

A CASE-STUDY ANALYSIS OF THE
ALTERNATIVE LAND USE SERVICES PROGRAM (ALUS)

by

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DEDICATION PAGE

This thesis is dedicated to the Nova Scotia Agricultural College Class of 1956. Having been the first recipient of the *Class of 1956 Graduate Student Scholarship*, this thesis is a fruit of their labours as well as my own, the first of many.

Do nothing out of selfish ambition or vain conceit, but in humility consider others better than yourselves. Each of you should look not only to your own interests, but also to the interests of others.

— Philippians 2:3-4

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ABSTRACT

Agricultural landscapes provide vital ecological goods and services (EG&S) such as wildlife habitat, biodiversity and water resource protection. Traditionally, there has been no monetary value for non-agricultural EG&S that benefit society and thus no financial incentive to private landowners to help justify the production of EG&S. The Alternative Land Use Services (ALUS) concept is a Canadian grass-roots approach to compensate farmers for delivering EG&S. Using a case-study methodology, nine ALUS programs across Canada were researched with data consisting of site visits, review of in-house reports, and conversations with administrators, stake-holders and participating farmers. Findings indicate that ALUS, despite lacking definitive data on products in terms of environmental improvements, has been successful in the process of engaging farmers at the grass-roots level. These findings indicate that future ALUS programs should build upon these successes while establishing better environmental monitoring to attract program participating and funding.

LIST OF ABBREVIATIONS USED

AIC	Alternative Land Use Services Implementation Committee
ALUS	Alternative Land Use Services
APAS	Agricultural Producer Association of Saskatchewan
ARP	Acreage Reserve Program
BACI	Before After Control Impact Analysis
CAP	Common Agricultural Policy
CRP	Conservation Reserve Program
CVR	County of Vermillion River
EBI	Environmental Benefits Index
EFP	Environmental Farm Plan
EG&S	Ecological Goods and Services
EAC	External Advisory Committee
eNGO	Environmental Non-government Organization
KAP	Keystone Agricultural Producers
MBI	Market Based Instrument
NSFA	Nova Scotia Federation of Agriculture
PAC	Partnership Advisory Committee
PEI	Prince Edward Island
PFRA	Prairie Farm Rehabilitation Administration
RMB	Rural Municipality of Blanshard
SLCP	Sloping Land Conservation Program
SUMA	Saskatchewan Urban Municipality Association
USDA	United States Department of Agriculture

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Agriculture is responsible for the foundation of human civilization. Through manipulating natural systems, humans have been able to produce raw materials to feed and clothe us and enhance our lives. Agricultural landscapes are in essence managed ecosystems that can be divided into three subsystems: the human subsystems entailing anthropogenic infrastructure, the productive subsystems which are composed of our agricultural crops and livestock and the natural/semi-natural subsystems containing native vegetation and wildlife (Moonen and Barberi 2008).

Since the Green Revolution, the magnitude of nonpoint-source (NPS) pollution associated with agriculture has increased through the use of synthetic fertilizers, concentrated livestock production and the use of chemical pest control (Kareiva and Marvier 2011). This, coupled with an historically undervaluation of natural subsystems (e.g. wetlands and riparian zones) as “wasteland”, leading to their subsequent conversion to agriculture, has created numerous ecological problems through the loss and overloading of natural ecological functions provided by these lands (Iowa Department of Agriculture and Land Stewardship. 1999; France 2002; Kareiva and Marvier 2011).

The undervaluation of wild areas can in part be linked to the misleading market value of the goods and services provided by the land, that are traditionally limited to

produced commodities (Devanney and MacDonald 2009). This limitation has traditionally left no monetary value for non-agricultural good and services that benefit society and thus no financial incentive to private landowners to help justify their production.

1.2 ECOLOGICAL GOODS AND SERVICES

Ecological goods and services (EG&S) can be defined as any non-marketable good or service produced on land, natural or cultivated, that are of benefit to society. The production of terrestrial EG&S are most strongly associated with the productive and natural/semi-natural subsystems of agricultural landscapes. Ecological goods and services can be further subdivided into four categories: supporting, provisional, regulating, and cultural (Figure 1.1) (Millennium Ecosystem Assessment 2005a,b). Examples of EG&S range from riparian wildlife habitat, fertile lands, flood protection, water quality protection through phytoremediation, and recreational opportunities (Olewiler 2004; Millennium Ecosystem Assessment 2005a,b; Devanney and MacDonald 2009). Though non-market EG&S have been traditionally ignored by society, there has been a recent shift to recognize the role that private landowners play in the production of the EG&S.

Worldwide, there are numerous policies and programs that compensate producers for the production of EG&S. Examples of notable EG&S programs include: the Conservation Reserve Program (CRP) in the United States, provisions under the Common Agriculture Policy in the European Union, and the BushTender program in Australia.

In Canada, the Alternative Land Uses Services (ALUS) program is a novel, grassroots approach to conservation and environmental stewardship in agriculture

developed by farmers (Bailey and Reid 2004; Delta Waterfowl 2009). This approach is based on rewarding farmers who voluntarily provide EG&S using a market valuation approach wherein farmers are compensated for land taken out of production on an areal basis (Bailey and Reid 2004; Keystone Agricultural Producers 2004).

Although the ALUS concept has expanded across the country, research on the program is lacking in academic circles. Preliminary research has shown that while ALUS was well documented in popular media, as of February 2012, there had not been any peer-reviewed publications (Table 1.1). In comparison, the CRP, which is much older and implemented as national policy, has had hundreds of publications in fields ranging from economics, to ecology, to hydrology. Research on the ALUS programs has been undertaken, though this is so far only available in grey literature and has thus not been widely circulated. This research has also been program specific, pertaining to only one geographic program at a time (Lantz et al. 2012). There has been no integrative research looking at multiple programs in different jurisdictions across the country, in particular the evaluation of the various implementations of ALUS concept.



Figure 1.1 Ecosystem Goods and Services. Source: Millennium Ecosystem Assessment (2005a).

Table 1.1 Survey of ALUS in databases conducted February 2, 2012 using the terms “ALUS” and “Alternative Land Use Services”.

Data Base	Peer Reviewed Literature	Grey Literature Documents¹	Media Releases²	Graduate Student Theses	Total
World Cat [©]	-	-	1	-	1
Scopus [©]	-	-		-	0
Science Direct [©]	-	-	1	-	1
Agricola [©]	-	-		-	0
EBSCO [©]	-	-	1	-	1
Delta Waterfowl Foundation Website	-	-	22	-	22
Keystone Agricultural Producers Website	-	7	-	-	7
Norfolk County Federation of Agriculture Website	-	1	90	3	94
Prince Edward Island Department of Agriculture Website	-	2	-	-	2
Youtube [©] – ALUS Channel	-	-	2	-	2
Total	0	10	116	3	129

¹Grey literature consisted of factsheet, project proposals, project reports, consultant literature and graduate theses. ² Media releases included web based news releases, electronic copies of news releases, press releases and documentary videos.

1.3 ALTERNATIVE LAND USES SERVICES IN NOVA SCOTIA.

In Nova Scotia there exists no ALUS or similar program by which to compensate farmers annually on an areal basis for delivering EG&S (Devanney and MacDonald 2009). This is despite the fact that reports commissioned by the Nova Scotia Federation of Agriculture (NSFA) indicate that amongst agricultural producers, there is interest for developing an EG&S compensation system such as ALUS (Kelco Consulting 2009a,b). These reports came after preliminary research on costs/benefits of EG&S and the impact a delivery program would have on farmers which was undertaken by the NSFA. This research included an EG&S pilot project in the St. Andrews Watershed, located in Colchester County (Government of Canada 2007). Important findings from this research included that the amount of participation in an EG&S program increased when financial incentives extend beyond the first year; and that increased outreach is needed to encourage non-conventional farmers, such as hobby-farmers to participate in such initiatives (Kelco Consulting 2009a,b). The study also found that agricultural producers value the environment and make management decisions based on each individual's attitude. However, capital investments in environmental projects are usually not made on-farm for benefits without factors such as regulations or incentives swaying the farmer decision making process.

Given that the NSFA has independently initiated EG&S research and a pilot program, it is time to synchronize their work with the growing nationwide grassroots movement of ALUS. This increased communication will undoubtedly reduce redundancies and misinterpretation by allowing networking and cumulative knowledge to

guide policy and development of the province's own grassroots environmental stewardship movement.

1.4 THESIS GOALS OBJECTIVES

Given the nascent development of the ALUS concept, there has been no single systematic comparison of all the various ALUS incarnations across the country. Using the general case-study methodology established by Francis (1999), developed through site visits, analysis and interpretation of the grey literature, and meetings and interviews with program coordinators, my goal is to generate the first comprehensive case-study of ALUS programs in Canada. Specifically my objectives are to:

1. Generate case-studies of ALUS programs across the country, spanning the development range from those just being established, to those presently in operation, to those that have run their course and expired. This work will focus on comparing the strengths, weaknesses, and recurring themes of these various programs.
2. Using insight gleaned from objective 1., to provide insight into program development for expanding ALUS programs elsewhere in Canada. In particular, Nova Scotia will be used as a reference given the interest expressed by the NSFA in developing an ALUS program within the province.

CHAPTER 2 LITERATURE REVIEW OF RELEVANT ENVIRONMENTAL PROGRAMS IN AGRICULTURE

2.1 INTRODUCTION

In agricultural landscapes, conservation initiatives can be loosely segregated into two major management approaches, land-sparing and land-sharing. Traditional conservation and the protection of ecosystem goods and services (EG&S) fall under the overarching category of land sparing which focuses on intensively managing optimal crop land for high yielding agriculture, leaving less valuable marginal land in a natural state (Grau et al. 2013; Byerlee et al. 2014). Facilitated by agricultural research and technological developments, increased crop production has predominantly happened on existing crop land in recent history. (Byerlee et al. 2014). However the scientific community has not accepted land sparing as the best way to conserve natural ecosystems and their goods and services.

Contrasting land sparing approaches to conservation, land sharing encourages and integration wildlife and agriculture in a mutually beneficial fashion. Land sharing approaches are incorporated into heterogeneous landscapes with high variability in land use, crops and topography, and socio-economic factors, such as site history and farm size, can also favor the use of land sharing approaches (Fischer et al. 2008; Grau et al. 2013; Byerlee et al. 2014). Although land sharing increases wildlife -based EG&S, it favours species that are adapted to and benefit from human disturbances (Grau et al. 2013).

Although land sparing and land sharing are contrasting approaches conservation, they should not be considered mutually exclusive (Fischer et al. 2008). For example wildlife friendly agriculture can complement land sparing approaches in homogeneous landscapes by reducing habitat fragmentation. Similarly, wildlife reserves in landscapes that favor land sharing will help facilitate species and EG&S that are intolerant of human disturbance (Fischer et al. 2008; Grau et al. 2013).

To facilitate conservation and the production of EG&S, government agencies and environmental non-government organizations (eNGOs) have begun using market based-instruments (MBIs) (Jackson et al. 2007). The term MBI is applied to any incentive that is loosely tied to economic principles, applying a financial value to EG&S (Table 2.1) (Pirard 2012; Robert and Stenger 2013). Presented as an alternative to regulatory approaches, MBI's provide land-use decision makers information and incentive to protect and enhance EG&S to incorporate the economic value of EG&S. Applications of MBI's range from direct payments for EG&S, product certification processes, taxes and compensation for the opportunity production of intangible services.

The concept of financially compensation for EG&S through MBI's is not without flaws. When only single ecosystem services are valued financially (e.g. carbon sequestration though carbon credits), focusing production may impair the production of undervalued or unknown EG&S (e.g. climate change mitigation, biodiversity, etc.) (Robert and Stenger 2013). This can be mitigated by "bundling" multiple ecosystem services. However, when the opportunity cost of encouraging a specific EG&S is higher than its associated value, "stacking" or paying for multiple services individually, especially when

produced without additional expense, can be used to address this costs.

Mitigation banking or ecosystem “credits” are also hotly debated. Often used by industry to compensate for destructive land development with new natural areas of equal or greater size, mitigation banking programs do have positive impacts for habitat reclamation, and the protection and enhancement of existing natural capital (Burgin 2008; Walker et al. 2009). Critics highlight that mitigation and banking is often done without sufficient data, long term monitoring and are often inadequate compensation for damaged or destroyed natural capital and associated EG&S.

This chapter examines existing programs that have been implemented to facilitate environmental stewardship in agricultural landscapes that are relevant to the ALUS program. These programs, which use MBI’s, have been influential to the development of ALUS and other environmental programs with both land sparing and land sharing goals and have been widely implemented in their respective regions.

Table 2.1 MBI’s used to promote EG&S. Source: Pirard (2012)

MBI Mechanism	Example
Coarsean-type agreements	Payment for Ecosystem Services such as the Alternative Land use Program (Section 2.5), Environmental Farm Plans (Section 2.4)
-	
-	
Direct Payment	Non-timber forest products, eco-tourism
Reverse Auction	Payments for ecosystem services, BushTender (Section 2.2), Conservation Reserve Program (Section 2.1)
-	
Regulatory price signals	Environmental taxes
Tradable Permits	Developmental offsets, carbon credits
Voluntary price signals	Certification (organic, fair trade)

2.2 CONSERVATION RESERVE PROGRAM (USA)

The Conservation Reserve Program (CRP) is the United States' largest average retirement program of environmentally sensitive and fragile lands (Ribaud et al. 2001) and is administered by the United States Department of Agriculture's (USDA) Farm Service Agency. As of the 43rd general sign-up in 2012, there were 29.6 million acres (12 million ha) enrolled in the program (United States Department of Agriculture 2012). From its first inception as a commodity reduction and soil conservation tool, the CRP has seen many changes in its 50-year history. Currently, the CRP is heralded for wildlife and habitat enhancement and other ecological goods and services (EG&S) the program's enrolled lands can deliver.

