PLANTING STRONG BOUNDARIES:
URBAN GROWTH, FARMLAND PRESERVATION,
AND BRITISH COLUMBIA'S
AGRICULTURAL LAND RESERVE

by

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Abstract

In this study, I investigate methods of strengthening British Columbia’s Agricultural Land Reserve, which protects farmland by restricting non-farm uses within its boundaries. Surveys of BC residents have consistently shown support for the Reserve, yet the quality of its land and the strength of the legislation protecting it have decreased over time. The Agricultural Land Commission, the body that manages the Reserve, continually approves applications to exclude prime farmland from the Reserve while including land into it that may never be suitable for agriculture. I examine the management policies of four successful North American reserves and discover that they have several main characteristics in common. Drawing on these findings, I propose four policy alternatives. After evaluating these alternatives based on a set of criteria, I recommend that the Agricultural Land Commission place a moratorium on applications to exclude land from the Reserve after completing a planning process with municipal governments.

Keywords: Agricultural Land Reserve; farmland preservation; reserve conservation; reserve management; British Columbia

Subject Terms: Agricultural conservation – British Columbia; Land use, Rural – British Columbia; Nature conservation – British Columbia; Ecosystem management – North America
Executive Summary

The objective of British Columbia’s Agricultural Land Reserve (ALR) is to preserve agricultural land throughout the Province by controlling the boundaries of the Reserve and the type of activities that occur within those boundaries. Its existence is significant in context of North America, where few other jurisdictions have such strict farmland protection legislation. However, despite widespread support for the ALR among BC residents, a large amount of the prime farmland within the Reserve has been excluded since its inception in 1973. As a result, the quality of the farmland inside of the Reserve has decreased and the amount of prime farmland in key farming regions of the Province has been greatly diminished.

By examining the way that four successful North American reserves function, this study highlights reserve management policies that the provincial government could use to strengthen the ALR. The four reserves are Quebec’s Agricultural Zone, the New Jersey Pinelands Reserve, Oregon’s Tillamook State Forest, and the Florida Keys Marine Sanctuary. The case study analysis reveals the following key findings:

- Successful reserves are centrally managed.
- Successful reserves have a sizeable support staff that includes positions devoted to research and monitoring.
- Successful reserves maintain close contact with municipalities and other relevant jurisdictions.
- Successful reserves compensate landowners and/or relevant jurisdictions for lost property rights.
Successful reserves are part of a larger network of protected areas.

Successful reserves have a highly protected zone.

Successful reserves do not allow land to be excluded from reserve territory.

These findings, along with key stakeholder interviews and a survey of existing literature, inform the creation of policy alternatives that address weaknesses in current ALR management policies. The policy alternatives considered include the following:

- **Centralized Management.** The Agricultural Land Commission (ALC) would be restructured and a single commission put in place. Only municipalities would be able to apply to the ALC to include land into the Reserve, exclude land from the Reserve, and subdivide or pursue non-farm uses on Reserve land.

- **Protected Zone.** The ALC would create a zone within the ALR that encompasses prime farmland and prohibit all land exclusion within the zone. The ALC support staff would increase by ten positions.

- **Exclusion Moratorium.** The ALC would work with a team of agrologists and planners from the Ministry of Agriculture and Lands and regional and municipal governments to review all existing Official Community Plans and Agricultural Area Plans that impact ALR land. At the end of the review, the ALC would stop accepting applications to exclude land from the ALR.

After identifying the policy alternatives, the study assesses their viability by using a set of criteria that includes effectiveness, cost, acceptability among key stakeholders, and food security. This multi-criteria analysis reveals that the Exclusion Moratorium policy is the best policy for the provincial government to pursue. It would be the most effective at protecting farmland within the ALR, it would receive support from environmental advocacy groups and the general public, and it would increase food security within BC.
Dedicated to all who farm and all who eat in the Cascadia bioregion.

"Eaters must understand that eating takes place inescapably in the world, that it is inescapably an agricultural act, and that how we eat determines, to a considerable extent, how the world is used."

--Wendell Barry
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Glossary

ALC     Agricultural Land Commission
ALR     Agricultural Land Reserve
BC      British Columbia
CPTAQ   *Commission de Protection du Territoire Agricole du Québec*
ICUN    International Union for Conservation of Nature and Natural Resources
MAL     British Columbia Ministry of Agriculture and Lands
NJPC    New Jersey Pinelands Commission
NOAA    National Oceanographic and Atmospheric Administration
ODF     Oregon Department of Forestry
1: Introduction

Aside from supplying food, farmland provides a variety of important environmental goods and services. It can increase water quality, preserve soils, and provide habitat for wildlife. Yet, farmland is disappearing at a high rate across Canada. According to Statistics Canada, the amount of urban land situated on high quality agricultural land has steadily increased since 1971 (Hoffman et al., 2005). Recognizing the need to protect existing farmland, the Province of British Columbia created the Agricultural Land Reserve (ALR) in 1973. The objective of the ALR is to preserve agricultural land by controlling the boundaries of the Reserve and the type of activities that occur within those boundaries. Its existence is significant in context of North America, where few other jurisdictions have such strict farmland protection legislation.

Although the boundaries of the ALR have changed over the years, the total size of the Reserve has remained nearly the same as it was upon inception. While the relevance of the current size of the ALR could be the subject of an analysis, I assume it constant and focus on changes in the quality of the land within the Reserve. Notably, 90 percent of the land added to the Reserve has been in Northern British Columbia and 72 percent of the land excluded has been in the South (Campbell, 2006). This is particularly important, given that the productivity of agricultural land in the South tends to be much higher than that of land in the North. In addition, there have been recent changes to the structure and decision-making criteria of the Agricultural Land Commission (ALC), the body that manages the Reserve. These developments call into question the transparency and accountability of the ALC and its capacity to protect farmland (Campbell, 2006).
The Act that created the ALR remains a landmark piece of legislation in North America and the Reserve has likely prevented significant losses of farmland over the years. However, the quality of the land within the ALR and the strength of the legislation protecting it have decreased. Given the various benefits of agricultural land to residents of British Columbia, it is critical to investigate how to fortify the boundaries of the Reserve. By examining the way that successful reserves and protected areas around North America function, I highlight reserve management policies that the provincial government could apply to the ALR. After my case study analysis reveals appropriate policies, I evaluate them against a set of criteria and recommend policy alternatives that are likely to strengthen the ALR. The results of this analysis are relevant to the provincial government of British Columbia and likely of interest to other North American reserve managers.

This study is organized as follows. Section 2 reviews theories on reserve formation and management, reasons for preserving farmland, and various strategies for farmland preservation. Section 3 begins by giving a detailed history of the ALR and then explains the Reserve's current management framework. I conclude the section by discussing a variety of perspectives on ALR management. Section 4 presents the study methodology and develops a reserve evaluation framework and Section 5 analyzes four case studies. In Section 6, I explain the policy objectives, alternatives, and criteria and in Section 7, I evaluate the policy alternatives and present my policy recommendation. The study ends with a discussion of the conclusions decision-makers can draw from this analysis.
2: Reserve Management and Farmland Preservation

In order to explain the broader context behind farmland preservation in British Columbia (BC), I begin by discussing reserve management in general. Then, I review reasons why many governments are interested in preserving agricultural land. I also explain various methods of doing so. This discussion highlights a variety of reserve management and farmland protection strategies that will put the ALR in the appropriate context.

2.1 Effective Reserve Management

The planet’s landmass and bodies of water provide humans with a vast diversity of resources, which are accessed through extraction, propagation, or passive enjoyment. However, if left unchecked, human activities may have a detrimental impact on the natural environment. Reserves or protected areas can counter this tendency by restricting human activities within defined boundaries.  

A jurisdiction may establish a reserve in a particular location because it is home to a rare or threatened type of land, entire ecosystem, community, or animal species. In the United States, the federal government funds a reserve program for wetlands because they provide a wide host of environmental goods and services, but are frequently threatened by development and other human activities. Australia’s Indigenous Protected Area Programme safeguards a system of reserves for native Australians because certain pieces of land are critical to their cultural traditions and general well-being. Across South Africa, a network of wildlife reserves protect habitat for a large number of animals. In other locations, such as Iguazu, Brazil, jurisdictions establish reserves to preserve spectacular scenery or recreational value.

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1 In this study, the terms ‘reserve’ and ‘protected area’ are used interchangeably.
The Convention on Biological Diversity identifies a protected area as a
"...geographically defined area which is designated or regulated and managed to achieve a
specific conservation objective" (CBD, 2006, paragraph 14). According to the World
Conservation Monitoring Centre, roughly 30,350 protected areas exist worldwide covering an
area of 1,323 million hectares, of which 255 million hectares are within marine areas. In total,
these reserves constitute about 9 percent of the world's land area (Green and Paine, 1997).²

Unfortunately, many of the world's reserves are located on pockets of land that have been
left undeveloped because they are not suitable for commercial uses, rather than on land with
features in need of preservation. In addition, many reserves are very small or consist of
fragmented pieces of land or water, making their boundaries more vulnerable (Green and Paine,
1997). In many cases, governing bodies will change reserve boundaries as commercial
opportunities arise, a tendency that affects the formation, quality, and management of reserves.
Time and data constraints, a lack of regional perspectives in reserve planning, and competing
planning agendas are three possible causes of these problems (Pressey, 1994).

Successful protected areas in industrialized countries share several features. First, they
have a managing body that works closely with relevant government agencies and controls
activities within the protected area's boundaries according to an established land use plan
(Leitmann, 1998). Second, they have regulations that are not excessively harsh or lenient and an
effective enforcement framework for those regulations. Third, the managing body includes local
perspectives and interests in management decisions. Some reserves do this by making local
stakeholders part of the managing body or through a formal consultation process (Leitmann,
1998).

² Established in 1872, Yellowstone National Park in the United States is the world's oldest protected area
(Leitmann, 1998).
Protected areas around the world today face a variety of external and internal threats. External threats are those originating outside the boundaries of a reserve or initiated by individuals outside of its management structure such as global warming and population growth. Internal threats are those originating from within the boundaries of a reserve or initiated by individuals within its management structure. These include a wide variety of risky reserve management practices such as permitting urban development within the boundaries of a protected area. Ideally, reserve management frameworks should address all threats to the sustainability of a given protected area.

2.2 Rationale and Strategies for Farmland Preservation

Agricultural land is scarce and frequently threatened by human activities, two factors that make it a prime candidate for protection through the establishment of reserves. In countries that face high levels of population growth and urbanization, farmland can diminish rapidly.\(^3\) This is partly because it tends to be flat, affordable, and have good drainage, making it attractive for both agriculture and urban development (AFT, 2008). Indeed, urban development is widely recognized as the main cause of farmland loss in North America (Beesley, 1999). However, many people in urban communities place a high value on having productive farmland within close reach. This sub-section discusses why certain communities value farmland and reviews common methods of farmland protection.

2.2.1 Viewpoints on Farmland Preservation

There are various reasons why communities of all kinds have an interest in protecting farmland. A 2006-survey found that the majority of Canadians believe that locally grown food has a variety of benefits not found in other food. These benefits include helping the local economy, supporting family farmers, and tasting better (Ipsos Reid, 2006). A 2007-survey in the

\(^3\) In this study, the terms ‘farmland’ and ‘agricultural land’ are used interchangeably.
Vancouver area found that 70 percent of shoppers prefer to buy fruits and vegetables grown in BC (Morton, 2007). Others feel that the benefits of local farmland extend beyond food production. A recent study in Abbotsford, BC, found that participants in that community place a high value on the scenic views, recreational opportunities, and wildlife habitat that farmland provides, in addition to local food it yields (MAL, 2007b).

