Time: 09:07
Sample: 1 822
Included observations: 711
Convergence achieved after 4 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-0.123493	0.423553	-0.291565	0.7706
BID	-0.014577	0.003137	-4.646938	0.0000
GENDER	-0.448734	0.163227	-2.749150	0.0060
AGE	0.146521	0.061891	2.367407	0.0179
INCOME	0.190102	0.053937	3.524519	0.0004
ORDER	0.703112	0.158784	4.428109	0.0000

McFadden R-squared	0.068262	Mean dependent var	0.634318
S.D. dependent var	0.481960	S.E. of regression	0.462598
Akaike info criterion	1.240469	Sum squared resid	150.8676
Schwarz criterion	1.279007	Log likelihood	-434.9868
Hannan-Quinn criter.	1.255355	Restr. log likelihood	-466.8551
LR statistic	63.73661	Avg. log likelihood	-0.611796
Prob(LR statistic)	0.000000		

Obs with Dep=0	260	Total obs	711
Obs with Dep=1	451		

Demographics Wildlife Habitat

Dependent Variable: WTP
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 05/08/09 Time: 09:54
Sample: 1 822
Included observations: 600
Convergence achieved after 4 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	1.343605	0.706219	1.902534	0.0571
BID	-0.041031	0.009611	-4.269283	0.0000
AGE	0.065348	0.081792	0.798954	0.4243
EDU	0.063173	0.102149	0.618434	0.5363
GENDER	-0.453325	0.193892	-2.338032	0.0194
INCOME	0.114142	0.071066	1.606147	0.1082
KM	-1.68E-05	2.60E-05	-0.647404	0.5174
DEV_IND	-0.346966	0.356339	-0.973697	0.3302
FARM_IND	0.212981	0.513715	0.414590	0.6784
LIVED	-0.135977	0.088253	-1.540764	0.1234
OWN	0.811074	0.286299	2.832957	0.0046
SIZE	-0.003045	0.078991	-0.038554	0.9692

McFadden R-squared	0.057413	Mean dependent var	0.753333
S.D. dependent var	0.431431	S.E. of regression	0.421081
Akaike info criterion	1.093140	Sum squared resid	104.2579
Schwarz criterion	1.181079	Log likelihood	-315.9421
Hannan-Quinn criter.	1.127373	Restr. log likelihood	-335.1860
LR statistic	38.48796	Avg. log likelihood	-0.526570
Prob(LR statistic)	0.000065		

Obs with Dep=0	148	Total obs	600
Obs with Dep=1	452		

Wildlife Habitat - Significant Variables Only

Dependent Variable: WTP
Method: ML - Binary Logit (Quadratic hill climbing)
Date: 05/08/09 Time: 09:59
Sample: 1 822
Included observations: 641
Convergence achieved after 4 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.990200	0.404061	2.450619	0.0143
BID	-0.035447	0.009100	-3.895101	0.0001
GENDER	-0.448905	0.185228	-2.423522	0.0154
INCOME	0.123033	0.061320	2.006401	0.0448
OWN	0.776251	0.262712	2.954764	0.0031

McFadden R-squared	0.045207	Mean dependent var	0.753510
S.D. dependent var	0.431304	S.E. of regression	0.421147
Akaike info criterion	1.082001	Sum squared resid	112.8039
Schwarz criterion	1.116814	Log likelihood	-341.7812
Hannan-Quinn criter.	1.095512	Restr. log likelihood	-357.9638
LR statistic	32.36519	Avg. log likelihood	-0.533200
Prob(LR statistic)	0.000002		

Obs with Dep=0	158	Total obs	641
Obs with Dep=1	483		

11.3.2 DETAILED CALCULATIONS

Detail Results

Model Values and Resulting Probabilities at Different Bid Levels.