2.2.1 Soil Banking Program

The modern CRP can be traced back to the USDA's Soil Banking Program, which ran from 1956 to 1960. Spurred by declining net farm incomes due to surplus commodity production, the Soil Bank was designed to reduce acreage of crops (wheat, rice, corn, tobacco, cotton and peanuts) and to conserve soil, while maintaining farm income (Helms 1985). During the life of the program, 28.7 million acres (11.6 million ha) were enrolled, 2.2 million acres (890,000 ha) of which was planted in trees (University of Georgia 2003). As of 1992, 80 percent of this acreage was still under forest cover in either original, successional forest, or replanted forests. The Soil Bank used two programs to allow farmers to voluntarily retire land: the Acreage Reserve Program (ARP) and the

Conservation Reserve Program (Helms 1985).

The ARP was designed for immediate reduction in acreage of productive agricultural land and was administered annually before being eliminated in 1958 (Helms 1985). The ARP suffered heavy criticism for not being effective for a variety of reasons. The ARP's immediate goal was to decrease agricultural commodity crop levels; however, enrolled land was often marginal and thus contributed little to a reduction in total production yields. Secondly, commodity land enrolled under the ARP only limited the production of one specific crop at a time and policy loopholes allowed farmers to produce other commodity crops on the enrolled land, defeating the purpose of the program. For example, land enrolled under the ARP for wheat could still be used to grow tobacco, which was also being targeted by the ARP program. This deficiency was amended with stricter regulations in 1958 that stated that ARP lands must be completely removed from production. It was also argued that larger farms were more easily able to utilize the program to their benefit compared to smaller farms, which led to the creation of a payment cap of \$3000 per farm in 1958.

The initial conservation reserve was based on the retirement of marginal lands for extended contracts (Helms 1985). Contracts were offered in three, five and ten-year durations with the last favoring reforestation efforts. Producers were also eligible for 80 percent cost share assistance from 1956 to 1958 for cover plantation and management. After 1958, cost-share assistance for cover establishment and management was reduced to be on par with cost share under the Agricultural Conservation Program.

Initial enrollment in the CRP component of the Soil Banking program was low due to inferior payment rates of \$10/acre, when compared to the ARP's rates of \$18/acre (Helms 1985). The CRP's enrollment rose in 1959 with the termination of the ARP and development of incentives to encourage long term enrollment. To increase enrollment, the national payment average of the CRP rose to \$13.50/acre with an additional 10 percent premium paid for whole farm enrollment on a five-year contract. Payments at this time were restricted to 20 percent of the value of the market value of the enrolled land. In 1960, further amendments were added to restrict eligible land to those that had been owned for at least three years. The program was terminated after 1960. However, enrolled lands received payments until 1973.

2.2.2 Modern Conservation Reserve Program (1985 – Present)

The modern Conservation Reserve Program was introduced into American agricultural policy in the 1985 Farm Bill (Dunn et al. 1993; Ducks Unlimited Incorporated 2013). The primary goal of the new CRP was to control erosion in marginal land (Dunn et al. 1993; Rao and Yang 2010; Ducks Unlimited Incorporated 2013). Secondary goals of the CRP included protecting water quality, enhancing wildlife habitat (Dunn et al. 1993; Rao and Yang 2010), controlling commodity production (Rao and Yang 2010), and providing financial support for agricultural producers. The CRP has remained an integral part of American agriculture and has been re-instated in subsequent Farm Bills in 1990, 1996, 2002, and 2008.

Working on a reverse auction structure, farmers enter bids on environmentally sensitive and marginal land parcels, prone to erosion, drought, flooding or are unfertile, to the USDA. The lowest bids win contracts and receive annual payments and cost share assistance for establishment of ground cover (Dunn et al. 1993; Ducks Unlimited Incorporated 2013). Bids are capped at a maximum that is on par with regional land rental rates. This upper limit is imposed to prevent market distortion though rising land prices (Shoemaker 1989).

In 1990, the addition of the Environmental Benefits Index (EBI) was introduced to the program in an attempt to maximize the environmental benefit per dollar invested (Ribaud et al. 2001). Land offers were scored on their ability to improve soil resources and water quality, provide wildlife habitat, and/or other environmental benefits, as well as the financial bid. In 1995, a more refined EBI with six components was created (Table 2.1). The revised EBI implemented equations that calculated each component's scoring based upon the characteristics of the land being offered. (Osborn 1997).

Table 2.2 Conservation Reserve Program EBI. Source: Osborn (1997)

EBI Factor	Maximum Weight
Government cost of the contract	200
Wildlife habitat benefits	100
Water quality benefits from reduced water erosion, runoff, and leaching	100
On-farm benefits of reduced wind or water erosion	100
Long-term benefits of certain practices that will likely extend beyond the contract period	50
Air quality benefits from reduced wind erosion	25
Benefits from enrollment in conservation priority areas when the offer significantly contributes to the priority area concern	25

2.2.3 Ecological Goods and Services Delivered

Though originally designed to reduce soil erosion, the CRP has long been heralded for many other EG&S provided by its enrolled lands. The wildlife habitat value of CRP lands has been linked with increased populations of upland game birds, waterfowl, and deer (Bangsund et al. 2004). Increases in these species have also resulted in rising participation in hunting, as well as a positive economic impact by local and non-local sportsmen. Many non-game species have also benefited from the conservation reserve program. One study reported that Henslow's sparrow (*Ammodramus henslowii*), a species that is of concern due to population decline, increased in population size in areas with a higher percentage of land enrolled in the CRP (Herkert 2007). Non-wildlife benefits of the CRP have included: improved hydrology and groundwater recharge (Rao and Yang 2010), the limiting of urban sprawl (Johnson and Maxwell 2001), and carbon sequestration (Dunn et al. 1993). All of these benefits have generated tremendous support for the CRP outside the agricultural community, particularly by conservation organizations and other non-government organizations (NGOs).

2.2.4 Future of the Conservation Reserve Program

With surging agricultural commodity prices there is concern about the future of the CRP (Atwell et al. 2010). Higher crop prices and improved margins may decrease new acreages enrolled by farmers as well as bring retired land back into production. This will have dire consequences for many species that have benefited from the program. A study undertaken

in 16 counties of North Dakota indicated that on average, 72 percent of land enrolled in the CRP would be returned to agriculture, should the program be phased out (Bangsund et al. 2004). If this estimate were to be applied to the 29 million acres currently enrolled in the CRP (United States Department of Agriculture 2012), it would result in 21 million acres of sensitive land returning to cultivation.

2.3 BUSH TENDER (*AUSTRALIA*)

Australia has extensively used reverse auctions, in which landowners competitively submit bids for undertaking environmental projects, to address conservation issues (Windle and Rolfe 2008). These programs have targeted salinity control, water quality, and/or biodiversity (Government of Australia 2004). The first conservation reverse auction tender scheme that garnered international attention was the BushTender (Freeman and Seabrook 2006), which was developed to address the issue of managing natural capital on privately held land in the Australian state of Victoria (Stoneham et al. 2003, Government of Australia 2004, 2012, Freeman and Seabrook 2006). Within the state, 29 percent of the areal coverage of native vegetation (one million hectares (Stoneham et al. 2003)) is held by private land owners and of this, 60 percent of the flora is of conservation concern in terms of supporting nearly one third of the threatened fauna (Government of Australia 2012).

2.3.1 The 2001-2003 BushTender Trials

Two trials of the BushTender program were conducted in the regions of north-east/north-central Victoria (2001/2002) and Gippsland (2002/2003) (Freeman and Seabrook 2006). During these two trials, 106 landowners successfully bid and received conservation tenures for over 4800 ha (Freeman and Seabrook 2006, Government of Australia 2012), much of which was of conservation significance. In north-east/north-central Victoria, 73 land tenures were signed for an enrollment duration of three years, while in the Gippsland trial, 33 contracts were signed for three (1) or six year (32) durations (Freeman and Seabrook 2006). Extended protection contracts were also offered at the expiry of the tenure in the Gippsland trial, of which half of the landowners opted for either an additional ten years or permanent protection.

2.3.2 Reverse Auction Benefits

Part of the success of the BushTender program has been its economic efficiency. Generally, while tender programs have higher initial developmental costs, they have similar operation costs to grant programs and can be more efficient in allocating limited budgets (Windle and Rolfe 2008). It was calculated that the north-east/north-central Victoria (2001/2002) BushTender secured and preserved seven times more biodiversity (Stoneham et al. 2003) and 25 percent more area of native vegetation, than a grant scheme would have achieved with the same budget (Stoneham et al. 2003; Government of Australia 2004).

Despite success in the BushTender trials, reverse auctions are not always successful. If there is a poor auction or contract design, no variation in farm land opportunity cost, or too few bidders, reverse auctions will be inefficient (Windle and Rolfe 2008). In the 2001/2002 Victoria trials, auction administrators withheld information about a land tender's natural capital to prevent market distortion (Stoneham et al. 2003). The principle of the reverse auction is to submit bids on the opportunity cost of removing land from production and to carry out conservation work, not a premium for the presence of rare species. Stoneham et al. (2003) argued that while there are advantages to withholding information about natural capital, disclosing a land's net capital in terms of biodiversity would encourage private investment in natural capital, and align government priorities with potential bidders.

2.3.3 Current Status

With the success of the original BushTender trials between 2001 and 2003, the program has been offered annually between 2006 and 2012 in 13 regions of Victoria and for a second time in the North East regions (Government of Australia 2012). Over the span of ten years Victoria's BushTender has accepted bids for 33,000 ha to be maintained under conservation contracts (Government of Australia 2012) and the concept has spread to many other EG&S programs offered in Australia such as CarbonTender and Land Management Tenders (Government of Australia 2004).

2.4 ENVIRONMENTAL FARM PLAN (*CANADA*)

The first Environmental Farm Plan (EFP) program was initiated as a pilot in 1993 in Ontario (Ontario Ministry of Agriculture, Food and Rural Affairs 2012; Eastern Canadian Soil and Water Conservation Center 2013), and has since been replicated in all Canadian provinces. The program, which is run by farm organizations with support from federal and provincial governments, generally consists of three main components:

1. Education – Normally in the form of producer workshops.
2. Plan Development – Combination of third-party farm assessments and/or independent proposals for environmental upgrades.
3. Plan Implementation – Access to funding for environmental upgrades and an eventual assessment of the implementation.

2.4.1 Funding Access

Funding for environmental upgrades is available through federal and provincial government programs through cost-share arrangements, and many funding sources are linked to participation in an EFP (Robinson 2006). In the province of Nova Scotia, cost-share assistance through EFPs range between 25 and 90 percent of the cost of environmental projects (Nova Scotia Department of Agriculture 2011). Non-government organizations also provide financial assistance through EFPs, which can cover up to 100 percent of the cost for specific environmental projects. For example, Ducks Unlimited

Canada will fund any wetland creation project on agricultural land as well as provide ongoing maintenance at no expense to the farmer.

2.4.2 Participation in Agriculture Community

The program has generally been well received by agricultural producers. Ontario has had over 35,000 EFP participants since 1993, with 95 percent of participants saying they would recommend the program to other producers (Ontario Ministry of Agriculture, Food and Rural Affairs 2012). As of January 2012, within Nova Scotia, 1,697 producers have participated in the EFP program (Fulton 2012).

Many farmers are drawn to the EFP due to its bottom-up nature in terms of being directed by farm organizations as opposed to government, as well as the voluntary approach of the program (Robinson 2006). Interestingly, farmers do not regard the financial impact of the programs as of premier significance in their decision to participate (Robinson 2006; Atari et al. 2009). However, many do feel that more financial incentive would increase participation amounts non-adopters.

2.4.3 Criticism

Due to the farmer-directed nature of the Ontario EFP, environmental issues such as erosion and nonpoint source pollution have assumed precedence (Robinson 2006). While these impacts are serious, other environmental issues such as wildlife habitat fragmentation and threatened biodiversity are often overlooked and ignored using this approach.

Program uptake has not been uniform across all agricultural sectors. Cattle (beef and dairy) farms have been more likely to develop and implement an EFP than crop-based farms (Robinson 2006; Atari et al. 2009). This uneven uptake of the program could be caused by financial barriers (Robinson 2006). These financial barriers may be caused by farm size, market conditions, and/or the opportunity cost of land lost to environmental projects. This can be supported by findings from Nova Scotia, indicating that higher gross farm incomes were related to increased participation in EFPs (Atari et al. 2009).

In 2008, EFPs, as part of the Agricultural Policy Framework of 2003, were criticised for a lack of monitoring and proof of positive impact (Government of Canada 2008b). A lack of transparency for program operational expenditure was also cited. These criticisms aside, it was noted that implementations of many environmental upgrades that were based on scientific research likely did deliver environmental enhancement. These criticisms have been acknowledged by their corresponding government departments and have been addressed with the following recommendations:

- Better defined result chains linking environmental projects with EG&S provided.
- Better identification of measurable environmental benefits and improvements.
- Improved information collecting and reporting on both project outcomes and operations.