Indeed, in the process of producing food and fibre, agricultural land generates a series of financial benefits. First, unlike residential land, farmland tends to supply more revenue in local taxes than it demands in local services (Daniels and Bowers, 1997, ch. 2). Second, agricultural land keeps the price of certain foods low and maintains a diverse food supply. When food is both imported and grown locally, consumers have access to a wide variety of foods without having to pay an excessive amount for items that are easy to grow locally but expensive to transport, such as dairy products (Baxter, 1999). Third, farmland and agricultural production provide tax base and investment in rural areas and promote a diverse economy by creating employment in trucking, shipping, food processing, marketing, and many other sectors. Fourth, preserving local farmland and food production has the potential to boost farming revenues, as farmers often increase their profit margin when they sell products directly to consumers. Finally, protecting farmland often preserves the character and community heritage of rural areas, which can generate tourism (AFT, 2003; Beesley, 1999).

Farmland also provides a variety of environmental amenities that residential and commercial lands do not, such as groundwater recharge and wildlife habitat. Ultimately, once a piece of farmland is developed for urban uses it is extremely unlikely that it will ever be transformed back into farmland. A local food supply also conserves energy that would otherwise be spent transporting food from other places (Daniels and Bowers, 1997, ch. 2).
2.2.2 Farmland Preservation Methods

Since 1970, more than 16 million hectares of farmland in North America have been converted to non-farm uses (Beesley, 1999). To put this into perspective, only 17 million hectares of prime farmland remain in the United States (Daniels and Bowers, 1997, ch. 1). In response, all state and provincial governments in the United States and Canada have initiated farmland protection measures. Such measures include right-to-farm laws, purchase and transfer of development rights programs, incentive programs, agricultural zoning, land trust programs, and foreign land ownership restrictions (Beesley, 1999).

Farmland preservation techniques managed at the state or provincial level of government are recognized by many land use analysts as the most effective way to protect agricultural land (Beesley, 1999). Incentive programs, including differential tax assessment and agricultural districting, are the most common farmland preservation techniques found in North America. Differential tax assessment involves valuing farmland in a way that lowers property taxes for farmers. Agricultural districting programs allow farmers to put their land into a designated district voluntarily for a fixed, but renewable amount of time. During the time that their land is part of an agricultural district, farmers receive particular benefits such as tax breaks and exemptions from local nuisance bylaws. As a voluntary program, this type of policy does not tend to work well in areas where development pressure is high (Daniels and Bowers, 1997, ch. 6).

Other jurisdictions, such as BC and Quebec, use agricultural zoning to protect farmland. In essence, agricultural zones are reserves for farmland and are widely considered one of the most successful ways of preserving farmland. However, it is not easy to initiate and maintain this type of policy and only three states and two provinces have such programs in place (Beesley, 1999). The next section describes the structure and history of BC’s agricultural zoning experience.
3: British Columbia’s Agricultural Land Reserve

Only 3 percent of BC’s land is suitable for agriculture, compared to 5 percent nationwide (Quayle, 1998). Recognizing this fact, the provincial government established the ALR through the Land Commission Act of 1973. The public strongly supported their decision and recent surveys confirm that the level of public support remains high. A survey done in 1997 found that “…90 percent of British Columbians felt that government should limit urban development to protect farmers and farmland; 72 percent believed it should be difficult or very difficult to remove land from the ALR” (Quayle, 1998). Despite a high level of public support, decisions about the Reserve have been contentious since its inception, partly because farmland preservation can make unplanned growth more difficult for municipalities. This section explains the evolution of the ALR and the Reserve’s management structure as well as reviews the problems it faces and discusses the perspectives of relevant stakeholders.

3.1 The Evolution of the ALR

Between 1940 and 1950, BC’s population increased from 805,000 to 1.1 million inhabitants, which the Province’s Town Planning Act was not prepared for (BC Stats, 2008b; Garrish, 2002/03). Development was sprawling haphazardly across large areas of agricultural land, making the provision of services increasingly difficult for municipalities. In 1948, the provincial government amended the Town Planning Act to allow for regional planning boards that would supervise specific regional planning areas. This led to the creation of the Lower Mainland Regional Planning Board, which supervised an area extending from the City of Vancouver to Hope. At the time, this area contained 54 percent of the Province’s population.

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4 Various other polls and surveys of the general public have yielded similar results (Garrish, 2002/03).
5 All information in Section 3.1 is from Garrish (2002/03) or Campbell (2006) unless noted otherwise.
Land-use trends changed in the 1960s with the birth of the environmental movement and concerns about farmland loss in areas around Vancouver mounted. After winning the provincial election in 1972, the New Democratic Party began passing legislation to prevent development on agricultural land, which culminated in the Land Commission Act of 1973. This Act established the ALR and the Provincial Land Commission, which later became the Agricultural Land Commission (ALC).

The first task of the ALC was to determine the boundaries of the Reserve. This was done by examining Canada Land Inventory data on the climate and soil quality of land across the Province, consulting municipalities, and holding a series of public hearings. The resulting reserve covered 4.7 million hectares. Originally, the ALC had access to a fund that enabled it to purchase land directly, which was intended to help maintain a small supply of viable farms. During its first few years, the Commission also took on an agricultural research role.

Prior to the establishment of the ALR, many agricultural landowners were counting on selling their land to real estate developers to fund their retirement. The creation of the Reserve limited their ability to sell their land for non-farm uses and therefore, usually entailed a decrease in the value of their land. To help farmers cope with this likelihood and provide income protection, the provincial government introduced the Farm Income Assurance Act alongside the Land Commission Act.

However, it was not long before an economic recession began, resulting in government-wide budget cuts that affected the ALC and farmers. In 1976, the Social Credit Party came into power, vastly reducing the budget and mandate of the ALC. The number of applications to exclude land from the Reserve increased between the mid and late 1970s and so did the number of exclusion approvals. The year with the highest number of exclusions from the Reserve was

6 The ALR includes various classes of land, as defined by the BC Agricultural Land Capability Classification system. This system defines two major classes of land, each of which is divided into seven distinct categories. These categories are based on the expected suitability of the land for the production of crops. The top four categories are considered the best lands for agricultural production (Kenk, 1983).
1977, when the ALC approved more than 18,925 exclusion applications. This resulted in a net loss of 14,625 hectares from the Reserve that year (ALC, 2007b).

During the 1980s recession, many landowners faced financial hardship and applied to exclude their land from the ALR, further increasing the number of exclusion applications and exclusion approvals. In 1981, the ALC approved more than 16,400 exclusion applications that resulted in a net loss of 15,192 hectares, making it the highest year on record in terms of land lost from the Reserve (ALC, 2007b). It was also during this time that the provincial government reduced the Commission’s budget again. During a brief period in the late 1980s, the ALC approved golf courses as an acceptable use of farmland and 8,400 hectares of land were requested for exclusion (ALC, 2008). In the early 1990s, the Province phased out the Farm Income Assurance program. Landowners continued to apply to exclude land from the Reserve to recover losses in the value of their property.

Throughout the 1970s, 1980s, and 1990s, a panel of five to seven individuals oversaw all changes to the boundaries of the Reserve and the activities that occurred within those boundaries. During this time, various parties accused the Commission of being unresponsive to the preferences of individual communities (Campbell, 2006). In 2002, the provincial government restructured the ALC, adding “community need” as a decision-making criterion and installing six regional panels that make decisions only on applications in a specific region of the Province.

At the end of 2007, the ALR covered about 4.8 million hectares. This is larger than its original size by 44,000 hectares. However, 95 percent of the land included into the Reserve since 2002 has been in Northern BC and 86 percent of the land excluded has been in Southern BC. Consequently, approximately 50 percent of the area of the Reserve is located in Northern BC (ALC, 2007b). The amount of prime farmland in key farming regions of the province, such as the Lower Mainland and Vancouver Island, has greatly diminished. Between 2002 and 2005, the

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7 See Figure 1 in the Appendix for a current map of the ALR.
ALC approved 87 percent of the exclusions applications it received for Vancouver Island and 56 percent of the exclusions applications for the Lower Mainland. Although not all land in the southern part of the province is equal in agricultural capability, it tends to be more suitable for crop production than land in the North because there are warmer temperatures, better soils, and more hours of sunlight each year. Reviewing the structure of ALR management helps put these boundary changes in context.

3.2 The Structure of ALR Management

Three main governmental bodies have land management roles that affect the ALR: The ALC, the Ministry of Agriculture and Lands (MAL), and local governments. Although these entities often work together, they perform distinct land management duties.

The Agricultural Land Commission Act specifies that the purpose of the ALC is to preserve farmland, promote farming, and encourage other governmental bodies to accommodate farming and farmland in their official plans and policies (ALC, 2007a). The ALC consists of six regional panels, containing three members each, that are politically appointed and rule on all applications to include land into the Reserve, exclude land from the Reserve, and subdivide or pursue non-farm uses on Reserve land (Smart Growth BC, 2007). The ALC also has a staff of 23 employees that provide Commissioners with information about current policies and bylaws pertaining to agricultural land (Campbell, 2006).

At the Ministry of Agriculture and Lands, the Strengthening Farming Program is the section most closely involved with ALR management (Smith and Haid, 2004). This program was established in the mid-1990s to connect the provincial government to local governments and farmers across the Province. Program staff review bylaws that affect farmland, help local

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8 The relative quality or agricultural capability of two pieces of farmland can often be difficult to determine. Notably, when a farm’s primary activities take place in greenhouses and barns, it is often possible for it to be located on sub-prime farmland without significant difficulty.
governments create agricultural area plans, and complete land use inventories. This program also provides support to the 28 agricultural advisory committees in the Province, which municipalities or regional districts can appoint to advise them on farm-related issues (MAL, 2007a). These committees include farmers, agrologists, and other members of the agricultural community.9

Finally, local governments play an important role in land management affecting the ALR. They are the first to see all applications to exclude land from the Reserve, subdivide agricultural lands, and pursue non-farm uses (Smith and Haid, 2004). They are also in charge of making sure that all bylaws and plans that could have an impact on land within the ALR meet the requirements of the Agricultural Land Commission Act (ALC, 2007a). Municipalities can encourage agriculture within their boundaries by appointing agricultural advisory committees, creating agricultural area plans, and enforcing zoning and subdivision bylaws that support farming activities (Curran, 2005).

In summary, there are many people working to manage land use in the ALR and protect agricultural land in BC. In the years since its inception, the ALR has likely prevented a significant amount of urban development on farmland. However, a review of the Reserve’s evolution and management structure reveals that it may be possible to further strengthen its ability to protect farmland.

3.3 Concerns with the Status of the ALR

There are three broad areas of concern regarding the status of the ALR. The first is the size of the Reserve and the amount of prime farmland it contains, the second is the nature of recent exclusions in the context of current ALR management policies, and the third is the strength

9 The Agrologists Act of BC defines an Agrologist as a professional who provides support towards the “…cultivation, production, improvement, processing, or marketing of aquatic or terrestrial plants or animals or the classification, management, use, conservation, protection, restoration, reclamation, or enhancement of aquatic or terrestrial ecosystems that are affected by, sustain, or have the potential to sustain the cultivation or production of aquatic or terrestrial plants or animals” (BCIA, 2008).
of the agricultural sector and the viability of current farm incomes. In this sub-section, I discuss each of these considerations in detail to put the focus of this study in context.