Area	1	1	1	2	2	2	3	3	3
Scarcity	Current	Half	Last	Current	Half	Last	Current	Half	Last
Intercept	2.04558	2.27962	2.862173	1.631714	1.635309	2.920795	2.219384	2.840216	3.62095
Beta	0.02138	0.018193	0.019756	0.021975	0.018215	0.0267	0.024539	0.027583	0.032584
Logit - 25	2.58008	2.734445	3.356073	2.181089	2.090684	3.588295	2.832859	3.529791	4.43555
Logit 0	2.04558	2.27962	2.862173	1.631714	1.635309	2.920795	2.219384	2.840216	3.62095
Logit 25	1.51108	1.824795	2.368273	1.082339	1.179934	2.253295	1.605909	2.150641	2.80635
Logit 50	0.97658	1.36997	1.874373	0.532964	0.724559	1.585795	0.992434	1.461066	1.99175
Logit 75	0.44208	0.915145	1.380473	-0.01641	0.269184	0.918295	0.378959	0.771491	1.17715
Logit 100	-0.09242	0.46032	0.886573	-0.56579	-0.18619	0.250795	-0.23452	0.081916	0.36255
Logit 125	-0.62692	0.005495	0.392673	-1.11516	-0.64157	-0.41671	-0.84799	-0.60766	-0.45205
Expo-25	13.19819	15.40119	28.67636	8.855945	8.090447	36.17235	16.99398	34.11684	84.39853
Exp 0	7.733643	9.772966	17.49951	5.11263	5.131043	18.55603	9.201661	17.11946	37.37306
Exp 25	4.531622	6.201524	10.67893	2.951575	3.254159	9.519049	4.982387	8.590363	16.5494
Exp 50	2.655359	3.935233	6.516732	1.703975	2.063821	4.883172	2.697793	4.310552	7.328347
Exp 75	1.55594	2.497137	3.976782	0.983723	1.308896	2.505016	1.460763	2.162989	3.245112
Exp 100	0.911722	1.584581	2.426799	0.567914	0.830115	1.285047	0.790954	1.085365	1.436989
Exp 125	0.534235	1.00551	1.480934	0.327862	0.526467	0.659215	0.428274	0.544624	0.636322
Prob-25	0.929569	0.939029	0.966303	0.898538	0.889994	0.973098	0.944426	0.971524	0.98829
Prob 0	0.8855	0.907175	0.945945	0.836404	0.836896	0.948865	0.901977	0.944811	0.97394
Prob 25	0.819221	0.86114	0.914376	0.746936	0.764936	0.904934	0.832843	0.895729	0.943018
Prob 50	0.726429	0.797375	0.866963	0.630174	0.67361	0.830024	0.729568	0.811696	0.879928
Prob 75	0.608755	0.714052	0.799067	0.495897	0.566893	0.714695	0.593622	0.683843	0.764435
Prob 100	0.476911	0.61309	0.708182	0.36221	0.453586	0.562372	0.441638	0.520468	0.589658
Prob 125	0.348209	0.501374	0.596926	0.24691	0.344893	0.397305	0.299854	0.352593	0.388873
ln(1+Exp0	2.167183	2.37704	2.917744	1.810357	1.813365	2.973284	2.322551	2.896987	3.647356
Ln(1+Exp1	0.428032	0.406381	0.468081	0.220668	0.296314	0.334546	0.262252	0.302024	0.328493
ln(1+Expo	101.3649	130.6568	147.689	82.38258	99.55339	111.3589	94.64732	105.028	111.937
ln(1+Expo	20.02019	22.33719	23.69308	10.0418	16.26759	12.5298	10.68716	10.94964	10.08142
Mean 0 -1	81.34475	108.3196	123.9959	72.34078	83.28579	98.82914	83.96015	94.07834	101.8556
ln(1+Exp-2	2.653115	2.797354	3.390351	2.288075	2.207224	3.615565	2.890037	3.558681	4.447329
ln(1+Expo	124.0933	153.7599	171.6112	104.1217	121.1762	135.4144	117.7732	129.0172	136.4881
Mean-25 -	-22.7284	-23.1031	-23.9222	-21.7391	-21.6228	-24.0555	-23.1259	-23.9892	-24.5511
Mean	59	85	100	51	62	75	61	70	77
Median	96	125	145	74	90	109	90	103	111

Mean & Median Considering Scarcity

Area		1			2			3	
Scarcity	Current	Half	Last	Current	Half	Last	Current	Half	Last
Mean	59	85	100	51	62	75	61	70	77
Median	96	125	145	74	90	109	90	103	111

	x	x squared	x cubed			
powers of	127	16129	2048383			

Mean				
1	$\frac{-0.0014x^3}{3} + \frac{0.5028x^2}{2} + 58.499x$	10521.94	82.84993	
2	$\frac{0.0003x^3}{3} + \frac{0.1582x^2}{2} + 50.842x$	7937.576	62.5006	
3	$\frac{-0.0003x^3}{3} + \frac{0.1592x^2}{2} + 60.841x$	8805.837	69.3373	