2.5 ALTERNATIVE LAND USE SERVICES (*CANADA*)

The Alternative Land Use Services (ALUS) concept was first conceived by Delta Waterfowl and Keystone Agricultural Producers (KAP) of Manitoba in the late 1990s. The premise of developing ALUS was simple: create a scheme that incentivises farmers to produce EG&S in the place of, or alongside, crops and livestock (Bailey and Reid 2004; Keystone Agricultural Producers 2004; ALUS 2011b). Delta Waterfowl based much of the developmental process of ALUS on a previous program, the Adopt-a-Pothole program (AAP) (Olson 2012). The AAP program, started in 1991, worked with landowners to protect small “pothole” wetlands nestled within agricultural fields (Delta Waterfowl 2013a). It has been estimated that these privately owned potholes are responsible for producing up to 70 percent of North America’s waterfowl. Delta Waterfowl biologists worked with farmers to sign 10-year contracts to protect these small wetlands and their surrounding upland habitat (Delta Waterfowl 2013b). The program has since evolved to a wetland easement program, the largest in Canada, with wetlands secured in perpetuity by Delta Waterfowl and maintained through the Manitoba Habitat Heritage Corporation.

During the initial phase of the AAP program, which was considered very successful, Delta Waterfowl staff learned many lessons about the realities of conservation on privately held land (Olson 2012). The first lesson they learned was that farmers are the most knowledgeable about their land and were both willing and able to more effectively deliver EG&S from working landscapes compared to outside conservation groups. Secondly, traditional desires by conservation biologists in terms of creating large nature preserves and regulations may be misplaced. The creation of large preserves in agricultural

areas is financially unfeasible for conservation groups and economically for the regions in question. Environmental regulations have been shown to be both expensive and ineffective in agriculture due to the large scale and diversity with its sub-sectors, when compared to other industries, such as mining or manufacturing (see Barnes et al. 2012, and references therein). By working with farmers, Delta Waterfowl staff also learned that farmers are far more willing to be involved in environmental programs when they are undertaken on a short-term basis. In other words, long-term or permanent easements are often unappealing to landowners (Olson 2012). Maintaining flexibility and control in the decision making process of their land is of key importance to many farmers. A third lesson learned was farmers like straight lines in their landscapes. Some locations that have established agricultural setbacks from watercourses and wetlands do so with a fixed linear distance, such as Prince Edward Island's 15-meter buffer regulation (Government of Prince Edward Island 2012a). This method creates fields with uneven boundaries with setbacks will reflect the outline of the water body, which cause over and under-lap when working land thus increasing the farmer's production cost. When given the option, farmers much prefer to do setback with strait lines preventing overlap while protecting water courses.

2.5.1 Principles

The ALUS concept was developed to deliver EG&S from privately held agricultural landscapes. To facilitate this, the programs operate on the following six core principles (Bailey and Reid 2004; Keystone Agricultural Producers 2004; ALUS 2011c):

- Participation in the ALUS program is voluntary.
- The amount of land enrolled in ALUS is capped at a maximum to maintain an agriculturally based landscape.
- ALUS was designed to be integrated into existing policy, conservation initiatives and incentive programs so as to compliment them rather than compete against them.
- Lands that are deemed of marginal productivity or of noted environmental fragility are the primary target of the ALUS program, with the intention being to retire or alter cultivation practices for ecological benefits.
- In addition to being voluntary, ALUS is meant to be flexible with short-term contracts. Farmers are also permitted to withdraw from the program earlier than the contract specified duration, but will have to reimburse payments received.
- To comply with trade obligations, ALUS programs must be “production neutral”; meaning the program must be compliant with World Trade Organization green box policies. These green box policies allow payment for conservation and environmental projects, as well as research, crop insurance, extension work and other policies associated with agriculture that do not distort production or provide price support for agricultural producers. (International Center for Trade and Sustainable Development 2009).

2.5.2 Current Status

Alternative Land Use Services programs have been established in five Canadian provinces to date (Table 2.3) and has evolved to use both land-sharing and land-sparing approaches to match local agriculture and conservation needs. Currently, there are five programs in Ontario and two in Alberta that are operated at a county level. In Saskatchewan, there is one program, involving four rural municipalities. Prince Edward Island (PEI) is the only province to have implemented ALUS as a provincial policy. Manitoba, which was the location of the first ALUS pilot, no longer has an operating ALUS program though there is interest from both farmers and conservation groups to restart the program in the future.

Table 2.3 Summary of Canadian ALUS programs as of October 2012.

Province	Area	Year	Status
MB	Rural Municipality of Blanshard	2006 – 2008	Expired
ON	Norfolk County	2007 – Present	Established
PE	Province Wide	2008 - Present	Established
AB	County of Vermillion River	2010 – Present	Established
ON	Grey/Bruce Counties	2011 – Present	Established
SK	Rural Municipalities of South Qu’Appelle, Indian Head, Lajord and Francis	2011 - Present	Development
AB	Parkland County	2012 – Present	Established
ON	Bayham	--	Development
ON	Caledon	--	Development

2.6 OTHER PROGRAMS

This overview of agri-environmental policies is just a snapshot of numerous programs worldwide. Other notable approaches include the Common Agricultural Policy (CAP) of Europe and Sloping Land Conservation Program (SLCP) of China, as well as countless others that work to restore natural capital and incentivizing the production of EG&S. The European Union's Common Agricultural Policy (CAP) is the overarching policy that governs agricultural policy. The program has shifted from providing price support to a wide variety of agro environmental measures to mitigate the negative impacts of agriculture and maintain Europe's historic rural countryside (Baylis et al. 2006). China's SLCP which lasted from 2001 to 2010, was the largest land retirement program in the developing world with over 14 million hectares of reforested marginal land (Bennett 2008, Song et al. 2014). Table 2.4 summarizes these programs along others focused on in this chapter, indicating the approach used for conservation, administration and the EG&S delivered.

Table 2.4 Summary of agri-environmental programs reviewed in Chapter 2.

Program	Management Approach	Region	MBI	Conservation Approach	EG&S Delivered
ALUS	Bottom Up	Canada	Direct Payment	Land-sharing/ Land-sparing	Water Quality Wildlife Habitat Soil Erosion Air Quality Rural Aesthetics
BushTender	Top Down	Australia	Reverse Auction	Land-sparing	Wildlife Habitat Biodiversity
CRP	Top Down	USA	Reverse Auction	Land-sparing	Soil Erosion Wildlife Habitat
EFP	Top Down	Canadian Provinces	Direct Payment	Land-sharing	Water Quality Air Quality Wildlife Habitat
CAP	Top Down	European Union	Direct Payment	Land-sharing	Rural Aesthetics, Wildlife Habitat, Water and Air Quality
SLCP	Top Down		Direct Payment	Land-sparing	Soil Erosion Water quality

CHAPTER 3 METHODOLOGY

3.1 INTRODUCTION

At the time of this research there had not yet been a systematic evaluation of all the Alternative Land Use Services (ALUS) programs across the country. To meet the first objective of assessing and comparing the ALUS programs, each location was examined using a standardized case-study approach to provide a comprehensive cross-systems comparison. Descriptive case-studies were constructed using site visits, and existing publications and reports from the ALUS programs meetings. While conducting research in the locations that were home to ALUS programs, casual conversations were held with farmers. These discussions did reveal some important data that are relevant to this study and are presented in the thesis anecdotally and anonymously.

3.2 CASE-STUDY METHODOLOGY

Data collected from seven of the nine programs is presented in descriptive cases (Chapter 4). The remaining two programs, Caledon and Bayham, in Ontario, do not have their own sections as the data collected from these locations was limited by the very early stage of the programs' development. However, these cases are referred to during the discussion when applicable. The use of this multiple case-study approach allows for the presentation of organically occurring literal replication in ALUS program development, and theoretical

replication where clear developmental differences due to specific and unique considerations.

The units of analysis (i.e. the ALUS programs), for this descriptive case-study were examined individually with an adapted version of landscape architecture case-study methodology developed by Francis (1999). This methodology was modified to focus on the following aspects: agricultural and environmental history of the regions, developmental history and process of the ALUS with the study areas, and final product and the deliverables of the programs. Using this modified case-study methodology (Table 3.1), data were collected from grey literature documents and reports, my meetings with program coordinators, and site visits to established and future ALUS projects. Meetings with program coordinators were recorded at the time of my investigations in conjunction with my own written field notes. Casual conversations, which were not formally recorded, also took place on a by-chance basis with farmers who are currently or were once involved with the ALUS programs. Evidence from these conversations are included in the cases as anecdotal as they were not consistent between cases or actively solicited.

Although ALUS has been the subject of little study, research on landscape architecture is prominent in academia. My working assumption is that ALUS can be regarded as a specialized type of landscape architecture or land-use planning that focuses on the delivery of EG&S rather than aesthetic form. The data from each ALUS program was first transcribed into individual case studies, with data being sorted into overarching themes (i.e. Environmental History, Program Development, and etc), using field notes, recordings and any literature relevant to each individual ALUS program. Each case study

was then analyzed using a directed content analysis, examining the organized data for recurring trends, themes, and differences between the programs, based upon the theories laid out in the case-study methodology (Table 3.1) (Hsieh and Shannon 2005).

During the course of my research the case-study methodology was designed to limit bias and opinion and focus on facts. During my interviews with administrators and PAC members, and casual conversations with farmers the benefits and strengths, of ALUS as criticisms and areas of improvement were answered honestly and without bias.

Conclusions from the data are presented in Chapter 5 (Section 5.7). Findings are categorized and presented via recurring themes and lessons that arose from the data, as presented in France (2012). Comparisons and contrasts are illustrated showing under what settings, which phenomena occurred. Drawing from these conclusions, Chapter 6 attempts to illustrate how these lessons could be applied to the future development of a Nova Scotian program. In particular, Section 5.6 focuses on the environmental issues that projects could address, and suggests how to develop the support and the administration structure to implement such a program. The main focus of my research was on farmer uptake, administration, and development of ALUS. Program funding, although the advantages and disadvantages of their sources are briefly touched within, is not the focus of my research. In my conclusions I do not attempt to rationalize why ALUS should be funded or how funding should be allocated within individual programs.

Table 3.1 Landscape architecture case-study methodology from Francis (1999) modified for agricultural comparison.

Information	Description/Questions
Program Base Info	Where is the program? Who are the managers? How much land and what type of ALUS projects are enrolled? Number of producers enrolled?
Agriculture Base Info	Soil types and erodibility. What types of agriculture are in the area and the environmental issues? What are the natural ecosystems of the region and how has agriculture changed it? Are there any other environmental impacts?
Program Development	How was the program developed and why? Who were the main drivers for the program? What professionals were used to develop the program? How were farmers involved? How was the project modified over the course of development?
Goals	What were the program goals? How were they defined and by who? Were they changed during the project and how?
Financial	What was the initial project budget? What was the final budget? Was there a difference and why? What was the source of financial support?
Process	How was the program developed? How were EG&Ss selected?
Lessons Learned	What lessons were learned in the course of the project? How did they affect the project?
Outside Critiques	Input from industry/government that have been documented.
Definition of the Responses to Problem	What problems is the program trying to address? Where it/they resolved? How/why not? Were other problems solved?
Ancillary Use	Are the ALUS enrolled lands used in any way? Recreational use? Conservation use?
Unique Constraints	Were there any unique constraints? How were they addressed?
Community	How is the community served by the project? Social impact, meaning?

3.3 SITE VISITS AND RESEARCH DETAILS

Site visitations were a major research component for this project as they are critical components in the case-study methodology established by Francis (1999). Visits to the locations of the ALUS programs allowed for documentation of qualitative data and trends such as site conditions, community impacts and other important factors that were not conveyed through the technical literature. Proponents for ALUS argue that these qualitative aspects, such as community empowerment, are the key reasons underlying the success of the ALUS approach (Delta Waterfowl 2008; Bailey 2012). However, these have often been overlooked in third-party program assessments which often examine only the economics and conservation merits of the ALUS concept (Bailey 2012).

The ALUS programs were visited during three separate research trips. The first program visited was the Provincial ALUS Program of Prince Edward Island (PEI), undertaken in August, 2012. During this research trip, ALUS projects were toured to view land enrolled for the production of riparian and wetland EG&S as well as land retired from cash-cropping due to high erosion potential.

Four of the five ALUS programs in Ontario (Bayham, Caledon, Grey/Bruce County, Norfolk County) were visited in August, 2012 (Table 3.2). While in Ontario, site visits were comprised of attending meetings with program coordinators, tours of project sites within the programs, visitations of restoration projects by previous environmental programs in locations where ALUS programs were still in the developmental stage, and attending a Partnership Advisory Committee (PAC) meeting.

Alternative Land Use Services programs that were either under development,

established and running, or expired were visited in Manitoba (Rural Municipality of Blanshard), Saskatchewan (Rural Municipalities of South Qu’Appelle, Indian Head, Lajord, and Francis) and Alberta (Parkland County, and County of Vermilion River) during the third field trip. This research was conducted in October, 2012 (Table 3.3), and was comprised primarily of project site visits and meetings with program coordinators.

Table 3.2 Ontario research travel details.