The current size of the ALR is 4.8 million hectares. Based on projections made by the provincial government about the amount of farmland needed to sustain a healthy diet and future population growth, this is likely to be an adequate amount of farmland for at least the near future.\textsuperscript{10} BC Stats (2007a) estimates that the Province’s population will increase by about 32 percent between 2007 and 2036, reaching 5.7 million people. The BC Ministry of Agriculture and Lands estimates that growing a healthy diet for one person within the Province each year requires an average of approximately 0.524 hectares of farmland (MAL, 2006b).\textsuperscript{11} This indicates that to be food self-reliant in 2036, the Province would need at least 3 million hectares of farmland, 10 percent of which must have access to irrigation.\textsuperscript{12} If the population continues to grow beyond that date, it is likely that residents of BC would someday need 4.8 million hectares of farmland.\textsuperscript{13} External influences such as human migration due to climate change and the conversion of farmland across the United States may also affect the demand for agricultural production in BC and the area necessary to accommodate that demand (McLeman and Smit, 2004; Olson and Lyson, 1999). Regardless of these projections, I consider the present size of the ALR as given for the purpose of this study. Therefore, any excluded land must be compensated for with expansion somewhere else.

\begin{flushleft}
\textsuperscript{10} Another consideration is the low likelihood of being able to use farmland for agricultural purposes after it has been developed for urban uses.
\textsuperscript{11} Although farmland in the southern portion of the Province is the most versatile in terms of agricultural production, certain products tend to be produced in particular regions. The majority of beef production takes place in the Interior, while dairy production is concentrated in the Fraser Valley and grain and oilseeds production primarily in the North. The estimated amount of land needed to produce a healthy diet for one person is an average, encompassing farmland from many different regions of the Province (MAL, 2006b).
\textsuperscript{12} The land with access to irrigation needs to be located in areas of the Province that grow fruit, vegetables, and dairy products. These areas tend to be located in the southern portion of the Province, particularly Vancouver Island, the Okanagan, and the Fraser Valley.
\textsuperscript{13} There are also arguments for protecting the Reserve at its present size based solely on the environmental goods and services that its land provides. It is prudent to safeguard these attributes as well as the agricultural capability of the land.
\end{flushleft}
The ALC's present service plan allows the Commission to exclude up to 4,856 hectares of prime farmland within a three-year period to meet community needs (Campbell, 2006). Municipalities may interpret this as an invitation to apply for exclusion opportunities. Given that the existing regional panels are not involved in province-wide reserve decisions, they run the risk of approving exclusions without considering the broader picture of farmland loss throughout the Province. Several recent ALC decisions based on the "community need" illustrate that this may be the case.

Over the past decade, the City of Abbotsford has submitted various applications to the ALC to exclude land from the Reserve for commercial or industrial purposes. In 2005, the ALC's South Coast Panel allowed the exclusion of 178.5 hectares of prime farmland in Abbotsford for industrial use (Campbell, 2006). Notably, the Panel based its decision on a 20-year economic development strategy rather than an Official Community Plan or an Agricultural Area Plan. During the same year, the ALC's Kootenay Panel approved the exclusion of 267 hectares of ALR rangeland in Invermere for recreational and residential development (Campbell, 2006). This decision proceeded despite the opposition of two farmers' associations.

As occurred during the 2005 Abbotsford decision, local governments often apply to exclude land from the Reserve, claiming that ALR land does not provide a significant economic benefit to their communities. While this may appear true when considering net farm incomes, the picture is different when recent trends in agricultural activity are considered. Statistics show that the province's agricultural sector has grown steadily and frequently provides significant economic benefit. In 2005, total farm cash receipts in BC were $2.4 billion and approximately 36,600 people worked in primary agriculture or aquaculture (MAL, 2006a). During that same year, agriculture was responsible for 8.5 percent of all goods produced and 1.8 percent of all employment in the province. In contrast, forestry and logging was responsible for 4.8 percent of all goods produced and 1 percent of all employment (BC Stats, 2008a). Agriculture in the Fraser
Valley is a critical component of these statistics. Between 1994 and 2004, the agricultural sector in Abbotsford grew by 5 percent each year (MAL, 2004). Moreover, in 2004, one hectare of farmland in Abbotsford produced an average of $18,000 in farm gate sales and nearly 92 percent of the ALR land in the community was actively farmed.

However, there are also indicators that point to challenges within the agricultural sector. On average, only 25 to 50 percent of the Reserve’s land has been actively farmed over the course of the last decade. In addition, farmland prices are high, hitting $375,000 per hectare in certain parts of the Lower Mainland (Campbell, 2006). These prices present a challenge to new farmers interested in purchasing land and existing farmers interested in expanding their operations, especially considering that the average net operating income of BC farm families in 2004 was $10,340 (Statistics Canada, 2007c). This stands in contrast to the average family income in BC in 2004, which was $60,400 (BC Stats, 2006). It is also notable that the average total income of BC farm families in 2004 was $83,780, implying that approximately 88 percent of their total income came from off-farm sources (Statistics Canada, 2007c).

Many jurisdictions use policies such as agricultural subsidies to supplement low net farm incomes so that new farmers continue to enter the agricultural sector and current farmers stay. While this study does not examine methods of increasing farm incomes, it is important to consider impacts on the rate of growth of farm incomes when discussing ALR management policies. Between 2004 and 2005, the average total income of BC farm operators increased by 8 percent, reaching $62,182 in 2005 (Statistics Canada, 2007b). The average net operating income of BC farm operators was considerably lower but rose by 10 percent during the same time period, starting at $16,179 in 2004 and reaching $17,813 in 2005 (Statistics Canada, 2007b).

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14 The average net operating income of farm families refers to the, “...profit or loss of the farm operation measured by total operating revenues less total operating expenses...” (Statistics Canada, 2007c). This measure may not be directly comparable to the average income of BC families, who are not likely to incur the same type of business expenses as farm families.

15 Policies that strengthen the ALR will not always lead directly to a stronger agricultural sector in BC. Examining methods of strengthening the agricultural sector is beyond the scope of this analysis.
Despite contention surrounding the optimal size of the Reserve, the recent ALC decisions, and the status of farm incomes, the ALR remains a landmark piece of legislation that receives significant support from residents of BC and supports a stable agricultural sector. Although each of the concerns discussed above deserves a thorough analysis, the focus of this study is the exclusion of prime farmland from the Reserve.

3.4 The Policy Problem and ALR Stakeholders

In light of the considerations presented in sub-section 3.3, the policy problem I focus on is that the government bodies that manage the ALR are allowing an excessive amount of prime farmland from the Reserve to be excluded for urban development. To address this policy problem, I examine how other reserves in North America function. My goal is to identify the characteristics that make them successful and then determine whether each feature would lead to stronger farmland preservation in the context of the ALR. However, farmland preservation initiatives can have significant distributive impacts, creating winners and losers among stakeholders (Duke and Lynch, 2006). Four key stakeholder groups would have a strong interest in any change that affects the Reserve: Agricultural landowners, environmental and farmland advocacy groups, private land developers, and the governmental bodies that manage the Reserve.

Agricultural landowners are interested in receiving a high price for their land because it is often their most valuable asset. Receiving a high price usually entails selling the land for non-agricultural purposes, which affects the integrity of the ALR (Daniels and Bowers, 1997, ch. 2). When the Reserve was established, the Farm Income Assurance Act helped compensate agricultural landowners within the ALR for decreases in the value of their land and provided them with income protection. By the time the Province repealed this Act in the 1990s, it was relatively easy for individuals to exclude land from the Reserve.
Environmental advocacy groups are concerned about the status of provincial farmland because they seek to minimize the damages to environmental goods and services that can occur as a result of both urban development and agriculture. However, despite some negative environmental impacts of agriculture, which can include pesticide use and water quality contamination, environmental advocacy organizations tend to favour a strong farmland protection measures (Baxter, 1999). The BC Chapter of the Sierra Club of Canada states that the ALR is important partly because local food production reduces the distance that agricultural products must travel, thereby reducing greenhouse gas emissions (Sierra Club of Canada, 2007). The David Suzuki Foundation cites food security and the importance of farmland wildlife habitat as two of the central reasons for preserving BC’s agricultural land by maintaining a strong ALR (David Suzuki Foundation, 2007). Alongside these environmental organizations are groups that advocate for farmland preservation in particular. These include the ALR Protection and Enhancement Committee, the Delta Farmland and Wildlife Trust, and Farm Folk/City Folk (Smart Growth BC, 2007). These groups support the existence of a strong ALR and work to raise awareness about farmland among policy-makers and the general public.

Real estate developers are key stakeholders because they potentially profit from the selling of agricultural land for non-farm uses, particularly during periods of rapid population growth (Halseth, 1999). Ultimately, agricultural land decreases the overall profit margin of developers. They are likely to prefer that landowners control land use options for their own property (Duke and Lynch, 2006).

Finally, the three government bodies involved in land management decisions affecting the Reserve have a significant investment in all ALR decisions because any change is likely to affect their mandates directly. In general, farmland preservation program administrators are likely to favour management policies that are easy to implement and inexpensive to administer and
enforce (Duke and Lynch, 2006). However, government agencies must also take into account the perspective of the other key stakeholder groups when making decisions about the ALR.

Each stakeholder group tracks ALR management policies closely and has some degree of influence over any policy change that occurs. In the next section, I examine and compare specific features of four North American reserves. The findings I draw from this analysis help me design policy alternatives for the ALR. I use the perspectives of the four stakeholder groups to predict the success of each alternative.
4: Methodology

In order to explore ways to strengthen the ALR, I examine how other land reserves and protected areas in North America function. Using academic literature and reports from government bodies and non-profit organizations, I look at both quantitative and qualitative information on four case studies. The goal of the analysis is to highlight the strengths and weaknesses of various reserve management techniques. After examining each management structure, I develop a set of criteria to evaluate the most effective and relevant management policies for the ALR. I then interview local stakeholders and use their input to help me determine which policy alternative could best enhance how the ALR protects farmland. This section briefly describes each case study and presents an evaluation framework.

4.1 Case Study Selection

I have selected the case studies so that they are similar enough to warrant comparison, yet diverse enough to add new perspective on the current management structure of the ALR. The case studies are Quebec’s Agricultural Zone, New Jersey’s Pinelands Reserve, Oregon’s Tillamook State Forest, and the Florida Keys National Marine Sanctuary. I chose these four reserves primarily because they are widely recognized as successful at fulfilling their objectives. They are similar in that they all aim to protect particular natural resources and were all initiated by state or provincial governments. However, they are located in a variety of different geographical setting across North America, protect vastly different resources, and have a range of different management structures. The diversity among these reserves makes their similarities more compelling.

16 I have limited my case study selection to reserves that are located in North America so that I can assume that the structure and wealth of the government bodies relevant to reserve management are comparable.
Quebec’s Agricultural Zone is the only reserve in this analysis devoted entirely to farmland. It is also particularly notable because it is one of the only other state or provincially governed agricultural reserves in North America. During the 1960s, soil scientists in Quebec discovered that only two percent of the Province’s land area was suitable for agriculture. This finding, in addition to a documented decrease in the number of farms in the province, led to the creation of a Royal Commission of Inquiry on Agriculture in Quebec, which recommended the establishment of an agricultural zone (Tardif, 2004). The provincial government established the Zone in 1978 along with its managing body, the Commission de protection du territoire agricole du Québec (CPTAQ). Each municipality in the province worked closely with the CPTAQ to establish agricultural zone boundaries within their jurisdiction (Glenn, 1985; Government of Quebec, 2007).

The New Jersey Pinelands Reserve was created in a similar context as Quebec’s Agricultural Zone and established the same year. Urban sprawl threatened the Pinelands throughout the 1960s, as New York, Philadelphia, and Atlantic City grew and local governments became increasingly concerned about threats to the cultural and environmental resources in the area (Lilieholm and Romm, 1992). An intergovernmental planning effort led to the establishment of the New Jersey Pinelands Reserve, which is managed by the regional, state, and federal government representatives on the New Jersey Pinelands Commission (NJPC, 2007b). This reserve is included here because of its unique intergovernmental management structure and its reputation as a successful protected area.