Median				
1	$\frac{-0.0012x^3}{3} + \frac{0.5466x^2}{2} + 95.455x$	15711.49	123.7125	
2	$\frac{0.0003x^3}{3} + \frac{0.2384x^2}{2} + 73.761x$	11495.06	90.5123	
3	$\frac{-0.0007x^3}{3} + \frac{0.2527x^2}{2} + 89.748x$	12957.94	102.031	

	Area 1	Area 2	Area 3
Mean	83	63	69
Median	124	91	102

Mean WTP Weighted over Households									
Local Government	Area	ALR- ha	Hsehold	ALR Hsehold	Net Hsehold	WTP/ Hsehold	Total WTP	Wildlife WTP	Wildlife Total
Anmore	3		535	0	535	69	36915	25	13375
Belcarra	3		260	0	260	69	17940	25	6500
Lions Bay	3		515	0	515	69	35535	25	12875
New Westminster	3		27050	0	27050	69	1866450	25	676250
North Van City	3		21350	0	21350	69	1473150	25	533750
North Van District	3		29750	0	29750	69	2052750	25	743750
Port Moody	3		10130	0	10130	69	698970	25	253250
Vancouver	3		253385	0	253385	69	17483565	25	6334625
West Vancouver	3		16840	0	16840	69	1161960	25	421000
White Rock	3		9515	0	9515	69	656535	25	237875
Bowen Island	2	182	1340	84	1256	63	79128	23	28888
Burnaby	2	235	78035	108	77927	63	4909401	23	1792321
Coquitlam	2	824	41245	150	41095	63	2588985	23	945185
Port Coquitlam	2	600	18700	206	18494	63	1165122	23	425362
Delta	1	9964	33550	1879	31671	83	2628710	24	760108.8
Langley	1	23468	43905	2459	41446	83	3440045	24	994711.7
Maple Ridge	1	3790	24935	1396	23539	83	1953707	24	564927.4
Pitt Meadows	1	6875	5820	326	5494	83	456009	24	131857.9
Richmond	1	5182	61430	344	61086	83	5070138	24	1466064
Surrey	1	9298	131135	7344	123791	83	10274690	24	2970995
			809425		**795130**	**73**	**58049703**		**19313670**
						per acre	$58,050	per acre	$3,247
Fraser Health South	94.4% urban					PV	$1,160,994	PV	$64,942

Wildlife Habitat Analysis			
	Area 1	Area 2	Area 3
Protest	27	29	18
Total response	264	262	295
Precentage protest	**10.2%**	**11.1%**	**6.1%**
Net responses	228	225	276
Yes	211	196	244
No	17	29	32
Percent No	**7.5%**	**12.9%**	**11.6%**
Logit Model			
	Area 1	Area 2	Area 3
Beta	-0.03922	-0.02928	-0.04241
intercept	2.502324	1.917499	2.741165
Logit-10	2.894484	2.210299	3.165235
Logit 0	2.502324	1.917499	2.741165
Logit 10	2.110164	1.624699	2.317095
Logit 20	1.718004	1.331899	1.893025
Logit 30	1.325844	1.039099	1.468955
Logit 40	0.933684	0.746299	1.044885
exp logit -10	18.07417	9.118442	23.69431
exp logit 0	12.21084	6.803921	15.50504
exp logit 10	8.249594	5.076891	10.14616
exp logit 20	5.573393	3.78823	6.639423
exp logit 30	3.765362	2.826669	4.344693
exp logit 40	2.543864	2.109179	2.843072
prob-10	0.947573	0.901171	0.959505
prob 0	0.924305	0.871859	0.939412
prob 10	0.891887	0.835442	0.910283
prob 20	0.847872	0.791155	0.8691
prob 30	0.790152	0.738676	0.812898
prob 40	0.717822	0.678372	0.739791
ln(1+exp-10)	2.948335	2.31436	3.206573
ln(1+exp-10)/b	-75.1819	-79.0423	-75.6142
ln(1+exp0)	2.581038	2.054626	2.803666
ln(1+exp0)/b	-65.8159	-70.1717	-66.1133
ln(1+exp40)	1.265218	1.134359	1.346272
ln(1+exp40)/b	-32.2628	-38.7418	-31.7465
Mean	24	23	25
Median	64	65	65