Date	ALUS Program	Travel Details
August 13 2012	Grey/Bruce Counties	Sat in on Grey/Bruce County PAC meeting. Reviewed with ALUS Coordinator.
August 14 2012	Grey/Bruce Counties	Visited previous stewardship work in the counties.
August 15 2012	Caledon	Reviewed methodology ALUS coordinator.
August 16 2012	Caledon	Toured Caledon to view former stewardship projects, urban encroachment and Caledon’s agriculture sector.
August 20 2012	Bayham	Met with ALUS Coordinator.
August 21 2012	Norfolk County	Discussed methodology with ALUS coordinator. Viewed a tall grass prairie ALUS project.
August 22 2012	Norfolk County	Attended Norfolk County ALUS tour. Viewed retirement of marginal farmland, wetland creation and pollinator strips. Toured the farm of Norfolk ALUS PAC member.
August 23 2012	Norfolk County	Toured a farm participating in ALUS tree plantings and wetland creation.

Table 3.3 Western Canada research travel details.

Date	ALUS Program	Travel Details
October 1 2012	Rural Municipality of Blanshard	Discussed methodology with Delta Waterfowl Director of Conservation Policy.
October 2 2012	Rural Municipality of Blanshard	Viewed former marginal land retirement and wetland ALUS projects with former municipal councilor.
October 3 2012	Rural Municipalities of South Qu'Appelle, Indian Head, Lajord and Francis	Viewed the farms of potential ALUS participants
October 5 2012	Rural Municipalities of South Qu'Appelle, Indian Head, Lajord and Francis	Discussed methodology with Agricultural Producers Associate of Saskatchewan.
October 8 2012	Parkland County	Discussed methodology with ALUS coordinator.
October 9 2012	Parkland County	Viewed the ground breaking of the first ALUS project in Parkland County.
October 11 2012	County of Vermillion River	Discussed methodology with ALUS coordinator. View shelterbelt, wetland and marginal land retirement Projects
October 12 2012	County of Vermillion River	Viewed native prairie grazing, wetland and alternative watering projects.

CHAPTER 4 ALUS CASE-STUDY DESCRIPTIONS

4.1 INTRODUCTION

This chapter details my case-study research. The following sections describe seven of the nine Alternative Land Use Services (ALUS) program I visited in the summer and fall of 2012 (Table 3.2, 3.3) (Figure 4.1). The programs of Bayham, and Caledon, Ontario are not included in this chapter. With both of these programs still being very early in their development, there was not enough information to dedicate an entire section within this chapter. However, both are referenced in Chapter 5, where relevant.



Figure 4.1 ALUS programs as of 2012: Province-wide, PEI, County of Vermillion River, Alberta, Parkland County, Alberta, Four RM's near Regina, Saskatchewan, Little Saskatchewan River Conservation District, Manitoba, Norfolk County, Ontario, United Counties of Stormont, Dundas and Glengarry, Ontario, Municipality of Bayham, Ontario, Grey/Bruce Counties, Ontario, Caledon, Ontario. Source: www.alus.ca.

4.2 The Rural Municipality of Blanshard, Manitoba

The Rural Municipality of Blanshard (RMB), Manitoba was the location of the first ALUS pilot. Located 40 km north-west of Brandon Manitoba (Figure 4.2), the RMB consists of six townships with an area of 347.6 km² (Government of Canada 2012b). First settled in the late 1800's, Blanshard currently has a population of 526 (Government of Canada 2012b), and has an economy still dependent almost entirely upon agriculture.

At the time of my case-study investigation in 2012, the RMB's ALUS Program (2006-2008) had been expired for four years. Information for my research was collected from former administrators of the municipality and Delta Waterfowl staff that had been heavily involved in the development of this first ALUS. This case-study descriptions pays less attention to the agricultural and environmental properties of the RMB, instead focusing on the beginnings of the ALUS concept and the successes and shortcomings that have shaped the subsequent ALUS programs across Canada.

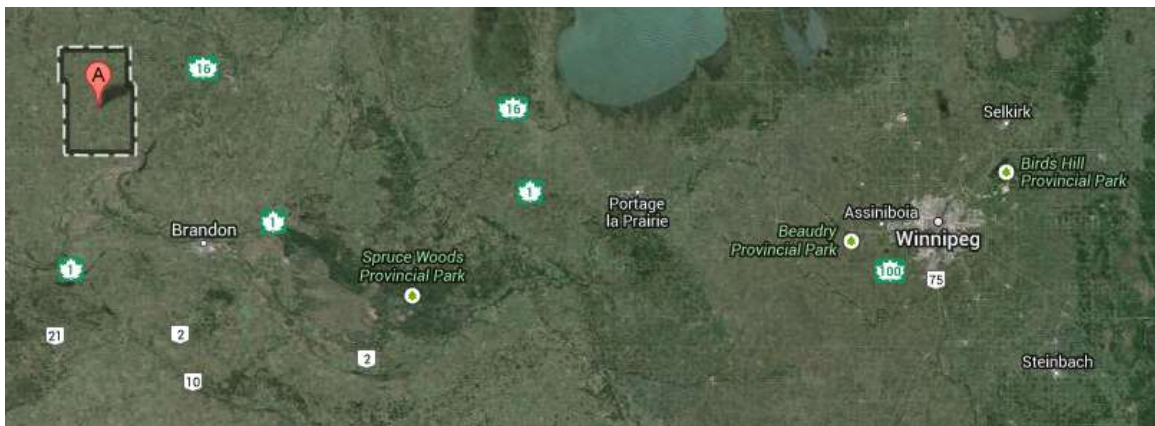


Figure 4.2 The Rural Municipality of Blanshard, Manitoba (A). Source: maps.google.ca.

4.2.1 Agricultural and Environmental Background

Agriculture is the economic backbone on which the residents of the RMB depend. Focused primarily on the production of grains and oilseeds, there are also some livestock operations within Blanshard. Cash crops dominate the landscape with over 40,000 ha dedicated to their production and only 5,400 ha being used to for the production of animal fodder and pasture, 1,690 ha of which is native prairie (Government of Canada 2011c).

Historic agricultural practices in the area were based on a two-year rotation with a year of summer fallow. The practice of summer fallowing involved a year of regularly scheduled primary tillage for weed control, though the continuous ground breaking created erosion and a tremendous impact on water courses. Improved agricultural methods have reduced environmental concerns with agriculture; modern no-till agriculture has greatly reduced the impact of erosion. However, increased frequency of cropping has negatively affected wildlife due to habitat loss and fragmentation as well as the breeding success of waterfowl that use agricultural fields for nesting (Podruzny et al. 2002).

Located on the eastern extent of the Canadian Prairie Pothole Region, the RMB is on the border between the true prairie and parkland prairie ecoregions. Agriculture has almost eradicated grasslands in Blanshard and the area of wetlands, known as sloughs and potholes, in the region has been reduced 20-40% due to drainage or alteration for agriculture (Fisher 2012). This change in the landscape can be seen clearly in historical records (Figure 4.3). Despite efforts to restore and create new wetlands, they are still being lost at a rate of two percent per year. Currently for each hectare of wetland being created, 20 are being lost due to drainage (Fisher 2012).

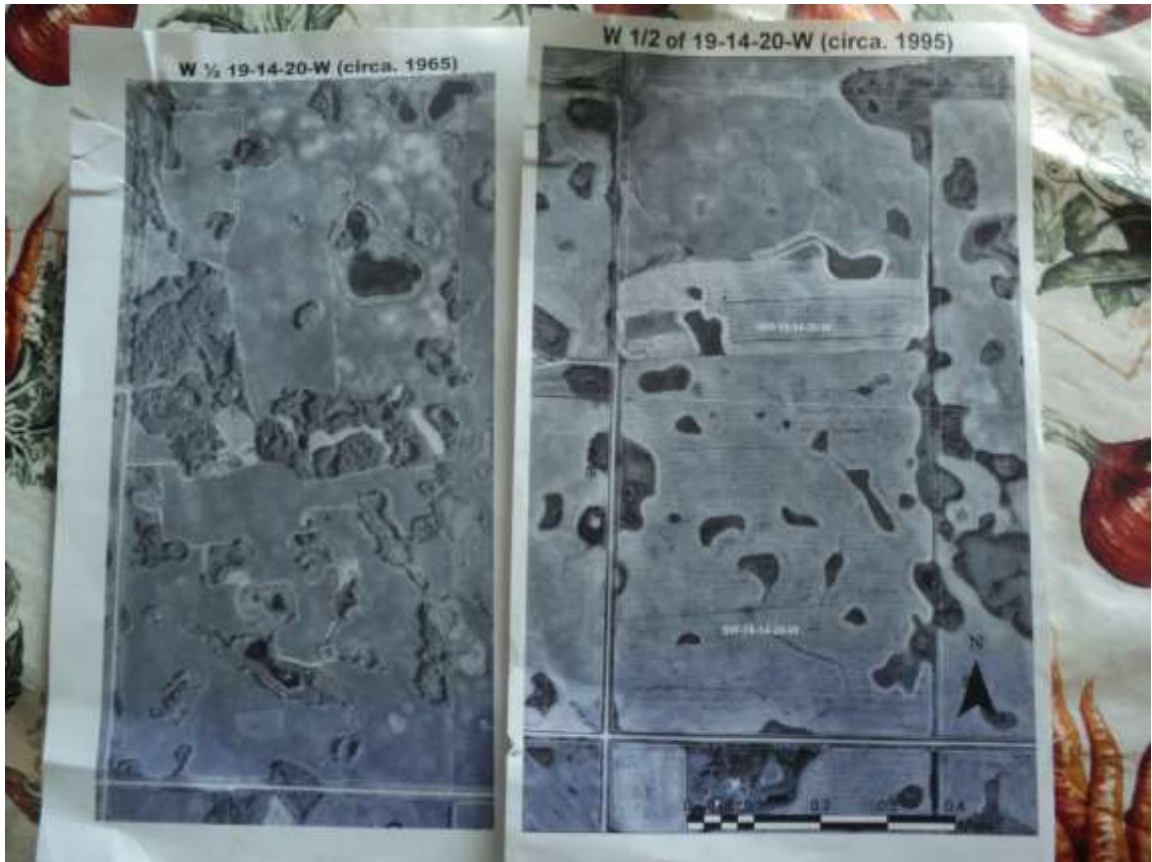


Figure 4.3 Historical aerial photographs showing the changes on a land parcel due to intensified agriculture from 1965 (left) to 1995 (right) in the Rural Municipality of Blanshard, Manitoba.

4.2.2 Inception of ALUS

The environmental issues of wetland loss and damage caused by farming marginal lands are of serious concern to conservation biologists, and traditional conservation approaches have proved ineffective in agricultural landscapes (Fisher 2012). Farmers are often leery of land conservation easements and the large scale purchasing of these are unfeasible, both financially for environmental non-government organizations (eNGOs), and for the economic viability of the surrounding rural communities.

To promote stewardship and recognize the role that farmers play in preserving existing natural capital, Ian Wishard of Keystone Agricultural Producers (KAP) and Jonathan Scarf of Delta Waterfowl collaborated to find a solution that met the needs of farmers, the environment and society. To find a feasible and effective solution, the pair examined agro-environmental policy of other countries, which led to the birth of the ALUS concept's principles (Section 2.4.1). Using these principles, ALUS was developed to be an alternative to environmental regulations, and turn on-farm natural capital from a liability to an asset.

4.2.3 ALUS in the Rural Municipality of Blanshard

The ALUS Pilot of Blanshard began in 2006 and lasted until 2008. The first ALUS program had three goals:

1. Determine the acceptability of the ALUS concept within agricultural communities (Keystone Agricultural Producers 2004),
2. Assess the feasibility of the ALUS concept as a grass roots approach for delivering Ecological Goods and Services (EG&S); and
3. Set the stage for an expansion to apply the concept across the country (Fisher 2012).

The administration structure of the RMB ALUS program was very different from the later incarnations that formalized administrative roles of farmers, eNGOs and government stakeholders known collectively as the Partnership Advisory Committee (PAC). However, this administration role was filled by representation and collaboration from KAP, Delta

Waterfowl, Manitoba Agriculture, Food & Rural Initiatives, Manitoba Habitat and Heritage Corporation, and public officials from the municipality (Keystone Agricultural Producers 2004).

During the three years of the program, ALUS met with tremendous interest and support from farmers and the community. A total of over 8000 ha of wetlands, native prairie, and riparian areas were enrolled in the ALUS program (Figure 4.4) and there was participation by 230, or 70% of the landowners in Blanshard. Much of this success was credited to the ALUS approach “making sense” to the agricultural community, compensating the opportunity cost of reduced production for environmental protection. Though the recognition was modest, often farmers received enough to cover their farm’s property tax, which was considered a more than adequate compensation by many. The ALUS pilot, unlike many other programs, was able to attract both the environmentally conscious farmers, many of whom were already undertaking similar projects on their own, and those who needed financial encouragement to make stewardship feasible in their farming operations.

Financially, the RMB ALUS was fortunate in having a \$300,000 annual operating budget, of which 83 to 90 percent, depending on the year, was spent on annuity payments to farmers. This financial support came from many sources, including Delta Waterfowl, the Manitoba Rural Adaptation Council, duck stamp funds from multiple U.S. states, the local municipal government, and in-kind support was also received from the Little Saskatchewan River Conservation District organization. During the course of the program, no applicants were rejected due to the ALUS pilot’s generous budget.



Figure 4.4 Remnant ALUS projects in the Rural Municipality of Blanshard ALUS pilot (2006-2008). Upland prairies (top left), pothole wetlands (top right, bottom left), and retired marginal land (circled in bottom right).