The Tillamook State Forest was created under somewhat different circumstances than the two previous reserves. Four significant forest fires raged across Tillamook County in Northwest Oregon from 1933 to 1951, burning 143,700 hectares of forestland (Wells, 1999). When the fires finally subsided, the state government initiated a large replanting effort. In 1973, the area burned

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17 See Figures 2 and 3 in the Appendix for a current map of Quebec’s Agricultural Zone.
18 See Figure 4 in the Appendix for a current map of the New Jersey Pinelands Reserve.
by the fires became the Tillamook State Forest under the management of the Oregon Department of Forestry (ODF, 2007). The State’s Board of Forestry advises this department and makes decisions on all forest management regulations (OBF, 2003).\textsuperscript{19}

The Florida Keys National Marine Sanctuary was created in 1990, making it the youngest reserve included in this analysis. The United States Congress founded it in response to threats of oil drilling, a series of ship groundings, and the continual degradation of marine resources such as coral reefs, mangroves, and marine life (Bohnsack, 1997). The National Oceanic and Atmospheric Administration (NOAA) manages the Sanctuary and works in close cooperation with state government agencies and a Sanctuary Advisory Council (Suman et al., 1999).\textsuperscript{20}

Forest and marine reserves require different management techniques than reserves encompassing farmland. The Tillamook State Forest and the Florida Keys National Marine Sanctuary are included in this analysis because they provide alternative perspectives on protected area management. I highlight the differences and similarities among all four reserves by using a reserve evaluation framework based on a protected area assessment tool developed by the International Union for Conservation of Nature and Natural Resources (Hockings et al., 2000).

4.2 Reserve Evaluation Framework

The reserve characteristics I have included in the evaluation framework are intended to shed light on reserve management policies relevant to the ALR. The framework includes basic features such as the age of a reserve, its size, and its main objective, as well as several features that are more complex. The management structure includes the size of the managing body’s staff and governing board, how board members are chosen and appointed, and the length of their terms. Current threats include both external and internal threats. External threats originate from outside of the boundaries of the reserve or are initiated by individuals outside its management

\textsuperscript{19} See Figures 5 and 6 in the Appendix for a current map of the Tillamook State Forest.

\textsuperscript{20} See Figure 7 in the Appendix for a current map of the Florida Keys National Marine Sanctuary.
structure. Internal threats originate from within the boundaries of the reserve or are initiated by
individuals within its management structure. I determine the comparative success of each reserve
by examining their strengths and weaknesses. Table 1 lists each characteristic and explains how it
is measured.

Table 1  Reserve Evaluation Framework

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>When was the reserve established?</td>
</tr>
<tr>
<td>Size</td>
<td>By how many hectares has the reserve changed in size since its inception? Are the boundaries of the reserve fragmented?</td>
</tr>
<tr>
<td>Objective</td>
<td>What is the reserve trying to protect? What are the reserve’s objectives?</td>
</tr>
<tr>
<td>Management structure</td>
<td>What are the governmental bodies managing the reserve and what responsibilities do they have?</td>
</tr>
<tr>
<td>Policy on territory exclusion and alteration</td>
<td>Can property be excluded from the reserve? Can the territory within the reserve be altered? If so, how does this process work?</td>
</tr>
<tr>
<td>Privately-owned property</td>
<td>Is there property owned by private individuals within the reserve? If so, how were these individuals compensated for lost property rights when the reserve was established?</td>
</tr>
<tr>
<td>Current threats</td>
<td>What are the external and internal threats that the reserve faces? What activities take place on the territory surrounding the reserve?</td>
</tr>
<tr>
<td>Comparative success</td>
<td>Is this reserve considered to be successful by experts in the relevant field? What are the reserve’s primary areas of weakness and strength? Has the quality of the territory within the reserve changed over time?</td>
</tr>
</tbody>
</table>
5: Case Study Analysis

In this section, I discuss the case studies in more detail by examining the characteristics identified in Table 1. For each characteristic and reserve, I provide a thorough description. I present a summary of the results in Table 2.
## Table 2  Reserve Evaluation

<table>
<thead>
<tr>
<th>Variable</th>
<th>Details</th>
<th>Quebec</th>
<th>New Jersey</th>
<th>Oregon</th>
<th>Florida</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>Year created</td>
<td>1978</td>
<td>1978</td>
<td>1973</td>
<td>1990</td>
</tr>
<tr>
<td><strong>Size</strong></td>
<td>Current size</td>
<td>6,339,400 hectares</td>
<td>445,154 hectares</td>
<td>143,663 hectares</td>
<td>951,500 hectares</td>
</tr>
<tr>
<td></td>
<td>Change in hectares since inception</td>
<td>+ 4,437 hectares</td>
<td>0 hectares</td>
<td>0 hectares</td>
<td>0 hectares</td>
</tr>
<tr>
<td></td>
<td>Fragmentation</td>
<td>Fragmented</td>
<td>Un-fragmented</td>
<td>Un-fragmented</td>
<td>Un-fragmented</td>
</tr>
<tr>
<td><strong>Objective</strong></td>
<td>Summarized objective</td>
<td>Protect farmland and promote agricultural business</td>
<td>Protect and enhance natural and cultural resources</td>
<td>Protect forest amenities and maintain productivity for revenue generation</td>
<td>Protect and monitor marine resources while raising public awareness</td>
</tr>
<tr>
<td><strong>Management</strong></td>
<td>Part of a larger reserve network</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>structure</td>
<td>Management body</td>
<td>CPTAQ</td>
<td>NJPC</td>
<td>ODF, advised by the state’s Board of Forestry</td>
<td>NOAA, advised by a Sanctuary Advisory Council</td>
</tr>
<tr>
<td></td>
<td>Number of members in management or advisory body</td>
<td>16</td>
<td>15</td>
<td>7</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Term length for management or advisory body members</td>
<td>5 years</td>
<td>3 years</td>
<td>4 years</td>
<td>3 years</td>
</tr>
<tr>
<td>Nature of management or advisory body members' appointments</td>
<td>Appointed by the provincial government</td>
<td>1 commissioner is appointed by the U.S. Secretary of the Interior, 1 is appointed by each of the Pineland area's 7 counties, and 7 are appointed by the Governor of New Jersey</td>
<td>Appointed by the Governor</td>
<td>Appointed by NOAA</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Qualification regulations for management or advisory body members</td>
<td>None</td>
<td>7 members must represent specific counties</td>
<td>At least 1 member must reside in each of the 3 major forest regions of the state. No more than 3 members of the board can receive a significant portion of their income from the forest products industry</td>
<td>Includes representatives from various stakeholder groups</td>
<td></td>
</tr>
<tr>
<td>Number of employees in support staff</td>
<td>81</td>
<td>60</td>
<td>60 in the Tillamook District.</td>
<td>74</td>
<td></td>
</tr>
<tr>
<td>Presence of research and monitoring positions within staff</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Ability of management body to purchase territory</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Policy on territory exclusion</td>
<td>Exclusion framework</td>
<td>CPTAQ considers applications from municipalities</td>
<td>None allowed</td>
<td>None allowed</td>
<td>None allowed</td>
</tr>
<tr>
<td>and alteration</td>
<td>Alteration framework</td>
<td>CPTAQ considers applications from municipalities</td>
<td>NJPC considers applications for new development</td>
<td>The state's Board of Forestry advises ODF about when they can log and build roads</td>
<td>The Sanctuary Advisory Council advises NOAA on whether the activities permitted within the sanctuary should change</td>
</tr>
<tr>
<td>---</td>
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<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Presence of a highly protected zone</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Privately-owned property</td>
<td>Presence of privately-owned property</td>
<td>Yes</td>
<td>Yes, 1/3 publicly and 2/3 privately owned</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Compensation framework</td>
<td>Landowners are compensated through tax exemptions</td>
<td>Landowners are compensated through tradable development credits. Municipalities are compensated through cash transfers</td>
<td>Counties are compensated through a percentage of the revenue from forest products</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Current threats</td>
<td>External threats</td>
<td>Climate change, natural disasters, urban growth</td>
<td>Climate change, natural disasters, urban growth</td>
<td>Climate change, natural disasters</td>
<td>Climate change, natural disasters, pollution</td>
</tr>
<tr>
<td></td>
<td>Internal threats</td>
<td>Exclusion approvals for residential development, declining agricultural industry</td>
<td>Approvals for urban development, water sales to surrounding communities</td>
<td>Logging</td>
<td>None</td>
</tr>
<tr>
<td>Comparative success</td>
<td>Main strengths</td>
<td>Main weaknesses</td>
<td>Decline in land or water quality since reserve’s inception</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td>----------------</td>
<td>-----------------</td>
<td>--------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Close relationship between CPTAQ and municipalities</td>
<td>Excluding land is possible</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inter-governmental management framework, strongly protected preservation zone</td>
<td>Urban development can be approved</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strong boundaries and strict restrictions on permitted activities</td>
<td>Logging of old-growth forest takes place</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Close relationship with state-level government agencies, extensive monitoring, strongly protected preservation zone</td>
<td>Difficult to prevent pollution and enforce boundaries</td>
<td>Yes, to some extent</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5.1 Age

Three of the reserves examined in this analysis were established in the 1970s as the environmental movement was gaining momentum. The year 1973 saw the creation of Oregon’s Tillamook State Forest, while Quebec’s Agricultural Zone and the New Jersey Pinelands Reserve were created in 1978. The Florida Keys National Marine Sanctuary was established in 1990 and is the youngest of the case studies. However, large portions of the sanctuary’s territory were established as national or state protected areas during the 1960s, 1970s, and early 1980s (NMPAC, 2007).

5.2 Size

At 6.3 million hectares, Quebec’s Agricultural Zone is the largest of the four reserves. Florida is the next largest at 951,500 hectares followed by New Jersey and Oregon. While the New Jersey, Oregon, and Florida reserves remain the same size as they were upon inception, the Quebec reserve has grown by roughly 4,437 hectares (CPTAQ, 2006). In addition, the borders of Quebec’s Agricultural Zone have been altered while the borders of the other reserves have not. These changes have occurred because municipalities can include or exclude land from Quebec’s Agricultural Zone. In all four cases, the activities permitted within reserve boundaries can change, given appropriate approvals.

5.3 Objective

While the stated objectives of the Florida and New Jersey reserves focus exclusively on preserving the natural and cultural resources of particular regions, the objectives of the Quebec and Oregon reserves include a statement about business promotion (NJPC, 2007b; Suman et al., 1999). In the case of Quebec, the objectives state that in addition to preserving farmland, the managing bodies of the reserves must encourage the development of agricultural businesses.
(CPTAQ, 2006). The objective of the Oregon reserve is more explicit in regards to business promotion. It states that the aim of the State Forest is to keep the forest ecosystem healthy and productive so that it can provide a range of benefits including wildlife habitat, recreational opportunities, forest products, and revenue for the State (ODF, 2007).

5.4 Management Structure

The management structure of the four reserves is somewhat similar. In all four cases, there is a governing or advisory board that is appointed by the government and served by a support staff that includes positions dedicated to research and reserve monitoring. Both the Quebec and New Jersey cases have a governing board that actively manages the reserve and makes critical land use decisions. In contrast, the Oregon and Florida reserves are managed by government agencies that have advisory boards.

Quebec’s Agricultural Zone is managed by the Commission de protection du territoire agricole du Québec (CPTAQ), which rules on any applications to include or exclude land from the Zone. The CPTAQ is made up of 16 members, consisting of 1 president, 5 vice-presidents, and 10 commissioners, all of whom serve terms of 5 years or less. There are no formal eligibility requirements for commission members, but they often have a background in law or experience within the agricultural industry (CPTAQ, 2006). A staff of 81 employees serves the Commission.