Demographic/Question Order Shift Variables							
Farmland							
Model	intercept	B-bid	B-age	B-income	B-gender	B-order	
	-0.12349	-0.01458	0.146521	0.190102	-0.44873	0.703112	
Mean x values		73	4.05	4.37	0.5	0.5	
Marginal shift in probability of WTP estimated at the mean WTP of $73.							
Logit at mean	0.363731						
EXP logit at mean	1.438687						
Marginal probabilities evaluated at the mean							
	Age	0.060082					
	Income	0.077953					
	Gender	-0.18401					
	Order	0.288316					
Wildlife Habitat							
Model	intercept	Bid	Own	Income	Gender		
	0.9902	-0.03545	0.77625	0.123033	-0.44891		
Mean x values		24	0.74	4.37	0.5		
Marginal shift in probability of WTP estimated at the mean WTP of $24.							
Logit at mean	WTP = .9902 + (c186*c188) + (d186*d188) + (e186*e188) + (f186*188)						
	1.027099						
EXP of logit	2.792951						
Marginal Probabilities							
	Own	0.204656					
	Income	0.032437					
	Gender	-0.11835					

Pitt Meadows Telephone Survey							
	Area 1	Telephone					
	Area 1	Telephone					
Sample Size	264	87	order on survey	Diff		order on survey	Diff
Renters	10.5%	2.3%					
Benefits							
Local Food	92%	76%	7	-16		1	-2
Greenspace	66%	65%	4	-1		2	14
Wildlife	55%	48%	8	-7		3	9
Nature	27%	25%	1	-2		4	-1
Rural Life	17%	35%	6	18		5	5
Jobs	11%	25%	2	14		6	18
Animals	10%	15%	5	5		7	-16
Culture	5%	14%	3	9		8	-7
Probability of yes vote							
				diff (Telephone - Area 1)			
Bid 0	97%	93%		-4			
Bid $25	79%	79%		0			
Bid $50	65%	80%		15			
Bid $75	62%	83%		21			
Bid $100	52%	52%		0			
Demographics							
Education	3	3.4					
Farm Industry	0.1	0.1					
Age	4.2	4.2					
Gender	0.4	0.4					