4.2.4 Reflecting Upon and Advancing ALUS

During my investigation in the RMB, the satisfaction in the ALUS program was apparent in conversations with farmers, administrators and supporters, as well as a review of in-house reports and evaluations. Many of the core concepts and lessons learned from the RMB set the stage for the expansion of ALUS into Norfolk Ontario and Prince Edward Island (PEI) (Fisher 2012). However, within the RMB, ALUS did receive some criticisms.

Although the ALUS program did fill the gap in protecting existing natural capital,

it was unappreciated by most layers of government. Annual wetland loss in rural Manitoba is occurring at two percent per year, which is easily overshadowed when compared to the cumulative historical impact on this vital ecosystem. Emphasis on a historical loss, as oppose to the ongoing degradation of wetlands and other forms of natural capital, has focused conservation measures on creation rather than protection; meaning ALUS did not fit well into existing policy or notions. Although there was some retirement of marginal land, the low acreages compared to those protecting existing wetlands and upland habitat generated the most criticism. Future programs learned from this lesson and would focus on both the protection and the creation of natural capital by mandating that new on-farm ALUS projects must be undertaken to match the enrollment of existing natural capital.

Monitoring, which was done by the Manitoba Crop Insurance Corporation, was a point of criticism in the RMB's ALUS program. Whereas monitoring is necessary to ensure that ALUS projects are being maintained, some farmers found the monitoring standards to be inconsistent. Anecdotal evidence suggests that individual monitors were interpreting the ALUS rules differently; foror instance some farmers to lose payment due to recreational use of ALUS lands.

Today many farmers and conservationists regret that the ALUS program of the RMB was allowed to expire. Presently, with a changing agricultural market place, increased prices in both land and commodity crops are making the economics of leaving land "idle" less appealing than had been the case a few years ago. Some farmers have indicated that should they decide to sell their farm, land that had been enrolled in ALUS would be put back into agricultural production due to the recent increase in farmland value.

However, if ALUS were to be reinstated, continued payments on projects would be sufficient compensation to prevent farmers from returning marginal land to production to increase the market value of the farm. The lingering interest and the need to preserve existing natural capital has spurred recent efforts to attempt a restart ALUS, with funding being raised through support from the Garfield Weston Foundation, Manitoba Habitat Heritage Corporation, and KAP. This new ALUS will not be a continuation, but a new program involving a demonstration phase and a PAC to conduct outreach and tell the ALUS expanding to a municipality wide program.

4.2.5 Summary

Despite its shortcomings, the ALUS pilot of the RMB was successful at demonstrating the concept for Canadian agricultural landscapes. By working with farmers, Delta Waterfowl and KAP successfully set the framework for subsequent ALUS programs. These programs, which will be discussed in the following sections, have all been based upon the successes and missteps of this novel management approach to promoting EG&S in Canada. With interest to relaunch ALUS in the RMB, cumulative lessons from the expired pilot and existing programs subsequently developed elsewhere in the country will influence any future program in the municipality.

4.3 THE RURAL MUNICIPALITIES OF FRANCIS, LAJORD, INDIAN HEAD AND SOUTH QU'APPELLE, SASKATCHEWAN

Most ALUS programs in Canada have been designed to be administered in just one provincial county. However, this is not the case for Saskatchewan's first ALUS program. Located less than 20 km east of Regina, Saskatchewan, the four rural municipalities of Francis, Lajord, Indian Head and South Qu'Appelle (Figure 4.5), are encompassed by a single ALUS program. This first Saskatchewan ALUS program is currently being overseen by Agricultural Producers Association of Saskatchewan (APAS), a grassroots agricultural advocacy organization formed in 2000. From its beginning, APAS has had a vested interest in incentivizing on-farm EG&S production. Upon the completion of the Rural Municipality of Blanshard's ALUS Pilot in 2008, APAS entered into conversations with Delta Waterfowl about establishing their own program. In December of 2011, ALUS was launched by APAS and in the spring of 2012, a program coordinator was hired to manage the program on behalf of the PAC. The present case-study description describes the process under which APAS is looking to develop both the support for ALUS as well as particulars about the program itself.

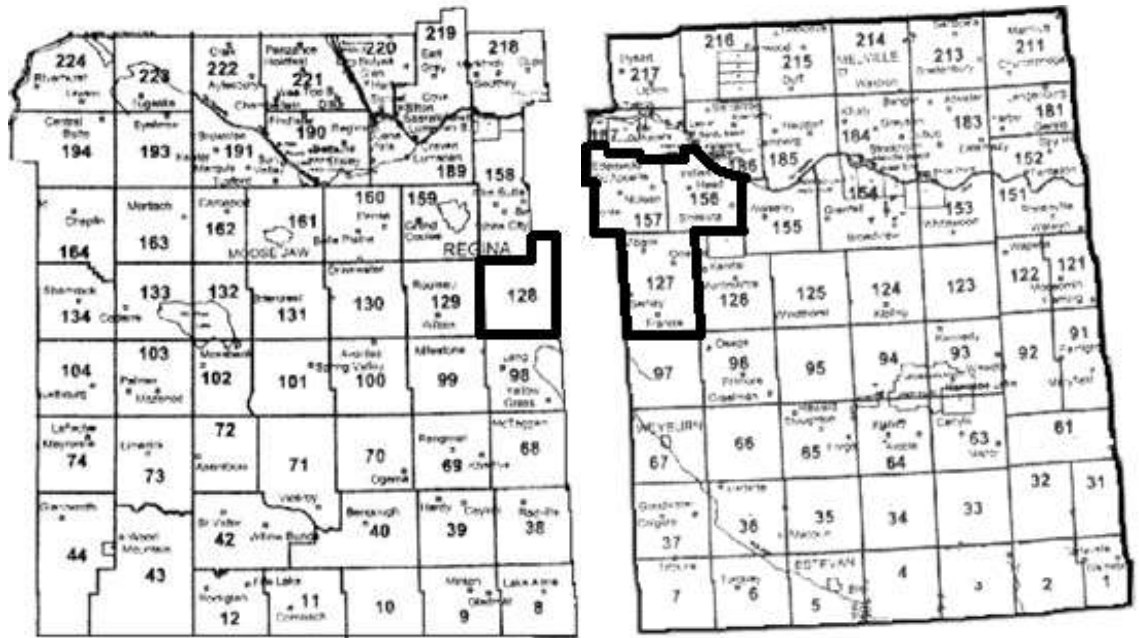


Figure 4.5 The Rural Municipalities of Francis (127), Lajord (128), South Qu'Appelle (157) and Indian Head (156). Source: www.sarm.com.

4.3.1 Agriculture

Agriculture has changed greatly in southern Saskatchewan in recent decades. Specialization has altered the landscape from a mosaic of small mixed farms to a countryside dominated by large cash crop farms, specializing in cereals and oilseeds (Figure 4.6). The increased scale of farming has encouraged agricultural cultivation in marginal land, often right up to stream banks in many cases. In addition to the increased size of farms, there has been a switch from biennial crop production, to continuous crop production. By removing the practice of summer fallowing (Section 4.2.1), agriculture has had greater environmental impacts over the past decades. Annual cropping has had impacts

on waterfowl by decreasing available nesting habitat (Podruzny et al. 2002), and has increased the frequency of agrochemical input applications (Carlyle 1997).

Annual farm revenues can vary wildly due to fluctuations in both crop price and yield which has caused policy measures to be implemented by the federal government to help farmers manage income uncertainty through the AgriStability Program. AgriStability has long been out of favor with Saskatchewan farmers as they are viewed as unreliable, unpredictable, lacking transparency, and overall considered to be overall ineffective. Recent changes in policy have altered the triggering levels for AgriStability and stabilization payments (Government of Canada 2013), and has been seen by many as further reducing the usefulness of an ineffective program.



Figure 4.6 Cereal agriculture dominates the landscape in Southern Saskatchewan.

4.3.2 Environment

The rural municipalities that are encompassed by the ALUS program lie in the moist mixed grassland ecoregion. Vegetation in this ecoregion is mostly prairie grasses, with alders (*Alnus spp.*) directly adjacent to sloughs and waterways (Secoy 2006; Saskatchewan Conservation Data Center 2012a). Sloughs in this region (Figure 4.7), though numerous, are less common than in the adjacent, northern aspen parkland ecoregion (Saskatchewan Conservation Data Center 2012a). This ecoregion has chernozemic prairie soils, fertile and attractive for cereal farming, and as a result the landscape is dominated by agriculture (Secoy 2006; Saskatchewan Conservation Data Center 2012a). Crop based agriculture and other anthropogenic development has reduced the remaining native prairie vegetation to conservation preservations (Figure 4.8), isolated pockets adjacent to sloughs, and native pasture for cattle grazing.

A history of improper agriculture in marginal land has left a lasting impact on Saskatchewan's rural landscape. During the 1930's, drought and poor erosion control devastated large tracts of agricultural land in Saskatchewan. In 1935, Prairie Farm Rehabilitation Administration (PFRA) was established by the Canadian Federal Government to deal with erosion and the shortage of water that was limiting agriculture (Gilson 2013). Marginal land was enrolled into the PFRA and converted into community pastures. In 2012, it was announced that the Federal Government would transfer PFRA-enrolled lands to the provincial government, and the province has made plans to sell or lease the lands by 2018 (Martens 2013). This has been opposed by farm organizations in Saskatchewan for multiple reasons including: potential for increased foreign ownership,

cultivation of marginal lands, formation of land trusts that use after-tax dollars in competition with farmers for land, and a livestock industry that cannot afford the debt of purchasing these lands.



Figure 4.7 Permanent slough located north east of Regina, Saskatchewan



Figure 4.8 Remnant native prairie in a public park outside Regina, Saskatchewan.

4.3.3 ALUS

The development of Saskatchewan's first ALUS program has been overseen by APAS. The ALUS concept, being farmer and community driven, has been viewed by APAS as a means to promote preventative stewardship instead of a reactive approach to environmental degradation. The rural areas to the east of Regina were strategically selected by Delta Waterfowl for their importance for harbouring nesting waterfowl, their proximity to Regina, and location in the Wascana Creek watersheds, and thus their utility in showcasing ALUS. In other words, being directly adjacent to the city of Regina increases the visibility of the ALUS program and concept, something that many other programs in very rural settings lack.

Although APAS is supporting ALUS in Saskatchewan and working to raise funding, it does not actively manage or administer the program. The ALUS program is administered by its PAC, which consists of two members from the four rural municipalities, Francis, Lajord, Indian Head and South Qu'Appelle, as well as two representatives from each of the following: APAS, Saskatchewan Wildlife Federation, Saskatchewan Association of Watersheds, Delta Waterfowl, and the Saskatchewan Urban Municipalities Association (SUMA). Groundwork and office work is done by the program coordinator, who reports to the PAC and farmers.

ALUS projects in Saskatchewan are working to create, enhance and protect native prairie, wetlands, upland habitat, and wetland buffers (Table 4.1). Farmers are drawn to these projects as a means to retire marginal land from production, control the spread of alkaline soils, and redefine field boundaries to accommodate larger equipment. Working

around sloughs and uneven field boundaries is an expensive nuisance for farmers, increasing their cost of production. Using ALUS to enroll wetlands as well as adjacent land ensures the farmer is not being financial penalized for environmental stewardship. Municipal and eNGO’s and other non-farmer stakeholders, as well as some farmers in ALUS, are attracted to its benefits that ensue for wildlife habitat and water quality in the Wascana Creek watershed.

Table 4.1 Areal amounts of ALUS enrolled land and projects in the rural municipalities of Francis, Lajord, Indian Head and South Qu’Appelle, Saskatchewan as of spring 2013.

Year Established	Project area (ha)				
	Shelterbelt	Wetlands	Native Prairie	Upland	Buffers
2013	2.25	-	13.94	15.94	10.00
2012	5.58	86.24	98.67	30.49	12.78

4.3.4 Unexpected Support

At the time of my case-study research, the ALUS concept was still relatively new to Saskatchewan’s agricultural community. Although farmers are the most exposed to and appreciative of natural areas on their farms, ALUS administrators in Saskatchewan have found that farmers are the least familiar with the concept of EG&S, contradicting the findings of a national survey of farmers (Environics Research Group 2006). The urban populace, on the other hand, is often more educated and excited about the environmental benefits of EG&S delivered through the ALUS concept. Evidence for this can be found both anecdotally, through reported conversations between program administration and

citizens of Regina, and in the participation of SUMA, who independently sought to partner with the ALUS program. This excitement and support for ALUS is viewed as positive for both the program's development and financial stability, as urban residents are willing to support EG&S production in the adjacent agricultural landscapes. Ironically, despite being invited to initial developmental meetings and interest from SUMA, the Saskatchewan Association of Rural Municipalities decided to not be involved with the ALUS program.

Administration and proponents have found that many parts of both federal and provincial government are foreign to the concept of a grass-roots approach to compensating for the production and delivery of EG&S. This has caused reluctance for government money to be involved in the ALUS program for the time being. What the Saskatchewan ALUS lacks in support from provincial and federal governments, it more than makes up for in support from local leaders.

4.3.5 Summary

The ALUS program of Saskatchewan, encompassing four rural municipalities, presents a unique venue to showcase the concept. Unlike most other programs, Saskatchewan's ALUS is in close proximity to the capital city of the province, thus allowing high visibility compared to other more rural programs. The interest from the urban populace is also unique, showing the potential for both financial and political support for the production of far reaching EG&S in more remote agricultural landscapes. With leadership the program's PAC and APAS, ALUS in Saskatchewan will continue to develop and refine to meet the needs of both urban and rural citizens.