The New Jersey Pinelands Commission (NJPC) manages the New Jersey Pinelands Reserve and consists of 15 commissioners that serve staggered 3-year terms. The U.S. Secretary of the Interior appoints 1 commissioner, each of the Pinelands’ 7 counties appoints 1 commissioner, and the Governor of New Jersey appoints the remaining 7 commissioners. The NJPC also has a staff of 60 employees that includes five research scientists. This staff serves the Commission and works closely with a municipal council that advises them on decisions. The council involves all 53 municipalities located within the Reserve’s boundaries (NJPC, 2007b).
The Oregon Department of Forestry (ODF) manages the Tillamook State Forest and is advised by the Oregon Board of Forestry. The Board approves all forest management policies and appoints the head of the ODF. The Governor appoints its 7 members, who serve 4-year terms. Oregon has 3 major forest regions and at least 1 member of the Board must be from each of these regions. In addition, no more than 3 members of the Board can receive a significant portion of their income from the forest product industry. The Board supervises the ODF by approving forest management policies (OBF, 2003). As of 2006, the Tillamook District branch of ODF had a staff of 61 employees that included at least 3 positions dedicated to research and monitoring (ODF, 2006).

The National Oceanic and Atmospheric Administration (NOAA) of the United States is the agency that manages the Florida Keys National Marine Sanctuary, although it works in close cooperation with various state government agencies (Suman et al., 1999). A Sanctuary Advisory Council advises NOAA on the Sanctuary’s management plan and consists of 19 members that serve 3-year terms. NOAA appoints the members of this council, which includes representatives from various stakeholder groups including the fishing industry, conservation organizations, and concerned members of the public (NMPAC, 2007). There is also a staff of 74 employees that helps manage the Sanctuary, with at least 10 positions dedicated to research and monitoring. Notably, NOAA reviews the success of all reserves within its Nation Marine Sanctuary Program every 5 years.

With 81 employees, Quebec’s Agricultural Zone has the largest staff of any of the reserves, followed by the Florida, New Jersey, and Oregon reserves. The New Jersey reserve has one staff member for every 7,419 hectares, the Florida reserve has one staff member for every 12,858 hectares, the Oregon reserve has one staff member for every 2,394 hectares, and the Quebec reserve has one staff member for every 78,264 hectares. Oregon has the smallest advisory board, yet is the only reserve that has a regulation about the number of board members.
with financial ties to industry. Both the New Jersey and Oregon reserves require some portion of
their board members to represent particular regions. Quebec is the only reserve that does not have
board member regulations. Another distinction in management structure is that the New Jersey,
Oregon, and Florida reserves are part of a larger reserve network, while Quebec’s Agricultural
Zone is a stand-alone entity. The New Jersey Pinelands Reserve is one of about 400 National
Parks in the United States and part of the United Nations Man and the Biosphere Programme, the
Tillamook State Forest is one of 8 Oregon State Forests managed by ODF, and the Florida Keys
National Marine Sanctuary is one of 14 National Marine Sanctuaries managed by NOAA.
Finally, New Jersey and Florida are the only cases that involve the federal government. However,
it plays a much larger role in the case of Florida, as a federal agency actively manages the
Sanctuary.

5.5 Policy on Land Exclusion and Alteration

As mentioned in sub-section 5.2, Quebec’s Agricultural Zone is the only reserve included
in this analysis that has a provision for excluding land. In the case of Quebec, CPTAQ accepts
applications by municipalities to alter, include, or exclude land from the Zone. However, the
municipalities must convince the Commission that there is no other way to accommodate the
proposed development (Tardif, 2004). CPTAQ also bases its decisions partially on soil quality
and on the impact that the conversion of a certain piece of land will have on the agricultural
activities in the area (Glenn, 1985).

The other three reserves have zones that are highly protected and intended to remain
untouched. This is explicit in the cases of New Jersey and Florida and implicit in the case of
Oregon. The New Jersey Pinelands Reserve is divided into eight management areas, one of which
is a preservation core that comprises roughly 22 percent of the Reserve and is meant to be kept
pristine (Walker and Solecki, 1999). Nobody can exclude land from the Pinelands, but individuals
and development companies must apply to the NJPC for permission to construct new residential
or commercial buildings (NJPC, 2007b). In Florida, the Sanctuary's management plan delineates a variety of zones in which different uses are permitted under varying levels of regulation. The management plan protects 24 of these zones, about 6 percent of the Sanctuary, with strict regulations that safeguard marine resources (NMPAC, 2007). In Oregon, the ODF has stated that they will never log about 15 percent of the reserve, creating an implicit zone of special protection. Although logging policies are highly controversial, nobody can exclude land from Oregon State Forests.

5.6 Private Property

Regarding the presence of private property, the Florida Keys National Marine Sanctuary is the most straightforward of the reserves included in this analysis. The waters where the Sanctuary is located were either state or federal before being incorporated into it and therefore, no compensation measures were necessary (NMPAC, 2007). In the case of Oregon, the long period of forest fires in the Tillamook region made it relatively easy for the state to acquire land in the area. The majority of the forestland was previously in the hands of private forestry companies and county governments, neither of whom was interested in stewarding the land after the fires (Tillamook Forest Center, 2007). Individual counties in the Tillamook region now receive a percentage of the revenue from forest products (CFTLC, 2006).

Both the Quebec and the New Jersey reserves have private land within their boundaries. In the case of Quebec, landowners within the Agricultural Zone receive a tax exemption that excuses them from paying a portion of property and school taxes (Government of Quebec, 2007). The New Jersey Pinelands Reserve is 1/3 publicly owned and 2/3 privately owned (NJPC, 2007b). Landowners within the Reserve have tradable development credits that they can sell to
developers within certain areas. Municipalities within the Pinelands are compensated by the federal government for any lost taxation opportunities due to the presence of the Reserve (Lilieholm and Romm, 1992).

5.7 Current Threats

To some extent, all the reserves included in this analysis are vulnerable to external threats associated with natural disasters. As reserves protecting specific natural resources, they also face a variety of external threats associated with climate change. However, some of the most significant threats concern the activities taking place on adjacent land or water. The greatest external threat that the Quebec, New Jersey, and Oregon reserves face is population growth and urban development.

Quebec's population grew by 4.3 percent between 2001 and 2006 (Statistics Canada, 2008a). In addition, the Agence de la santé et des services sociaux de Montréal predicts that Montreal's population will grow by 3.6 percent between 2001 and 2011 (Montreal, 2004). This urban growth is an important consideration when discussing threats to the Agricultural Zone, as farmland at the edge of city boundaries is often the first land developed for residential, commercial, or industrial uses.

New Jersey has also recently experienced high rates of population growth and urban development. The State's population grew at 8.9 percent per year between 1990 and 2000 and is expected to have a growth rate of 6.8 percent per year between 2004 and 2014 (Corzine and Socolow, 2006). Any population growth in Philadelphia, Atlantic City, or any of the 53

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21 Under a tradable development credit system, certain pieces of land in heavily protected areas are assigned credits. These credits can be transferred to increase the amount of development permitted in less protected areas. Landowners, development companies, and government agencies can buy and sell these credits privately or through public banks, such as the Pinelands Development Credit Bank (NJPC, 2007a).
municipalities within the Pinelands area, is likely to put pressure on the protected land within the Reserve.

Although land within state forests in Oregon cannot be developed for residential, commercial, or industrial uses, urban development at the edge of a forest can impact wildlife habitat, water quality, and tree health. Tillamook county’s population is increasing, having grown by 2.7 percent between 2000 and 2004 (Greenwald and Garty, 2007). However, Portland, the only large city near the Reserve, is 80 kilometres away, making the Tillamook State Forest the least threatened by urban development of the four reserves.

The external threats facing the Florida reserve are slightly different. As a marine sanctuary, protecting reserve boundaries and enforcing regulations within those boundaries is considerably difficult. External threats include over-fishing by recreational and commercial fishermen, ships going aground, and high levels of algae due to inadequate on-shore wastewater and stormwater treatment (NMPAC, 2007). Population growth in Southern Florida or increases in tourism in the area could exacerbate these threats. The United States Census Bureau predicts that the population of Florida will grow by 20.4 percent between 2000 and 2010 (US Census Bureau, 2008). The number of tourists in Florida grew by 42 percent between 1999 and 2006 (Visit Florida Research, 2008).

The external and internal threats that reserves face are often closely related, as internal management decisions are influenced by activities taking place outside a reserve’s boundaries. In the case of Quebec, the majority of the requests to exclude farmland from the Reserve in 2005/2006 were for residential development. During that year, municipalities requested a total of 890 hectares for exclusion for residential development, 40 percent of which was authorized (CPTAQ, 2006). Other internal threats include declining numbers of farmers and large portions of farmland that are not in production (Statistics Canada, 2007a).
Although nobody can exclude land from the New Jersey reserve, the NJPC has recently approved business park and large-lot housing developments that threaten critical wildlife habitat and other natural resources within the Reserve (PPA, 2007). Another internal threat is the withdrawal of water from streams and aquifers in the Reserve, as surrounding communities are in need of groundwater (Lilieholm and Romm, 1992). This could disrupt the Reserve’s delicate ecosystem.

In the case of Oregon, the ODF is pursuing a forest management strategy called structure-based management, which will allow parts of the forest to reach 120 years of age. However, the strategy allows up to 85 percent of the forest to be logged eventually (Sierra Club, 2007). This threatens 21 animal species that depend on old growth timber for habitat.

5.8 Comparative Success

Quebec’s Agricultural Zone is recognized as being one of the strongest and most successful farmland preservation policies in North America (Beesley, 1999). The Agricultural Zone derives a portion of its strength from the close and ongoing relationship between the CPTAQ and municipalities across the Province. This is partially a product of the fact that only municipalities can apply to alter, include, or exclude land from the Zone. However, it is not invulnerable and farmland has been excluded from the reserve every year of its existence. As a result, the quality of the farmland and the amount of un-fragmented farmland within the Agricultural Zone is decreasing. Land at the edges of urban areas is under the greatest threat from urban development, although the CPTAQ enforces zone regulations more strictly in those areas.

Some consider the New Jersey Pinelands Reserve the most successful regional land-use planning effort in the United States (Ray and Gregg, 1991). Various stakeholders including landowners, environmental groups, and government agencies feel that the Reserve has successfully balanced their interests (Lilieholm and Romm, 1992). Its strength is partially derived
from its unique cooperative institutional management framework. Although the NJPC has allowed development on land within the Reserve over the years, the amount of land conversion has been lowest in the preservation core (Walker and Solecki, 1999). Between 1981 and 1992, the NJPC approved 25,872 residences, only 74 of which were located within this core (PPA, 2007). However, although its boundaries are firm and its territory is un-fragmented, this development signals that the quality of the land inside the Reserve has steadily decreased over time. It is partially a result of the fact that the Reserve explicitly balances development and conservation.

The Tillamook State Forest is widely considered a great success because its establishment was the result of one of the largest government-sponsored forest restoration projects in history (Wells, 1999). Many Oregonians took part in the massive re-planting effort and still remember the part they played in restoring the Forest (Tillamook Forest Center, 2007). Similar to the New Jersey Pinelands, this reserve’s territory is un-fragmented and its boundaries are firm. In contrast, logging is one of the only activities taking place within the reserve. The State Board of Forestry’s management plan determines the timing and location of any logging activities. However, current management techniques may compromise remaining old-growth trees, which used to make up about 80 percent of the forest and provide habitat for a variety of wildlife species (Sierra Club, 2007; Greenwald and Garty, 2007). This indicates that to some extent, the quality of the land within the Reserve has decreased over time.

The Florida Keys National Marine Sanctuary is recognized as effective and innovative among marine protected area specialists (NMPAC, 2007). The most recent review of the Sanctuary occurred in 2002 and found that there had been marked increases in water quality, improved monitoring of the area’s marine resources, and a reduction in the number of grounded ships since its inception (FKNMS, 2007). However, the Sanctuary has seen a continuous decline in healthy coral, partly due to boaters and divers, and only six percent of its territory is fully
protected (NMPAC, 2007). As a fragmented marine reserve, it is difficult to enforce its boundaries.