ECOLOGICAL GOODS

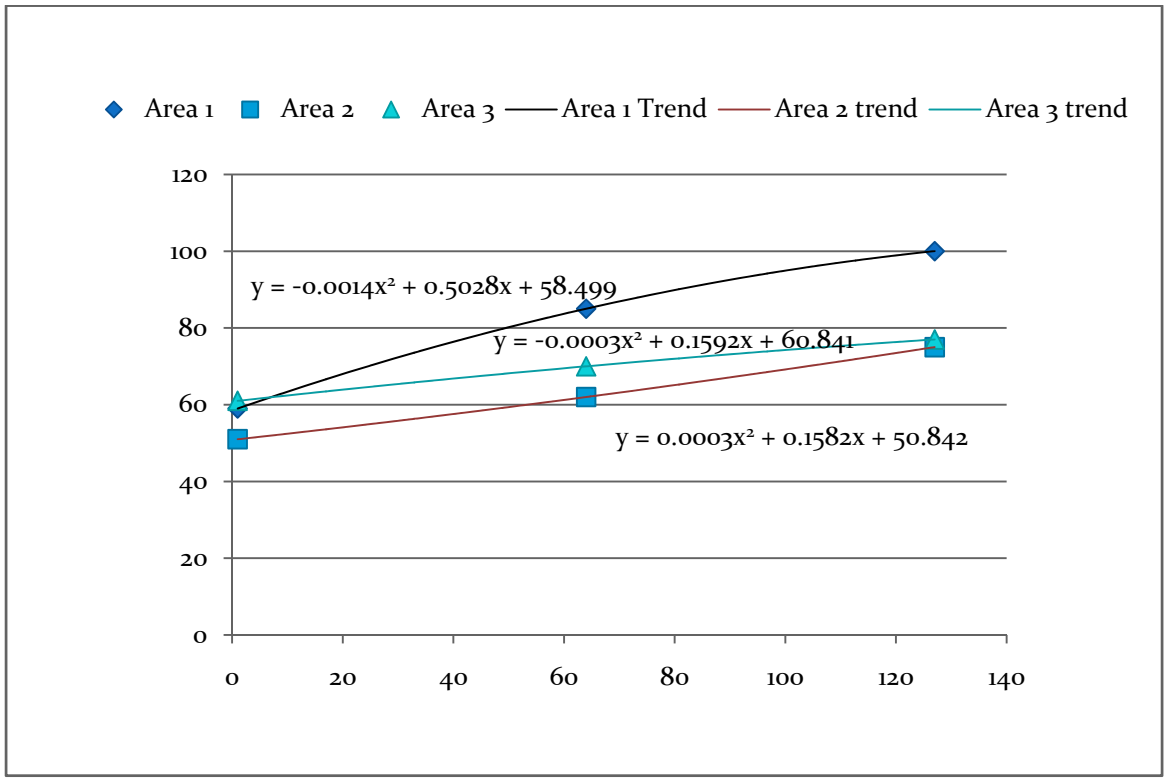
Riparian									
Area	Area in ALR (ha)	Area in Urban (ha)	Stream Length ALR (m)	Stream Length Urban (m)	Stream Density ALR (m/ha)	Stream Density Urban (m/ha)	Difference	Extra Stream Length	Production
Langley	23422	6581	368615	65563	15.73798139	9.96246771	5.775513675	135274.0813	758617.048
Maple Ridge	3790	6414	47959	84949	12.65408971	13.2443093	-0.590219614	-2236.932336	-12544.717
Surrey	9298	20290	208533	118216	22.42772639	5.82631838	16.60140801	154359.8917	865650.272
Groundwater									
	Area in ALR (ha)	Extra impervious surface (.67)	Extra surface in sq meters	Effective Precip* in m/year	Quantity of groundwater	Price/cubic meter**	Value of groundwater	Value/ha of farmland	
Langley	23422	15692.7	156927400	0.517	81131465.8	0.4	32452586.32	1385.56	
Maple Ridge	3790	2539.3	25393000	0.517	13128181	0.4	5251272.4	1385.56	
* From Farmwest.com website that estimates the proportion of precipitation that contributes to groundwater.									
	Area in ALR(ha)	Area in Urban (ha)	Stream Density ALR (m/ha)	Stream Density Urban (m/ha)	Extra Stream Length ALR (m)	Extra Production ALR ($)	Extra Production ALR ($/ha)		
Langley	23422	6581	15.7379814	9.96	135274.08	$758,617	$32		
Maple Ridge	3790	6414	12.6540897	13.24	-2236.93	-$12,545	-$3		
Surrey	9298	20290	22.4277264	5.83	154359.89	$865,650	$93		
						$1,611,723			
	Area in ALR (ha)	Extra impervious surface (.67)	Extra surface in sq. meters	Effective Precip* in m/year	Quantity of groundwater	Price/cubic meter**	Value of groundwater	Value/ha of farmland	
Langley	23422	15692.7	156927400	0.517	81131465.8	0.4	$32,452,586	1385.56	
Maple Ridge	3790	2539.3	25393000	0.517	13128181	0.4	$5,251,272	1385.56	
							$37,703,859		