4.4 GREY AND BRUCE COUNTIES, ONTARIO

Located in southern Ontario, approximately 150 kilometers from Toronto (Figure 4.9), Grey and Bruce Counties were first settled in the 1800s, with the city of Sydenham, presentday Owen Sound, being established in 1841 (City of Owen Sound 2013). The economies of the counties were historically based on agriculture and merchant trade, though the latter has declined due to the construction of the St Lawrence Seaway and direct access to the lower Great Lakes. Tourism has risen in the counties due to its beaches and proximity to the Greater Toronto Area.

At the time of this data collection, in the summer of 2012, the ALUS program of Grey/Bruce had not yet been officially implemented and it was still in the developmental stages. With no physical ALUS projects having been established, this case-study description examines the developmental process of the counties' program.

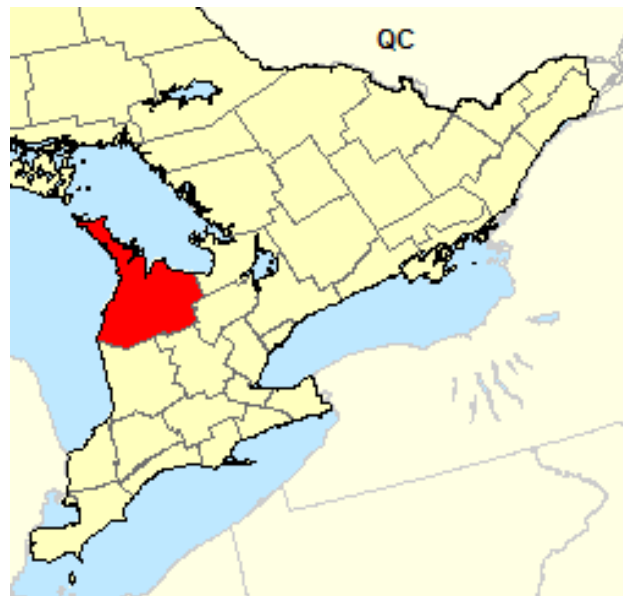


Figure 4.9 Grey and Bruce Counties, Ontario. Source: www.ec.gc.ca

4.4.1 Agriculture

Situated atop the Niagara Escarpment, the counties of Grey and Bruce are today heavily involved in agriculture, with beef and cash cropping being the mainstay of the industry. Production of cash crops such as corn and soybeans is expanding with surging commodity prices (Table 4.2). In the region, alternative agriculture, in the form of orchards and vineyards, has also expanded in recent years.

Within Grey/Bruce, many officials have expressed that they have noted an increase in the number of young farmers in the area and have associated this with a sense of hope and a belief that there is a future in agriculture. This observation is not supported by the 2011 Census of Agriculture; the average age of farmer in the counties has continued to increase (Government of Canada 2011e,f). This inconsistency may be due to surveying errors or a difference between what Statistics Canada and Grey/Bruce officials consider to be a farmer.

Within Grey and Bruce Counties, there is anecdotal evidence that the surge in cash cropping has affected land rental prices and left many residents whom had historically leased nearby land for crops and pasture now being unable to compete with higher prices paid by farmers from outside the counties. There has also been a decline in agricultural land in production due to land being purchased by vacation cottagers and weekend residents. One PAC member stated that in the last five years, over 11,000 ha or 14% of agricultural land in the counties was purchased by out-of-county residents who were not active farmers. This raises concerns for local producers, not only due to decreased agricultural land, but also the spreading of weeds that result from the natural succession of

unmanaged retired farmland.

Table 4.2. Increases in the areal production of grain corn, canola, soybean and wheat in Bruce County and Grey County from 2006 to 2011. Source: Government of Canada (2011a,b).

Crop	Bruce County (ha)		Increase %	Grey County (ha)		Increase %
	2006	2011		2006	2011	
Canola	294	2582	778.2	358	4475	1150.0
Grain Corn	19113	25868	35.3	5658	8961	58.8
Soybean	27116	38819	43.2	7335	12674	72.8
Wheat	21855	23465	7.4	7067	10021	41.8

4.4.2 Environment

The Counties of Grey and Bruce lie in Ontario's mixedwoods plains ecozone and contains some of the highest plant and animal biodiversity in Canada (Government of Ontario 2007). A variety of ecosystems are found within the region including wetlands, tall grass prairie, mixed coniferous and deciduous forests, as well as deciduous dominated forests.

With a topography that ranges from flat fields along the Bruce Peninsula, to rolling hills of the Grey Highlands, agriculture varies widely within the region (Figure 4.10). Soil orders type is predominately brunisolic and luvisolic with good and imperfect drainage respectively (Government of Canada 2009a). However, more detailed soil maps show a highly variable mosaic of soil series within these orders (Government of Canada 1979 a,b). Farmers often state how even relatively small fields of four ha or so can contain multiple soil series.

Although agriculture has been the cause of much of the fragmentation and loss of wildlife habitat within the counties, the natural biodiversity has remained high

(Government of Ontario 2007). The recent expansion of cash crop agriculture in Grey/Bruce has also led to increased environmental losses through deforestation, wetland drainage, and cultivation of marginal pasture land and riparian zones. Many watersheds are impacted by cattle that have unregulated access to water bodies. Though this effect is believed to have not yet become detrimental by farmers and county residents, the image and potential impact have caused some concern. Wildlife associations and other eNGO's have begun working with producers to minimize this impact of cattle.



Figure 4.10 The topography of Grey and Bruce County, Ontario. Flat agricultural fields (left) and rolling hills (right).

4.4.3 ALUS

Based out of Markdale, Ontario, the ALUS program of Grey and Bruce Counties is administered by Grey Agricultural Services, a grassroots agricultural information service developed in 2000 to assist local farmers and rural industry (Grey Agricultural Services 2012). Since its conception in 2012, the PAC has become well established and is

comprised of representatives from the municipal and provincial governments, conservation organization and farmer groups (Table 4.3), in addition to a hired ALUS coordinator who handles daily operations (Reid 2012b). The PAC of the Grey/Bruce predominantly employs consensus decision making, though when this is not possible, formal voting is conducted with majority rule. When decisions must be voted on, all PAC members, except the PAC Chair, vote with the exception of a tie, in which case the PAC Chair will cast the deciding vote. The ALUS coordinator reports and provides input at PAC meetings, but does not have voting power.

Table 4.3 Partnership Advisory Committee representation of the Grey/Bruce ALUS program. Source: Reid (2012b).

Partnership Advisory Committee Representation	
ALUS Project Coordinator	National Farmers Union – Bruce County
Christian Farmers Federation of Ontario	National Farmers Union – Grey County
Conservation Ontario – Saugeen Valley Conservation Authority	Ontario Bee Keepers Association
Conservation Ontario – Grey Sauble Conservation Authority	-
County Council – Bruce County	Ontario Federation of Agriculture – Bruce County
County Council – Grey County	-
Ducks Unlimited Canada (DUC)	Ontario Federation of Agriculture – Grey County
Grey Agricultural Services	Ontario Soil and Crop Improvement Organization (OSCIA)
Innovative Farmers Association of Ontario	Stewardship Council – Grey County
	Stewardship Council – Bruce County

4.4.4 Vision for ALUS in Grey and Bruce Counties

While there are no serious environmental problems associated with agriculture in Grey and Bruce Counties, the PAC intends to use ALUS as a means to educate the public as well as to demonstrate to farmers that there can be alternatives for conservation (Reid 2012b). Through this education, PAC members hope to be able to put in place preventative measures and to set standards that will prevent the development of regulations.

To introduce the ALUS concept, the PAC plans to establish demonstration farms in a pilot phase, not only for environmental education but also to highlight the variety of ALUS projects and availability of potential funding Sources (Reid 2012b). There will be a total of four demonstration farms, two in each of the counties. The purpose of this pilot phase is to emphasize that:

- Stewardship does not have to be an economic burden for producers.
- ALUS is a viable program to meet the needs of both conservationists and farmers.
- ALUS and its expansion within the counties is a good investment for funding agencies working towards environmental sustainability.

While the administration structure is heavily influenced by other ALUS programs, projects that appeal to farmers must still be selected and developed. To do this, the coordinator and the PAC will draw from the past successes of other programs established in the counties, such as the Grey County Stewardship Network (Figure 4.11) and the Big

Head River Watershed Restoration (Figure 4.12) that were environmentally successful programs and widely accepted by farmers. By building on past success, both in other ALUS programs across the country and environmental programs within these Ontario counties, the PAC and coordinator hope to move towards their goal and their vision of sustainability and stewardship that they feel ALUS can provide.



Figure 4.11 Grey County Stewardship Network Projects. Riparian exclusion fencing and vegetation enhancement (left) and engineered livestock river crossing (right).



Figure 4.12 Big Head River Watershed restoration projects. Bankside armouring (left) and stream channel restoration (right).

4.4.5 Moving ALUS Forward

Integration into existing policy and programs is one of the core principles of ALUS (Bailey and Reid 2004; Keystone Agricultural Producers 2004; ALUS 2011c). To ensure efficient use of funding, the PAC for Grey/Bruce intends to integrate ALUS with cost-share assistance with programs, such as Environmental Farm Plans and local organizations such as the Sydenham Sportsmen Association. By partnering with local programs, ALUS will also be able to focus on regionally important issues.

Like ALUS programs located elsewhere, the one in Grey and Bruce Counties will no doubt have its own unexpected problems that must be accommodated. For example, one of the constraints that the program currently faces in this early stage is a lack of interest shown by farmers to become involved in establishing one of the demonstration sites. Many farmers feel that they would be opening themselves up to scrutiny from a public that is unfamiliar with agriculture touring their farms. This fear has caused a temporary setback for the ALUS coordinator and the PAC, as some of the potential candidate farms and farmers, who would have been well suited to demonstrate ALUS, have been hesitant and wary of becoming involved.

No ALUS projects have been developed yet but the PAC is attempting to tailor potential projects to suit wildlife conservationists and farmers such as enhancing bobolink (*Dolichonyx oryzivorus*) habitat, grassland birds that are currently threatened in Ontario (Government of Ontario 2011). While biologists have been promoting the placement of fallow strips in the centre of hay fields, to encourage breeding habitat for the birds, farmers have been very reluctant to adopt this practice. Farmers are concerned that plants that they

consider to be weeds, which that are traditionally kept under control through mowing, could become established in these fallow strips spread their seeds to the adjacent fields, thus infesting the desired forage crop. ALUS may help to facilitate important conversations between farmers and conservationist to design management practices that can provide bobolink habitat without jeopardizing farm productivity.

4.4.6 Summary

The development of ALUS in Grey and Bruce Counties program is underway. While some farmers have been hesitant to allow their properties to become ALUS demonstration farms, there is still interest from the agricultural community about the program. With a PAC and coordinator in place, the program will continue to develop to meet environmental goals that are well place with local agriculture.

4.5 PARKLAND COUNTY, ALBERTA

Located directly on the western border of Edmonton, Parkland County is home to over 30,000 people and occupies an area of almost a quarter million ha (Parkland County 2013) (Figure 4.13). The county is home to agriculture, support industries for Albertan oil production, and is considered a rural subdivision of the Greater Edmonton Metropolitan.

In October 2012, this case-study investigation was undertaken during the official launch of ALUS in Parkland County by the municipal government (Figure 4.14). The present case-study description focuses on the developmental process of this newly created

program, as well as the expected future development. Differing from the area encompassed by Saskatchewan's ALUS program, which is completely rural despite its similar proximity to an urban center, agriculture in the eastern region of Parkland County is intersected by the ever encroaching suburbs. Unlike many of the other case-studies visited and examined, the study of Parkland County examines the potential for ALUS of incentivizing the production of EG&S in non-agricultural settings as well as a tool to reduce conflict between agriculture and the densely populated peri-urban portion of the county.

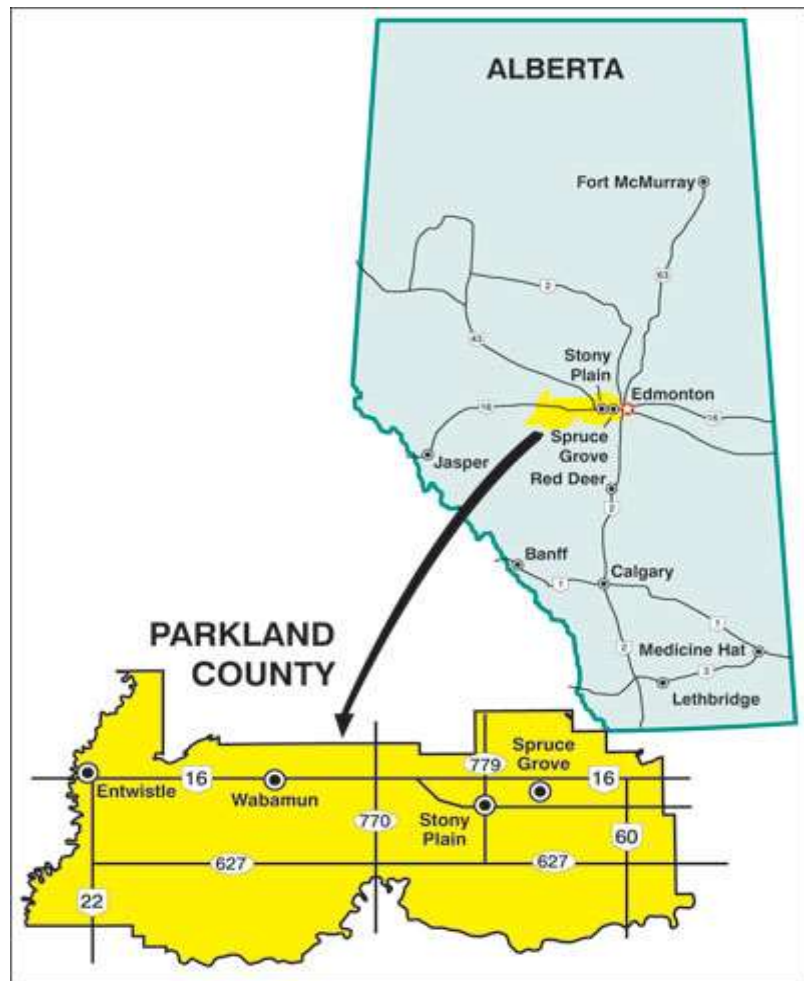


Figure 4.13 Parkland County, Alberta. Source: www.yellowheadit.com.