Among these four case studies, Oregon stands out as the reserve that most successfully manages the threats it faces and defends the natural resources it is mandated to protect. The other three reserves have had high levels of success. However, the quality of the territory within their boundaries has markedly declined.

5.9 Summary of Findings

Despite their diversity, the four successful protected areas have a series of common characteristics. Key findings are the characteristics that are common to at least three of the cases. These constitute traits of successful protected areas. I also derive a series of secondary findings, which are characteristics that occur in two of the case studies.

5.9.1 Key Findings

- Finding 1: Centralize the management of the reserve.

  In all four case studies, a single centralized body manages the reserves. In Oregon and Florida, the managing bodies carry out reserve policies and advisory boards assist them with decision-making. Three of the four case studies have regulations on the qualifications of their management or advisory board members and two require some board members to represent specific regions.

- Finding 2: Have a sizeable support staff that includes positions devoted to research and monitoring.

  With the exception of Oregon and New Jersey, the size of the support staff for each reserve grows with the size of the reserve. For example, Quebec is the largest of the four reserves
and has the largest support staff. Notably, the support staff for the New Jersey, Oregon, and Florida reserves includes positions devoted to research and monitoring.

- Finding 3: Maintain close contact with municipalities and other relevant jurisdictions.

In three of the four case studies, several levels of government are involved in reserve management decision-making. In Quebec, municipalities work closely with CPTAQ on exclusion, inclusion, and alteration applications. In New Jersey, municipalities and the federal government are involved in decisions on development approvals. In Florida, NOAA works closely with various state-level departments on sanctuary management decision-making.

- Finding 4: Compensate landowners and/or relevant jurisdictions for lost property rights.

Three of the four case studies in this analysis continuously compensate landowners or particular government jurisdictions for lost property rights. Compensation may be easier for the Quebec and Oregon reserves because they have objectives related to revenue generation and business promotion. In those cases, the resulting revenue can be put towards compensation payments. In the case of Oregon and New Jersey, the reserve management body was able to purchase territory from some or all landowners instead of making compensation payments.²²

- Finding 5: Be part of a larger network of protected areas.

The New Jersey, Florida, and Oregon reserves are all part of international, national, and/or state-level networks of reserves. Connecting to a network helps these reserves attract attention and support from the public and government agencies and increases their ability to fund a large support staff that includes positions devoted to research and monitoring.

- Finding 6: Have a highly protected zone.

²² Given that New Jersey is the only reserve with a tradable permit system, I do not highlight this type of policy explicitly in Finding 4. However, there are other cases not included in this analysis where tradable permit systems have successfully protected natural resources. Examining these systems is beyond the scope of this analysis.
In three of the four case studies, there is a highly protected zone in which permitted activities are restricted and closely monitored. The existence of a highly protected zone is explicit in the New Jersey and Florida case studies. It is implicit in the case of Oregon, where roughly 15 percent of the Forest will never be logged.

Finding 7: Do not allow land to be excluded from reserve territory.

Quebec is the only reserve in this analysis from which territory can be excluded. Such exclusions can change the size of the Agricultural Zone and permanently alters the quality of its land. However, all four reserves allow the activities permitted within certain parts of their territory to change over time. Some of these activities, such as urban development, have a permanent impact on the quality of reserve land.

5.9.2 Secondary Findings

This analysis yields two more secondary findings. First, it may be easier to preserve an un-fragmented reserve like Oregon or New Jersey. However, pre-existing development patterns often make fragmentation difficult to prevent. In the case of Quebec, the CPTAQ chose reserve boundaries based on the location of high quality farmland. In the case of Florida, NOAA chose boundaries based on the location of particular marine resources and aquatic life. Nevertheless, existing urban development limited the territory that these two reserves could encompass. Second, it is easier to protect a reserve that does not include private property. The Oregon and Florida reserves can focus on their own management planning and controlling the activities of reserve visitors instead of working with private landowners to determine and enforce management regulations.

5.9.3 Implications for the ALR

My findings highlight two main similarities between the four reserves and the ALR. First, the Agricultural Land Commission does work closely with municipalities, which must approve all
applications before they forward them to the Commission. Second, ALR landowners are compensated for lost property rights. They are exempt from paying a portion of their property taxes and received payments through the Farm Income Assurance Act during the first twenty years of the Reserve’s existence.

My findings also highlight numerous differences between the four reserves and the ALR. In contrast to the four case studies, the ALR has a fragmented management board. Additionally, it has only one staff member per 207,000 hectares, many fewer than that of the other four reserves. Within this staff, the ALC does not have any positions devoted to research and only has three enforcement officers, despite having a sizeable territory to monitor. As in Quebec, land can be excluded from the ALR, but unlike Quebec, anyone can apply to exclude land and they are not required to prove that there is no other way to accommodate the proposed development. Finally, the ALR does not have a highly-protected preservation zone and is not part of a larger network of protected areas, as is the case in New Jersey, Oregon, and Florida.

The differences between the characteristics of the ALR and the common characteristics of these four case studies present opportunities for policy suggestions. It is possible that the ALR would protect farmland more successfully if it were to adopt different management practices inspired by the reserves analyzed in this study. The next section translates the findings into a series of policy alternatives for the ALR.
6: Policy Objectives, Alternatives, and Criteria

The primary goal of any protected area is to safeguard a scarce resource. Section 2 outlined various existing threats to the ALR, making it clear that policy changes need to take place to protect agricultural land in BC. This section first explains the short and long-term objectives that should govern such policies, then outlines the policy alternatives, and finally, discusses the criteria I use to assess them. Key stakeholders, including various provincial and municipal government employees, a Richmond farmer, and a Lower Mainland real estate developer, provided input on the design of the policy alternatives.23

6.1 Policy Objectives

I identify a set of long and short-term objectives that guide my selection of policy alternatives and help me evaluate them. The time horizon for the long-term objectives begins ten years after policy implementation. There are two long-term objectives for successful ALR management policies:

1. Foster a thriving agricultural economy.
2. Maintain food security and quality.

Successfully maintaining a strong ALR over the course of the next 100 years is unlikely in the absence of a healthy agricultural economy. This does not mean that all land within the Reserve must be actively farmed, rather that there needs to be a steady influx of new farmers as older farmers retire. In the long-term, ALR management policies should make it as easy as

23 This list does not include an environmental advocacy organization because the David Suzuki Foundation indicated to the author that their 2006 report by Charles Campbell represents their official position on the ALR.
possible to become a farmer, acquire farmland, and maintain a profitable farm operation. This entails fostering agricultural education and research.

In addition, ALR management policies must take into account the likelihood of continued population growth in BC and the rising cost of oil, which will increase the cost of imported food in the long term. Maintaining local farmland ensures the possibility of having local food at lower prices and increases the probability that BC residents will have ample access to food when dealing with unforeseen events like natural disasters. Polling data also shows that Canadians feel that locally grown fruits and vegetables taste better (Ipsos Reid, 2006). Therefore, maintaining local farmland will also increase the quality of the food available to BC residents.

To achieve the long-term objectives, ALR management policies need to protect the Reserve’s existing boundaries over the next ten years. Therefore, I evaluate the policy alternatives based on the following short-term objectives:

1. Maintain the current size of the ALR territory.
2. Protect the current quality of ALR farmland.
3. Foster farming activity within the ALR.

6.2 Policy Alternatives

In this sub-section, I outline four policy alternatives that I have drawn from the key findings of my case study analysis. The history and current context of farmland preservation in BC also informs these alternatives. The current management structure of the ALR is considered the status quo policy alternative in this analysis.

❖ Policy Alternative 1: Status Quo

Since the changes to the ALC’s service plan and structure in 2002, the management framework of the ALR has included the following features:
• The ALC consists of six provincially appointed three-member regional panels that make decisions about land use within the ALR and determine its boundaries.

• Individuals and local governments can apply to include land into the Reserve, exclude land from the Reserve, and subdivide or pursue non-farm uses on Reserve land. The applications are sent to municipalities for review before they are forwarded to the ALC.

• The ALC has a support staff of 23 people, which includes two positions dedicated to policy, three positions dedicated to enforcement, one agrologist, eight planners, two mapping specialists, and various administrative positions.

❖ Policy Alternative 2: Centralized Management

• The ALC would be restructured and a single commission of 12 members put in place. The ALC would divide the province into four regions and the provincial government would appoint three representatives from each region to serve on the Commission. The Commission would make decisions about land use within the ALR and determine its boundaries as one large group.\(^\text{24}\)

• Only municipalities would be able to apply to the ALC to include land into the Reserve, exclude land from the Reserve, and subdivide or pursue non-farm uses on Reserve land. To exclude land from the Reserve, municipalities would have to demonstrate that there is no other way to accommodate the proposed development within their existing boundaries using a documented community plan.\(^\text{25}\)

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\(^{24}\) This component was designed with input from Interview #2 (February 8, 2008).

\(^{25}\) This component was designed with input from Interview #1 (February 5, 2008), Interview #2 (February 8, 2008).
Policy Alternative 3: Protected Zone

- The ALC would create a zone within the ALR that encompasses prime farmland. The ALC would prohibit all land exclusion within the zone.

- The ALC support staff would increase by ten positions. Three of the positions would be dedicated to ALR research, five would be dedicated to enforcement, and two would be dedicated to policy analysis and land-use planning.

- The ALC research staff would investigate ways to connect the ALR to a larger network of protected areas. This network may or may not be pre-existing.

Policy Alternative 4: Exclusion Moratorium

- The ALC would work with a team of agrologists and planners from the Ministry of Agriculture and Lands and regional and municipal governments to review all existing Official Community Plans and Agricultural Area Plans that impact ALR land. This process would involve reviewing all land within the ALR and identifying growth and density targets for each community.\(^{26}\)

- During this process, municipalities could request to exclude sub-prime farmland within their boundaries. The ALC and the team of provincial agrologists and planners would consider such requests with the objective of excluding as little land as possible from the Reserve.\(^{27}\)

- At the end of the review, the ALC would stop accepting applications to exclude land from the ALR.\(^{28}\)

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\(^{26}\) This component was designed with input from Interview #2 (February 8, 2008).

\(^{27}\) This component was designed with input from Interview #2 (February 8, 2008).