** Current GVRD cost of water.

11.3.3 SCARCITY ANALYSIS

Scarcity Calculation

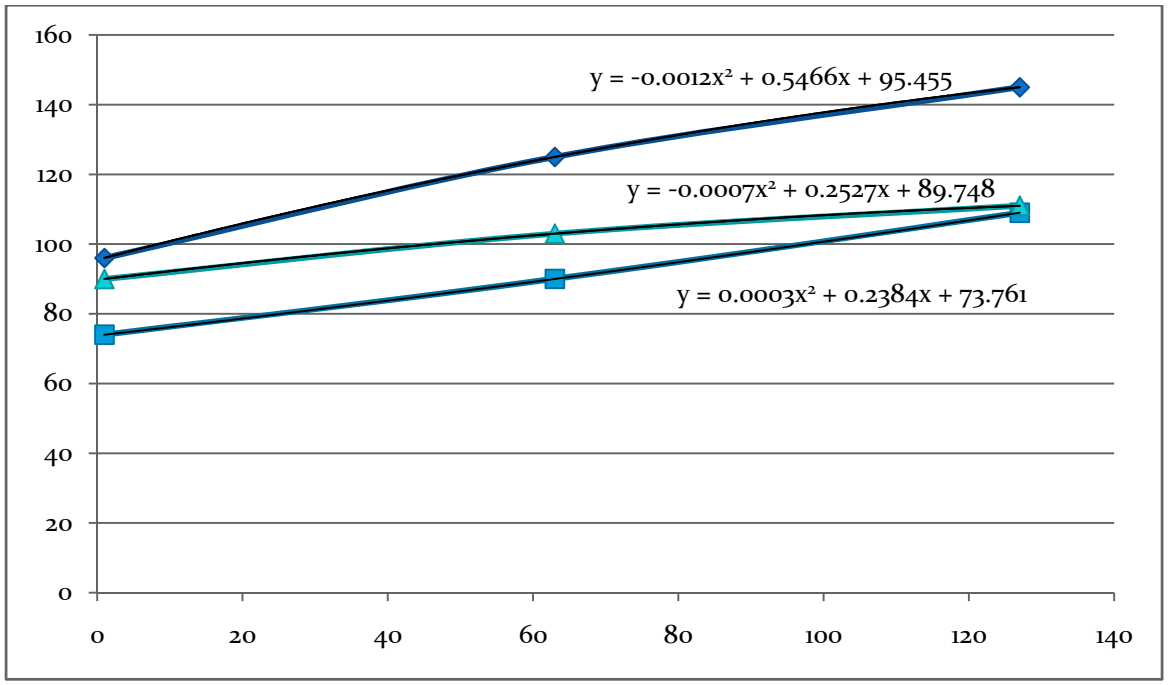
Mean



The mean willingness to pay over the full quantity of farmland is the area under each curve divided by the total quantity of farmland. This is calculated by evaluating the integral of the equation of the line over all quantities of farmland divided by 127

Area	Integral of line	Valued at x = 127	Mean
1	$\frac{-0.0014x^3}{3} + \frac{0.5028x^2}{2} + 58.499x$		
2	$\frac{0.0003x^3}{3} + \frac{0.1582x^2}{2} + 50.842x$		
3	$\frac{-0.0003x^3}{3} + \frac{0.1592x^2}{2} + 60.841x$		

Median



Area	Integral of line	Valued at x = 127	Median
1	$\frac{-0.0012x^3}{3} + \frac{0.5466x^2}{2} + 95.455x$		
2	$\frac{0.0003x^3}{3} + \frac{0.2384x^2}{2} + 73.761x$		
3	$\frac{-0.0007x^3}{3} + \frac{0.2527x^2}{2} + 89.748x$		

11.4 WILLINGNESS TO ACCEPT SURVEY

This project is a research undertaking. Questions raised should in no way imply potential policy or taxation considerations of any level of government.

The Metro Vancouver region is made up of 22 member municipalities covering 287,736 hectares of land in the western Fraser Valley.

Approximately 61,000 hectares (21%) of the land in Metro Vancouver is designated as Agriculture Land Reserve (ALR) where the primary land use is agricultural production (See Map-green areas represent ALR).

Section 3: Loss of Farmland

Local governments play a major role in determining land uses within a community. Imagine a situation where there is a proposal to use 400 hectares (approximately the size of Stanley Park) of farmland for urban development. One reason for changing the land use is to increase property tax revenues for local governments. Tax revenues generated from industrial and commercial development are more per hectare than farmland. The increased tax revenues may postpone a future increase in residential property taxes.

1.0 Would you prefer that the 400 hectares remain as farmland?

☐ Yes ☐ No

1.1 If you answered **yes** to question 1.0, would you be willing to support the use of the 400 hectares of farmland for urban development in exchange for a one time payment to you of $2,500?

☐ Yes (go to ques 1.2) ☐ No (go to ques 1.3)

1.2 If you said **yes** to question 1.1, would you be willing to support the use of the 400 hectares of farmland for urban development in exchange for a one time payment to ☐you of $1,200?

☐ Yes ☐ No

1.3 If you said **no** to question 1.1, would you be willing to support the use of 400 hectares of farmland for urban development use in exchange for a one time payment to you of $3,500.

☐ Yes ☐ No

11.5 INTERCEPT SURVEY

Attached.