Figure 4.14 Parkland County's first ALUS project, riparian zone fencing at the Tomahawk Cattle Company. The riparian zone (left) and project ground breaking (right).

4.5.1 Agriculture

Agriculture in Parkland County began in the late 19th and early 20th centuries, when the Canadian Government, under the Dominion Lands Policy, made 64.7 ha (160 acres) available for settlement (known as homesteaders) for a price of ten dollars (McCracken 2012). This offer was made with the conditions that the family would erect a shelter and cultivate a minimum acreage by their third year of habitation. From these humble beginnings, Parkland County now has 782 farms within its boundaries, predominantly in beef (219) and cash crop production of oilseeds and cereals (108), with some dairy, sheep, and fruit and vegetable farms (Government of Canada 2011f).

All beef production in Parkland County is produced on ranches; feedlots have been banned within the county. Ranch-raised beef is produced by pasturing animals, often on

native grasses, in the summer and sometimes also winter pasture. Beef from ranches can be produced on native grasslands and practices such as flash grazing can prevent the spreading of trees, thereby preserving prairie habitat and wildlife.

As with many agricultural communities in Alberta, beef producers in the county are still feeling the financial effects of the Bovine Spongiform Encephalopathy outbreaks of 2003 (Stewart 2012). More recent farmer concerns about beef prices and processing capacity were centered on the XL Foods *E.coli* outbreak at the Brooks Alberta Plant in September 2012 (Government of Canada 2012a). With suspended production, many producers were left with nowhere to ship their cattle given that XL Foods Plant was the largest in Canada.

As in many places in North America, urban sprawl is encroaching upon the agricultural lands of Parkland County and creating conflict. Non-farming residents, many of whom are first or second generation immigrant families, have a negative view on agriculture due to its associated noises, odours, and practices.

4.5.2 Environment

The eastern portion of Parkland County lies within the aspen parkland ecoregion, containing fescue (*Festuca spp.*) prairies and alder (*Alnus spp.*) groves (Saskatchewan Conservation Data Center 2012b). While alders are also present in other prairie ecoregions, parkland prairies are distinguishable by the presence of alders that are not in proximity to sloughs or potholes and is considered a transitional area between grassland prairies in the south and the northern boreal forests (Government of Alberta 2001). The soils of this

ecoregion are chernozemic soils, loamy in texture and very fertile.

Western Parkland County lies in the boreal transition ecoregion. With warm summers and fertile luvisolic soils, this area is good for agriculture (Government of Alberta 2012; Saskatchewan Conservation Data Center 2012c). The area is also noted for its abundance of lakes, ponds, and sloughs that drain into the North Saskatchewan River, and by the presence of white spruce (*Picea glauca*), jack pine (*Pinus banksiana*) and aspen (*Populus spp.*) stands.

As with many agricultural landscapes, Parkland County has seen environmental damage as a result of land drainage and deforestation. Many areas in the county have had shallow lakes completely drained and converted to fields, altering hydrology issues and causing flooding.

Unlike many of the other areas studied in my thesis, Parkland County contains an extensive industrial presence. Gravel Extraction by Trans ALTA and power generation through the excavation and burning of coal by the Sundance Power Plant have left lasting impacts on the landscape. Oil and gas extraction in the eastern, densely populated, portion of the county have also impacted air and water quality. Like many modern industries, reclamation and offset efforts have been put in place to minimize the environmental impacts in the surrounding landscape. However, poor water quality remains a major issue faced by residents of Parkland County. For example, groundwater contamination caused by industry and agriculture has meant that 70% of the county's residents depend on cisterns, which are periodically filled in bulk. This has caused many residents to maintain a personal "water truck", usually a one-ton truck, whose sole purpose is to do weekly water

runs. The expense of purchasing and transporting bulk water has led many of these residents to begin collecting rainwater for wash and utility water.

4.5.3 ALUS in Parkland County

The ALUS program of Parkland County is administered through the municipal government and at the time of my case-study investigation, was overseen by a Sustainability Services Coordinator who manages and tries to balance the often conflicting social, environmental, and economic needs of the municipality. As the ALUS program in the county grows, a full time position is planned to be created to coordinate the program.

Whereas this ALUS program does not yet have a PAC established, during its developmental phase, the county's Agriculture and Rural Life Committee filled this role. Drawing from lessons from the nearby County of Vermillion River ALUS (Section 4.6), Parkland County planned to develop its PAC following the establishment of its program in order to bring landowners together with additional representation from various levels of government and eNGOs. By involving these diverse stakeholders, ALUS will be developed in a manner to appeal to both farmers and non-farming residents of the county, as well as bring in financial and in-kind support for the program.

Parklands County's ALUS program uses cost-share measures and annuity payments. For projects that require one-time costs, such as the purchase of fencing supplies, a 50/50 cost-share is used to reduce the burden to the farmer, and for land taken out of production, annuity payments are made based on the opportunity cost by land area on the areal amount of land.

One unique trait that has not occurred in other jurisdictions that have running ALUS programs, is to include developed residential areas. In these areas, remnant natural capital still provides wildlife habitat, aesthetics, and many other services to the county. During the development of the Parkland County's program, numerous times non-agricultural landowners approached the acting coordinators interested in undertaking ALUS projects on their property.

4.5.4 Parkland County's Case for ALUS

The ALUS concept was brought to Parkland County, almost accidentally, by the current Sustainability Services Coordinator, who during his graduate studies had to do his co-op placement in Norfolk County, Ontario, where he became acquainted with the concept and key players of the ALUS Programs. After accepting the position in Parkland County, Alberta, the Sustainability Services Coordinator saw ALUS as a way to address environmental issues associated with agriculture that farmers had not yet been able to address due to economic constraints.

The goals of Parkland County's ALUS program are to encourage stewardship in agricultural landscapes by offering an EG&S program of high appeal to local farmers. To do this, the county hopes to gain farmer attention through two three elements: the voluntary aspect of the program, the grass-roots administration, and the financial incentives for the production of EG&S. By removing the financial burden from environmental stewardship, farmers' decision making could become a more environmentally conscious process.

In addition to financially and socially empowering farmers to produce EG&S,

ALUS will also educate the peri-urban and urban community about the role that farmers play in managing the landscape. Once the communication gap about the realities of farming and how urban residents need the EG&S that they farmers able to deliver is bridged, smoother relations between these two estranged communities may attract long-term sustainable financial support for the program from urban sources.

4.5.5 Moving ALUS Forward

One issue faced by the Sustainability Services Coordinator and other ALUS proponents in Parkland County was miscommunication and a lack of enthusiasm from the Agricultural and Rural Life Committee, which was acting as the PAC, about the value of the ALUS program for farmers and the county. With a lack of understanding about the ALUS concept and how incentives could be a useful stewardship approach, the committee became viewed as a hindrance to the development of Parkland County's program. Proponents from within the county as well as other ALUS programs view this as an example which emphasizes the importance of a knowledgeable stake-holder PAC.

At the time of my investigation, the Parkland County ALUS had no formal monitoring program in place, although one was planned. By partnering with Cows and Fish, an NGO specializing in stream and riparian management in Alberta's agricultural landscapes, Parkland County plans to establish long-term monitoring of both physical (i.e. water quality, erosion, etc.) and biological (i.e. biological integrity, diversity, etc.) impacts of agriculture and their mitigations by their ALUS program.

4.5.6 Summary

Due to its embedded urban populace, as Parkland County's ALUS program moves forward, it will face many issues that the other current programs will not likely face. Alternative Land Use Services may provide a means to mitigate the conflict between farmers, and ranchers and the peri-urban populace through both education and incentivizing environmental stewardship. While still in its infancy, ALUS is generating excitement in the region and hopes for a healthier and sustainable landscape in Parkland County for both rural and urban residents alike.

4.6 THE COUNTY OF VERMILLION RIVER, ALBERTA

Located on the Alberta side of the Alberta/Saskatchewan border (Figure 4.15), the area of the County of Vermillion River (CRV) was first settled in 1903 (Anderson 2012). The CVR has an area of 5,518.18 km² and as of 2011 had a population of 7,905 (Government of Canada 2012c). The county is sparsely populated with a population density of 1.4 people per square kilometer, and contains four towns and a portion of the city of Lloydminster on the Alberta/Saskatchewan border.

Agriculture remains one of the predominant industries in the county with 290,904 ha of cropland and 211,523 ha of pasture, 56 percent of the latter being natural vegetation (Government of Canada 2012c). The oil and gas industry is also economically and historically important to CVR. Commercial oil production on the Saskatchewan side of Lloydminster area first began in the 1950's (Hanly 2006), though exploration in the area

dates back to the 1920's (Heavy Oil Science Center 2011). Within the CVR, ALUS, though well developed and often used as a reference for other programs in Western Canada, is still in its pilot phase. This case-study description highlights the administration and the need for flexibility in ALUS programs.



Figure 4.15 The County of Vermillion River, Alberta. Source: County of Vermillion River (2012).

4.6.1 Agriculture

Agriculture in the CVR has become highly mechanized and specialized, as with most Canadian agriculture. Historically, the region contained mixed farm operations but many have specialized to become either beef or cash crop (canola and cereals) producers. Due to the bovine spongiform encephalopathy (BSE) outbreaks in Alberta and Saskatchewan in 2003, and the decrease in beef prices that accompanied them, many cattle producers

have either gone bankrupt, stopped farming, or shifted to cash cropping.

Farmers in the CVR have the advantage compared to those in other regions in that due to a low population density, there is no conflict from an urban populace. However, many farmers are beginning to take a proactive approach to possible environmental impacts before the pressure of a rapidly expanding urban populace, driven by the oil and gas industries, moves in.

The oil and gas industry has long been intertwined with agriculture in the CVR. In consequence, many pipelines and oil rigs dot the landscape. In bad years, oil extraction on agricultural land has helped many farmers maintain a livable salary. However, with high commodity prices at the time of my research, oil extraction is now viewed as a nuisance due to increased traffic, loss of rural aesthetics and the potential for environmental impacts.

4.6.2 Environment

The county is located in the aspen parkland ecoregion, so classified due to the presence of fescue prairies grasses and alder groves (Saskatchewan Conservation Data Center 2012b). Aspen parkland, with its short warm summers, is a transition region between grassland prairies in the south and the boreal forests in the north (Government of Alberta 2001), and can be distinguished from other prairie ecoregions by the presence of alders in areas proximal to prairie pothole wetlands (Saskatchewan Conservation Data Center 2012b). The aspen parkland ecoregion's soil is mainly black chernozemic soils that are loamy in texture and very fertile (Government of Alberta 2001). Gleysolic soils are also found in the region (Government of Alberta 2001), with a clay texture and poor drainage they are

usually found in topographical depressions (Government of Canada 2008a).

The native prairie of the aspen parkland ecosystems have been reduced in recent decades. Reasons for the decline in grasslands in the CVR include agricultural specialization and a departure from mixed farms consisting of crops and livestock, impacts from BSE outbreaks causing a switch into cash cropping, and subsequent destruction of native prairie pastures. Increased farm equipment size has also caused the removal of shelterbelts, fragment forests, and wetlands to accommodate these larger agricultural implements. Shelter belts had been planted in the mid 1900's to reduce wind erosion, snow accumulation on roads, and provide protection from destructive weather events known as plow winds. Of these three regulators of natural hazards, plow wind protection can be the most dramatic, as damage from plow winds can flatten buildings (Figure 4.16), uproot trees and damage farm equipment.



Figure 4.16 Plow wind damage. Source: www.northernprideml.com

4.6.3 ALUS

Initiated in 2010, the CVR ALUS program is overseen by its part time coordinator and a PAC, consisting of farmers, representatives from the county and eNGO's. Currently in the pilot phase of the ALUS, the PAC and coordinator are using the pilot project to showcase the concept and to create a base for developing the full-fledged program, similar to that in Norfolk County, Ontario. As of September 2012, the CVR ALUS pilot consisted of 18 farmers and 600 ha enrolled in ALUS.

The ALUS program in the CVR enrolls marginal land in a variety of projects, including: wetland restoration by plugging drains and naturalization, riparian zone enhancement, native prairie management, and the creation and protection of shelter belts (Figure 4.17). These projects must be managed by farmers by mowing or controlled burns to maintain habitat and prevent unwanted succession in adjacent lands. In addition to enrolling marginal land, to accommodate farmers, adjacent productive lands can also be enrolled to reduce overlap during agricultural operations.