\(^{28}\) This component was designed with input from Interview #1 (February 5, 2008), Interview #2 (February 8, 2008).
6.3 Criteria for Analysis

A set of four criteria provide the framework for evaluating each policy alternative. The criteria are effectiveness, cost, acceptability, and equity. I establish three benchmark measures for each criterion. I then give these measures a performance rating of low, medium, or high. Each rating corresponds to a score. Policies that have a high performance rating receive three points, those with a medium performance rating receive two points, and those with a low performance rating receive one point. This system allows me to assign a total score to each policy, making the tradeoffs between the alternatives explicit. When a criterion has a number of subcategories, I calculate the average score for that criterion and add it to the total. I have not weighted the criterion because each one plays a distinct and important role. Table 3 summarizes the criteria and measures I use in this analysis.
<table>
<thead>
<tr>
<th>Criteria</th>
<th>Definition</th>
<th>Measurement</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td><strong>Effectiveness</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Strength of boundaries</td>
<td>How much prime farmland will be excluded from the ALR in the next ten years under the policy?</td>
<td>Percentage of prime farmland excluded</td>
<td>3. High&lt;br&gt;2. Medium&lt;br&gt;1. Low</td>
</tr>
<tr>
<td>Quality of reserve land</td>
<td>How much will the quality of the land within the ALR change in the next ten years under the policy?</td>
<td>Percentage of reserve land that decreases in quality</td>
<td>3. High&lt;br&gt;2. Medium&lt;br&gt;1. Low</td>
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<tr>
<td><strong>Cost</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual expenditure</td>
<td>How much will it cost annually to manage the ALR under the policy for the next ten years?</td>
<td>Amount of money per year in millions</td>
<td>3. High&lt;br&gt;2. Medium&lt;br&gt;1. Low</td>
</tr>
<tr>
<td><strong>Acceptability</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Acceptability among farmers</td>
<td>How much will the average total income of BC farmers change each year for the next ten years under the policy?</td>
<td>Percentage increase in average total income</td>
<td>3. High&lt;br&gt;2. Medium&lt;br&gt;1. Low</td>
</tr>
<tr>
<td>Acceptability among real estate developers</td>
<td>How much decision-making power will landowners have under the policy?</td>
<td>Anyone can apply to exclude or pursue non-farm activities in ALR</td>
<td>3. High&lt;br&gt;2. Medium&lt;br&gt;1. Low</td>
</tr>
<tr>
<td>Acceptability among environmental advocacy groups</td>
<td>How much will the environmental goods and services on land within the ALR change in the next ten years under the policy?</td>
<td>Anyone can apply to do only certain activities in ALR or anyone can apply to exclude or pursue certain activities but only in certain parts of ALR</td>
<td>3. High&lt;br&gt;2. Medium&lt;br&gt;1. Low</td>
</tr>
<tr>
<td>Acceptability among relevant government agencies</td>
<td>How simple is the design, implementation, and operation of this policy?</td>
<td>The policy entails: No changes to existing policies</td>
<td>3. High&lt;br&gt;2. Medium&lt;br&gt;1. Low</td>
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<tr>
<td><strong>Food Security</strong></td>
<td></td>
<td></td>
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<tr>
<td>Future availability of local food</td>
<td>How much local food will be consumed in BC ten years from now because of this policy?</td>
<td>Percentage of food consumed in BC that is local</td>
<td>3. High&lt;br&gt;2. Medium&lt;br&gt;1. Low</td>
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Effectiveness. I have separated this criterion into two parts. The first one measures the amount of prime farmland that the ALC would likely exclude in the next ten years under each policy. These exclusions do not necessarily entail a decrease the total area of the Reserve. The low benchmark for this measure is the percentage of farmland that the ALC excluded from 1996 through 2006, which was 0.5 percent (ALC, 2007b). The second one measures the extent to which each policy would change the quality of the land inside the Reserve over the course of the next ten years by estimating the amount of ALR land that would likely decrease in quality. The low benchmark for this measure is the percentage of the ALR that decreased in quality from 2002 through 2006, which was 0.1 percent. Since the time horizon for the policy alternatives is ten years, I double this number for a total of 0.2 percent (ALC, 2007b).

Cost. This criterion measures the annual cost of managing the ALR for the next ten years under each policy by estimating the yearly expenditure in millions of dollars. The medium benchmark for this measure is the amount it cost to manage the ALC during the 2006/07 fiscal year, which was $2,025,200 (ALC, 2007c).

Acceptability. This criterion includes the four key stakeholder groups I discuss in subsection 3.3: farmers, real estate developers, environmental advocacy organizations, and relevant government agencies. To determine the acceptability of each policy to farmers, I estimate the extent to which each policy will change their average total income each year over the next ten years. The low benchmark for this measure is the percentage increase in the average total income of BC farmers between 2004 and 2005, which was 8 percent (Statistics Canada, 2007b).²⁹ When compared to other provinces, this increase is relatively low. During the same time period, the total average income of farmers in Prince Edward Island increased by over 13 percent. Three of the four key stakeholder interviews confirmed that farmers tend to prefer policies that increase their

²⁹ I use the year 2005 because it is the most recent year for which average total income data is available.
total average income. Ideally, their income would at least rise at the same rate as the average income of other BC residents. Between 2004 and 2005, the average income of British Columbians rose by 6 percent (BC Stats, 2007b; BC Stats, 2007c).

To determine the acceptability of each policy to real estate developers, I estimate how each policy will change the amount of decision-making power that landowners have. I measure this by determining whether it will be possible for anyone or only certain parties to apply to exclude land or pursue non-farm activities within the ALR and whether they are restricted to doing so in only certain parts of the Reserve. I expect real estate developers to favour policies that give landowners the most freedom.30 Therefore, I give a high performance rating to policies under which anyone can apply to exclude land or pursue non-farm activities. I give a low performance rating to policies under which it is not possible to apply to exclude or under which it is only possible to do so in certain parts of the ALR.

I determine the acceptability of each policy to environmental advocacy organizations by estimating how each policy will change the amount of environmental goods and services on land within the ALR. I measure this by using the same metric as that of farmers and real estate developers. I expect environmental advocacy organizations to favour policies that restrict the actions of landowners because this is likely to increase the amount of preserved farmland, thereby increasing the amount of environmental goods and services.31 Therefore, I give a high performance rating to policies under which it is not possible to apply to exclude or under which it is only possible to do so in certain parts of the ALR.

Relevant government agencies are the fourth stakeholder group included in this criterion. Their acceptability of each policy alternative is dependant on the simplicity of the policy’s design, implementation, and operation. I measure this by estimating the degree to which each

30 This was confirmed by Interview #3 (February 12, 2008).
31 This is confirmed by Campbell’s 2006 report for the David Suzuki Foundation.
alternative requires a change to current ALR policies, as outlined in sub-section 3.2. I give a high performance rating to alternatives that do not entail any changes to existing policies.

Food Security. This criterion attempts to measure how decisions made about the ALR today will affect the availability of local food for future generations. If less prime farmland is available, there will likely be less local food production. I measure this criterion by estimating the percentage of the food consumed in BC that would be from local sources in ten years under each policy. The low benchmark I use for this measure is the percentage of food consumed that was from local sources in BC in 2006, which was 48 percent (MAL, 2006b). I use 65 percent as my high benchmark because it has been identified as a reasonable goal for British Columbia in previous studies (EAP, 1997).
7: Policy Analysis

This section evaluates each of the policy alternatives using the established set of criteria in order to predict the success of these policies in the context of BC. The analysis presented here informs the final policy recommendation.

7.1 Policy Alternative 1: Status Quo

Effectiveness. Under current management policies, it is possible to exclude any piece of farmland within the ALR. Between 1996 and 2006, the ALC excluded 25,141 hectares, or 0.5 percent of the ALR (ALC, 2007b). Much of the excluded land was in the Southern part of the Province, where the majority of the high quality farmland is located. Indeed, 86 percent of the exclusions that occurred between 2002 and 2006 were located in Southern BC, where the ALC excluded over 6000 hectares of land or 0.1 percent of the Reserve. Ninety-five percent of the inclusions during that period were located in Northern BC (ALC, 2007b). If no policy change takes place, the number of exclusion approvals is unlikely to change and the quality of the farmland within the ALR is likely to continue decreasing at the same rate. This policy is rated Low for boundary strength and Low for reserve land quality.

Cost. The total cost of ALC operations in 2006/07 was $2,025,200 (ALC, 2007c).32 During that year, the ALC had 19.67 full-time equivalent positions and the majority of the operations budget went towards staff salaries. The cost of ALC operations is unlikely to vary over the next ten years in the absence of any policy changes. This policy is rated Medium for cost.

Acceptability. Between 2004 and 2005, the total average income of BC farmers increased by 8 percent (Statistics Canada, 2007b). If no policy changes take place, this rate of increase is

32 All dollar amounts are in Canadian dollars unless otherwise noted.
likely to continue. Under current ALR management policies, individuals and local governments can apply to exclude land from the Reserve, subdivide land, or pursue non-farm activities. Therefore, the status quo allows ALR landowners a relatively high level of decision-making power over their property. Interviews with key stakeholders revealed that real estate developers favour this type of policy, while environmental advocacy groups do not.\(^{33}\) This is because real estate developers can profit when landowners succeed in excluding ALR land. However, exclusions often lead to urban development, which diminishes the amount of environmental goods and services present on the land. The status quo is likely to be favoured among relevant government agencies because it does not entail any policy changes. This policy is rated Low among farmers, High among real estate developers, Low among environmental advocacy groups, and High among relevant government agencies.

Food Security. Under current management policies, the ALC can approve prime farmland for exclusion, decreasing the amount of land available for local food production for future generations. One study, using production and consumption data from 2001, estimated that BC farmers produce 48 percent of the food eaten in the Province (MAL, 2006b). This quantity is unlikely to increase over the next ten years if no policy change takes place. This policy is rated Low for food security.

7.2 Policy Alternative 2: Centralized Management

Effectiveness. In terms of boundary strength, this policy is likely to be slightly better than the status quo. Although it would still be possible to exclude or subdivide reserve land and pursue non-farm activities within the Reserve’s boundaries, only municipalities would be able to apply. It is likely that the ALC would see fewer applications if municipalities were required to demonstrate that each development project could not be accommodated elsewhere.\(^{34}\) In addition,

\(^{33}\) Interview #3 (February 12, 2008).

\(^{34}\) This was confirmed by Interview #2 (February 8, 2008).
a centralized commission would likely approve less land for exclusion, subdivision and non-farm activities because they would be keeping close track of all changes taking place within the Reserve. Quebec’s agricultural zone has a very similar policy and between 2001 and 2006, its CPTAQ authorized 4,079 hectares for exclusion (CPTAQ, 2006). Notably, this is approximately 3,630 fewer hectares than the ALC excluded from the ALR during the same time period (ALC, 2007b). I estimate that the percentage of land excluded in the next ten years under this policy would be less than 0.5 percent. This policy is not likely to stop the quality of land within the reserve from continuing to decrease. However, such decreases may take place at a slower rate because it would take municipalities a long time to submit each application.\(^35\) I estimate that under this policy, less than 0.2 percent of reserve land would decrease in quality over the next ten years. This policy is rated Medium for boundary strength and Medium for reserve land quality.

Cost. Given that this policy is highly similar to that of Quebec’s agricultural zone, I use their expenditures to estimate its cost. The operating expenses of the CPTAQ, which manages Quebec’s agricultural zone, were $8,660,000 in 2005 (CPTAQ, 2006). However, the number of staff positions at the CPTAQ in 2005 was 95, which is 72 more positions than the staff of the ALC. If I adjust the operating expenses of the CPTAQ so that their staff decreases by 72, the total is $2,010,000.\(^36\) This is slightly cheaper than the status quo, as the ALC would likely process fewer applications overall. Notably, this policy also has financial implications for municipalities, particularly those interested in applying to exclude, subdivide, or pursue non-farm activities on a large quantity of farmland from the ALR. This policy is rated Medium for cost.

Acceptability. The rate of increase in the average total income of BC farmers each year may rise under this policy, given that more prime farmland would likely be available for farming. Between 2004 and 2005 in Quebec, the average total income of farmers increased by more than 9

\(^{35}\) This was confirmed by Interview #2 (February 8, 2008).

\(^{36}\) This number was calculated by assuming that the value of each full-time staff position is $70,000 per year including benefits.
percent. Given the similarities between this policy and those of Quebec’s agricultural zone, I assume that this rate of increase will be similar. This policy places limits on the decision-making power of landowners within the ALR, as they would now need to convince their municipality to apply to the ALC on their behalf if they wanted to exclude, subdivide, or pursue non-farm activities. As one key stakeholder interview confirmed, this is likely to be less favoured by real estate developers because it requires more work on their part. Under this policy, a real estate developer wanting to use a particular piece of land would first need to prove to the relevant municipality that the development was a good idea. Environmental advocacy groups are likely to favour this policy because it makes changing existing ALR land more difficult. This policy involves moderate changes to existing policies and a significant increase in work for municipalities interested in excluding land from the Reserve. Municipalities and the ALC are likely to prefer options that do not entail changes to existing policies. This policy is rated Medium among farmers, Medium among real estate developers, Medium among environmental advocacy organizations, and Medium among relevant governmental agencies.

*Food Security.* Similar to the status quo, this policy allows land to be excluded from the Reserve and makes it possible to subdivide and pursue non-farm activities, given ALC permission. The amount of land producing food is likely to decrease as municipalities submit applications to the ALC. This decrease may happen more slowly than it would under the status quo, but the overall amount of local food consumption is likely to remain at approximately 48 percent. This policy is rated Low for food security.

### 7.3 Policy Alternative 3: Protected Zone

*Effectiveness.* This policy would reduce the quantity of land that can be excluded from the Reserve. However, it could have interesting implications for the land located outside of the

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37 Interview #4 (February 13, 2008).
protected zone, where there might be more applications to exclude land.\textsuperscript{38} I estimate that overall, the percentage of land excluded in the next ten years under this policy would be less than 0.5 percent. There might also be an increase in the number of applications to subdivide and pursue non-farm activities on land within the protected zone. In New Jersey’s Pinelands Reserve, roughly six percent of the land decreased in quality between 1975 and 1986 (Walker and Solecki, 1999). I estimate that under this policy, the quality of land within the reserve would continue decreasing by at least 0.2 percent over the next ten years. However, the ALC may be able to better manage these risks with a larger support staff. This policy is rated Medium for boundary strength and Low for reserve land quality.

Cost. The cost of administering this policy would be higher than $3 million because of the additional costs associated with managing a new highly protected zone and increasing the size of the ALC staff. Given that this policy is highly similar to that of New Jersey’s Pinelands Reserve, I use their expenditures to help me estimate its cost. The operating cost of the Pinelands Reserve in 2007 was $4,804,730 in U.S. dollars (NJPC, 2006). However, 83 percent of this total was spent on personnel. In order to accurately reflect the likely cost of this policy, I add the remaining 17 percent of the NJPC expenditures to the cost of funding 33 ALC employees.\textsuperscript{39} This yields a total of $3,126,804. This policy is rated Low for cost, meaning that its cost is high.

Acceptability. In order to assess the acceptability of this policy to farmers, I examine the percent increase in the average total income of New Jersey farmers between 2005 and 2006, which was 5 percent (USDA, 2008). Given that this policy is similar to that of New Jersey’s Pinelands Reserve, these statistics illustrate that the presence of a protected zone may not change the rate of increase of average total incomes for farmers. This policy has a significant impact on the decision-making power of landowners within the protected zone, as they would no longer be

\textsuperscript{38} This was confirmed by Interview \#1 (February 5, 2008), Interview \#2 (February 8, 2008), and Interview \#4 (February 13, 2008).

\textsuperscript{39} I have added U.S. dollars to Canadian dollars because the exchange rate is close to even. I have assumed that the value of each full-time staff position is $70,000 per year including benefits.
able to apply to exclude their land from the ALR. Two key stakeholder interviews revealed that real estate developers are unlikely to favour this option, but environmental advocacy groups would.\textsuperscript{40} This is because this policy places a limit the amount of land available for future development and prevents development from happening in areas with prime farmland. In BC, prime farmland tends to be located in areas where property values are relatively high. Given the difficulty of designing and regulating a protected zone, this policy involves major changes to existing ALR regulations. All relevant government agencies are likely to prefer alternatives that do not entail changes to existing policies. This policy is rated Low among farmers, Low among real estate developers, High among environmental advocacy organizations, and Low among governmental agencies.

\textit{Food Security.} Unlike the first two alternatives, this policy prevents exclusion from taking place in the parts of the ALR with the highest agricultural capability. Although the amount of exclusion happening in other parts of the Reserve could increase, the policy is likely to safeguard a large portion of prime farmland that will be available for food production in the long-run. Nevertheless, it is unlikely to increase the amount of local food production and consumption within the next ten years. I estimate that the percentage of local food consumption will remain at approximately 48 percent. This policy is rated Low for food security.

7.4 Policy Alternative 4: Exclusion Moratorium

\textit{Effectiveness.} Upon implementation, this policy would entail reviewing official community and agricultural area plans with municipalities and establishing growth and density targets. This may involve adjusting the boundaries of the ALR in certain places. However, after the necessary adjustments are made, no further land could be excluded, ensuring that the boundaries of the ALR would not change. The percentage of reserve land excluded over the next ten years would be close to 0 percent. This policy may increase the number of applications to

\textsuperscript{40} Interview #3 (February 12, 2008) and Interview #4 (February 13, 2008).
subdivide and pursue non-farm activities on reserve land, decreasing the overall quality of the land within the boundaries of the ALR. I estimate that 0.2 percent or more of the land within the Reserve would decrease in quality. This policy is rated Medium for boundary strength and Low for reserve land quality.

Cost. During its first phase of implementation, which is expected to last two years, this policy is likely to cost $2,550,200 each year. About $525,000 of this expenditure would be devoted to the municipal planning process. After the initial implementation period is over, this policy is likely to cost $2 million or less annually for the ALC to administer because it would decrease the total number of applications that the Commission must process. This policy is rated Medium for cost.

Acceptability. Having a permanent and secure supply of prime farmland may increase the rate at which the average total income of BC farmers grows. This is due to the likelihood that the price of farmland would stay relatively low, decreasing debt and property tax payments and making it easier to expand existing farm businesses or begin new ones. In addition, one key stakeholder confirmed that farmers would welcome policies that include a review of existing ALR boundaries so that the quality of the farmland within the Reserve can be closely examined. By placing a moratorium on excluding land from the Reserve, this policy severely limits the decision-making power of ALR landowners. Stakeholder interviews revealed that it is likely to be unpopular among real estate developers and popular among environmental advocacy organizations. Relevant government agencies are likely to favour alternatives that require fewer changes to existing ALR policies. In particular, it would require a significant amount of work

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41 I assume that the planning phase would involve 7.5 full-time equivalent positions each year for two years at the ALC and the Ministry of Agriculture and Lands. I assume that the value of each full-time staff position is $70,000 per year including benefits. I add this cost to the cost of the status quo, which is $2,025,200.
42 Interview #4 (February 13, 2008).
43 Interview #3 (February 12, 2008) and Interview #4 (February 13, 2008).
from ALC staff and municipalities during the initial planning process.\textsuperscript{44} It is likely to be especially unpopular among municipalities that face significant population growth. This policy is rated Medium among farmers, Low among real estate developers, High among environmental advocacy organizations, and Medium among governmental agencies.

\textit{Food Security}. Despite the possibility that some land within the Reserve will decrease in quality due to landowners applying to subdivide and pursue non-farm activities, this policy permanently protects a large amount of farmland. This implies an increase in the quantity of local food production and consumption in the future. Under this policy, the percentage of local food consumption in BC could reach more than 65 percent within the next ten years. This policy is rated Medium for food security.

\textbf{7.4.1 Evaluation Summary}

Table 5.2 summarizes the results of this policy analysis, using the four policy alternatives and the established criteria and measures.

\textsuperscript{44} This was confirmed by Interview \#2 (February 8, 2008).
<table>
<thead>
<tr>
<th>Criteria</th>
<th>Alternative 1</th>
<th>Alternative 2</th>
<th>Alternative 3</th>
<th>Alternative 4</th>
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<td>Protected Zone</td>
<td>Exclusion</td>
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<td></td>
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<td>Management</td>
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<td>Moratorium</td>
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<td>Medium (2)</td>
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7.5 Policy Recommendation

Given the short-term objectives and the policy evaluation criteria, the Exclusion Moratorium policy is the best way to strengthen the ALR. Unlike the other three alternatives, it would likely succeed in increasing the amount of local food that is grown and eaten in the Province. It could also decrease the amount of speculative land purchasing within the ALR, lowering the price of farmland and making it more accessible to future farmers. Although the cost of managing the initial planning process with municipalities may be high, the operating cost over the course of ten years is likely to be lower than that of the other alternatives. Among stakeholder groups, municipalities and real estate developers are likely to be the least supportive of this policy because it restricts their capacity to change the fate of ALR land. However, such restrictions would be an integral component of any policy that maintains the current size and quality of the Reserve.

Prohibiting territory exclusion is a standard management policy of other North American reserves and is a characteristic of three of the case studies analyzed in this study. Although transitioning to a new ALR management policy may not be easy, the Exclusion Moratorium policy would receive widespread support from the general public. As highlighted in sub-section 2.2, BC residents have strong feelings about protecting the ALR.

Implementing this policy would first require changing the Agricultural Land Commission Act and announcing the new management policies to the public. The ALC would then initiate the comprehensive planning process with municipalities. Similar to the process that occurred when the ALR was first established, it would involve a team of agrologists and planners from the Ministry of Agriculture and Lands. For communities that have already developed Agricultural Area Plans, this process would include reviewing existing plans and establishing growth and density targets. Communities that have not yet adopted an Agricultural Area Plan may decide to initiate a public consultation process. It would likely take the ALC and the team from the
Ministry of Agriculture and Lands two years to develop and review plans in each municipality, during which the ALC would not accept other exclusion applications. After that period, the moratorium would go into effect.
8: Conclusion

Farmland in British Columbia provides residents with a wide variety of benefits including food and wildlife habitat, yet it is constantly under threat due to urban growth. The Agricultural Land Commission protects farmland by restricting non-farm uses within the Agricultural Land Reserve, one of the Province’s greatest assets. Since its inception in 1973, the ALC has weathered various changes to its mandate and management policies. Despite these fluctuations, it has succeeded in preventing the loss of many hectares of farmland across the Province. However, the ALC continues to approve applications to exclude and subdivide reserve lands, while including land into the Reserve that may never be suitable for agriculture.

In this study, I have explored ways to strengthen the ALR by examining the management policies of other North American reserves. Through a case study analysis, I discovered that other successful reserves have several main characteristics in common. These features include having a single management body, having a sizable support staff, having a highly protected zone, being part of a larger network of reserves, and prohibiting territory exclusion.

After carefully considering the history and current context of ALR, I established long and short-term objectives and translated the findings into a series of policy alternatives. These were maintaining the status quo, centralizing the management of the Reserve and restricting applications to municipalities, creating a protected zone and expanding the staff of the ALC, and placing a moratorium on applications to exclude land from the Reserve. Using a set of criteria and information from interviews with key stakeholders, I analyzed these policies and determined that an exclusion moratorium policy would be the best way to strengthen the ALR.
The ALR was established to protect farmland in BC and has the capacity to do so when managed carefully. However, the public must closely monitor ALR management policies and continue to demonstrate support for the preservation of agricultural land. Future research should investigate methods of increasing farm revenues and encouraging new farmers in order to strengthen the agricultural economy. Ensuring local food production and consumption in BC will require a strong agricultural economy and a strong ALR.
Appendix
Figure 1  British Columbia’s Agricultural Land Reserve

Dark grey areas denote ALR land.

Source: MAL (2008)
Figure 2  The Province of Quebec

Source: Guide to Quebec (2008)

Figure 3  Quebec’s Agricultural Zone

Black areas denote the agricultural zone.
Source: CPTAQ (2006)
Figure 4  The New Jersey Pinelands Reserve

The dark grey area denotes the New Jersey Pinelands.
Source: Walker and Solecki (1999)
**Figure 5** Oregon State and the Tillamook State Forest

The dark grey area denotes the Tillamook State Forest.
Source: ODF (2005)

**Figure 6** The Tillamook State Forest

The dark grey area denotes the Tillamook State Forest.
Source: ODF (2008)
Figure 7  The Florida Keys National Marine Sanctuary

The dashed line denotes the boundaries of the Florida Keys National Marine Sanctuary. Source: Florida (2008)
Bibliography

Works Cited


**Interviews**


Interview #2: Huntington, V. Council Member. The Corporation of Delta. Vancouver, BC. Interviewed on February 8, 2008.