To enter into ALUS, farmers prepare project proposals, which are then reviewed by the PAC to determine if it is a good fit for the program and the needs of the county. These proposals are submitted anonymously by farmers, through the ALUS coordinator, to the PAC. The proposals reveal only the acreage, project type, and some physical features of the land parcel. In this manner, projects are selected in an unbiased manner, adding credibility to the PAC, and protecting interested farmers from discrimination and rejection that is not based on the merits of the proposal. Once accepted, the location of the proposed project and the farmer are identified.

One project that is unique to the CVR, compared to other locations in my research, is a wildlife food plot project in marginal lands (Figure 4.18). Consisting of plants selected to produce grain, these plots were planted and allowed to go through a natural succession. While not entirely natural when compared to a prairie restoration, these projects still encourage the retirement of marginal land and demonstrate farmer willingness to keep wildlife and nature in their landscapes.

As a grass-roots program, the finances of the CVR ALUS lack the relative stability of programs such as the CRP in the United States, and PEI's ALUS. Program budgets vary from year-to-year depending on the grants and funding received which influences the number of new ALUS projects that the county can undertake.



Figure 4.17 ALUS projects in the County of Vermillion River, Alberta. Wetland creation (left), and shelterbelts with managed native prairie (right).



Figure 4.18 ALUS wildlife food plots project in the County of Vermillion River, Alberta.

4.6.4 How ALUS Fits in CVR

As with many rural communities, there has been a shift in the environmental conscience of residents. In the CVR, a new generation of farmers are beginning to change the way they view natural capital. Consequences of intensive agriculture are no longer being ignored and there is an effort to balance the needs of nature and agriculture. ALUS is working to find this balance, acknowledging the opportunity cost of producing EG&S while keeping the needs of farmers in mind. This approach not only empowers those already willing to do environmental work but also encourages projects to be undertaken by producers who in the past had overlooked and undervalued natural capital on their farms.

As with all agriculture, farmers in prairie ecosystem of the CVR are dependent upon the weather. Drought and flood often cause marginal lands to be financially unreliable, often leading to losses rather than profits. The opportunity to take an annual ALUS payment, rather than “gamble” on marginal lands, has been well received by farmers. And

while the payments are very modest, farmers appreciate the recognition for making the right environmental decision.

4.6.5 Moving Forward

During the administration of the CVR ALUS program, the coordinator, PAC, and participants have faced many challenges and are constantly learning. Weather can have drastic results for agriculture (Section 4.6.2), but weather has also impacted the implementation of ALUS projects in the county. In 2011, various ALUS projects were unable to be established due to a wet spring that prevented planting, followed by a drought that would have killed off seedlings. In these cases where the clear intent to install the ALUS projects was demonstrated, the PAC decided that payments would still be issued on the condition that the projects would be established as early as possible.

With the exception of these cases that were delayed due to inclement weather, other projects in the CVR are monitored for compliance annually before annuity payments are made. Baselines studies were conducted prior to the establishment of ALUS projects by Cows and Fish, a provincial group dedicated to protecting riparian habitat, and local environmental experts. However, post-establishment monitoring for biophysical assessments in terms of biodiversity, ecosystem health, and overall environmental improvements have been lacking and inconsistent. With limited financial and technical resources, there have been some biophysical assessments of ALUS projects, but not the annual assessments that ALUS administrators hope for. The scale of agriculture has also created issues for the management of ALUS projects. With large equipment that is sized

to work in fields of hundreds of hectares, small ALUS projects, often less than 30 ha, can often be problematic for farmers. The equipment at the farmer's disposal to establish and maintain ALUS projects is often too large for such a relatively small tract of land.

One constraint faced by the CVR ALUS program is the county's geography, both in terms of size and variation. The large size of the county has made networking with experts and farmers difficult for the coordinator and PAC. Compounding this problem is the county's variation in agriculture, with cereal production being concentrated in the south and ranching in the north, necessitating the need for multiple experts. This difficulty of operating at the county level, strengthens the argument of many ALUS proponents across Canada, that the programs, to be effective, should be managed at a local level.

Still in its pilot phase, the CRV's ALUS administration is working to address these issues and expand the program's network of technical and financial resources. It is hoped by ALUS administrators that this approach will ease the future transition from pilot program to a fully developed program within the county.

4.6.6 Summary

Within the CVR, ALUS has benefited the county through increases in wildlife habitat, aiding game and fish populations and improving rural aesthetics. Producers are benefitting with financial consistency, with what they consider a decent return on marginal land. Many farmers place more value on being recognized for environmental stewardship than the size of the financial payment they are receiving.

In addition to the support from farmers and participants, government departments

and agencies are also very supportive of the ALUS program in the CVR. While financial stability was a concern at the time of the case-study, but as of the spring of 2013, the CVR through its ALUS program have been designated as a wetland restoration agency (Delta Waterfowl 2013b). This is the first time a county in Alberta has received this designation and will allow the county and ALUS to access provincial funds for wetland restoration within the county.

With support from farmers, eNGO's and government, the future of ALUS in the CVR is positive. Although there are administration issues and unpredictable events that have caused challenges, the program is changing and adapting to cope. ALUS in the CVR is working to ensure that, even in this very rural landscape, farmers will be incentivized and for the production of EG&S that benefit not only local residents, but people many hundreds, if not thousands of kilometers away.

4.7 NORFOLK COUNTY, ONTARIO

Located 150 kilometers south-west of Toronto, on the shores of Lake Erie, Norfolk County (Figure 4.19) is home to diverse agriculture and natural capital. Occupying an area of over 1.6 million ha, Norfolk County has a population of over 63,000 (Government of Canada 2012d), many of whom are economically dependent upon agriculture (Duff 2011). Natural capital ranges from pristine wetlands, to tall grass prairies and oak savannas, as well as Canada's only Carolinian forest ecosystems.

Norfolk County's ALUS program, established in 2007, was the second to be established and has set many of the standards for the other programs across Canada.

Whereas the Rural Municipality of Blanshard’s ALUS program proved the principle to be an effective approach to conservation in agricultural landscapes (Section 4.2), Norfolk County honed and refined the administration of the program. Within Norfolk County, the term “Partnership Advisory Committee”, or PAC, was first coined and established as a fundamental principle in the administration of future ALUS programs.

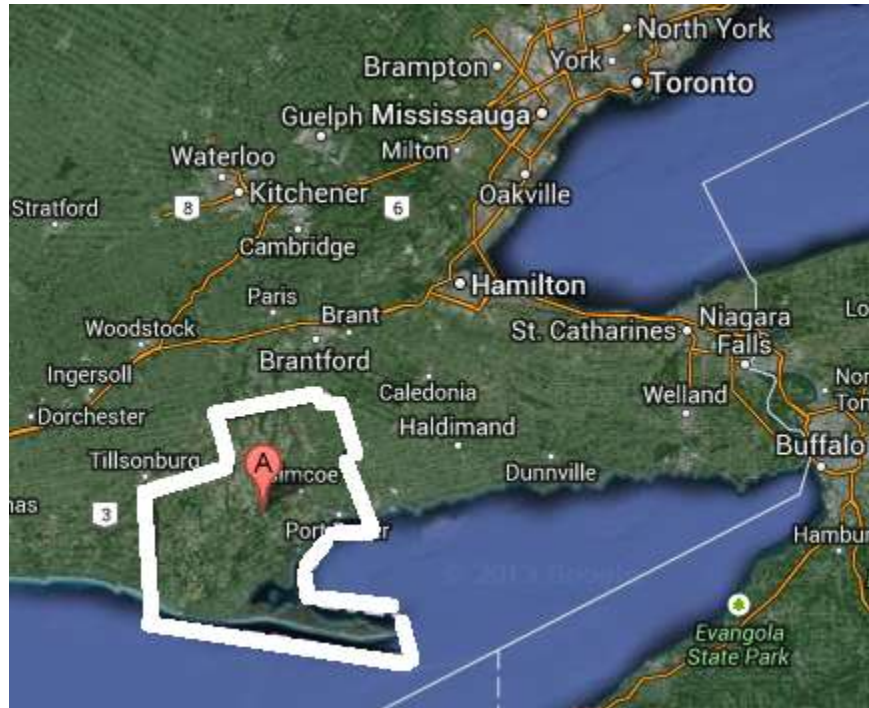


Figure 4.19 Norfolk County, Ontario (A). Source: maps.google.ca.

4.7.1 Agriculture

Norfolk County has a long history of agriculture. As of 2011, there were 1,322 farms managing 94,210 ha of agricultural land in Norfolk Country (Government of Canada 2011g) with 12% of the labour force being employed by agriculture (Duff 2011). Within Norfolk County’s agriculture sector, 19.9% of labourers are involved with crop production

compared to Ontario's province-wide level of 1.2%. Due to Norfolk County's fertile soil, mild climate, and long growing season, agriculture has traditionally been tobacco production but has also included livestock, cash crops, and vegetable production (Bailey and Reid 2004; Duff 2011).

Recent decreases in tobacco demand have caused farmers to transition their operations to the cultivation of cash crops, fruit and vegetables, and alternative crops (Figure 4.20) such as lavender, ginseng and hazelnuts (Duff 2011). The production of value-added products such as wines and spirits has also grown through this diversification. Norfolk County's agriculture sector has placed an emphasis on branding county produce and products under the "Direct from Norfolk" marketing cooperative (Duff 2011, Norfolk Farms 2012).

Growing tobacco (Figure 4.21), while controversial from a human health perspective, has had benefits for the county. Not only has it provided a substantial income for farmers occupying a small land base, but tax revenues from this high value crop has paid for much of the county's roadways and other infrastructure. As well, the small land base required for profitable tobacco farming has subsequently protected the remnant forests of the county. In 2008, the Tobacco Transition Program was introduced to buy out tobacco quotas and shift producers into other forms of agriculture. Though the program has been criticized for loopholes that allowed some farmers to take the buyout and keep producing tobacco (Daniszewski 2011), many have accepted the buyout and have switched to livestock and cash cropping, which has increased the potential for consequent deforestation to increase in the county.

Farmers in the county also have a pessimistic view of the economy in the county. Surveys undertaken in 2006, showed that of 58 percent of farmers were pessimistic about the future and economy compared to 50 percent of non-farmers.



Figure 4.20 Alternative agricultural crops in Norfolk County, Ontario. Ginseng production (left) and viticulture (right).



Figure 4.21 Tobacco agriculture in Norfolk County, Ontario.

4.7.2 Environment

Norfolk County is home to a high level of biodiversity that includes Canada's only

Carolinian forest ecosystem and the countries' highest concentration of species at risk (Bailey and Reid 2004). Large pristine wetlands can be seen jutting into Lake Erie. Long Point is separated into two sections: the first being a National Wildlife Area and a designated Ramsar Wetland of International Importance. The second portion of Long Point, as with nearby Turkey Point, is privately owned and maintained in its natural form for waterfowl hunting.

The western section of the county has a luvisolic soil (Government of Canada 2009b). Although this soil is very sandy and excellent for growing tobacco, its inability to hold moisture makes alternative cropping difficult. Fortunately, most transitioning tobacco farmers have irrigation equipment that enables this land to still be productive in dry years. On the eastern side of Norfolk County, the soil is more clay-based and of the greysolic order. This section of the county is more conducive to livestock farming due to this clay soils with imperfect drainage.

Although rich agricultural land, Norfolk's Sand Plain is highly susceptible to erosion. At the turn of the 20th century the region suffered from severe habitat, water, and soil degradation, which has left a lasting lesson for residents about the importance of ecological sustainability (Bennett 2012). Despite this, as with many agricultural landscapes, the county still faces issues of improper waterway buffering with cultivation right up to the edge of creeks and rivers. Deforestation has also impacted the wind buffering along roadways, thereby increasing snow drifts and roadside wind erosion. In addition to the societal impact of deforestation, numerous rare species in this transitional ecozone are also at risk due to habitat loss.

While the county's forests have remained in reasonable shape over the years, tall grass prairies and wetlands have not been so fortunate. In southern Ontario, 70 to 90 percent of wetlands have been drained (Government of Ontario 2012) and as little as three percent of the original tall grass prairie remains in southern Ontario (Rodger 1998). Norfolk is fortunate, having pristine wetlands along Lake Erie that are protected by private hunting clubs and government bodies. Ironically these wetlands were spared from development though nefarious human activity. Bootlegging operations during Prohibition and the presence of mob strongmen uprooted onetime residents and discouraged further settlement along the lake.

4.7.3 ALUS

Established in 2007, ALUS was introduced to Norfolk County at a time of transition away from tobacco farming. With the tobacco farming winding down, the lower profits of cash cropping caused concern about the future of the county's existing natural capital. When established county, industry, conservation organizations, and farmers set the initial goals of Norfolk's ALUS to change the mindsets of farmers and empower them to "grow better environments". Through education to consumers that conservation comes a cost, and to farmers that natural capital can pay, ALUS in Norfolk County was established to create and protect natural capital, enhance rural communities, and set the stage for a national expansion.

Originally proposed as a nine-year pilot project, ALUS in Norfolk was implemented as a three-year pilot. Although originally intended to be administered

provincially, the program was reworked into a non-profit, non-government, county-based program. The Norfolk ALUS pilot was supported with funding from numerous organizations and agencies, and has captured considerable interest from farmer groups and eNGOs from across North America (Table 4.4). The initial budget totaled one million dollars over the three years. During this phase, initial costs included seeders, seed harvesters, and establishing wetland projects as well as administration and farmer cost shares and annuity payments.

The pilot project developed into an established program in 2011, with 1.3 million dollars in funding with funding until 2014. This funding, primarily from the private corporations of the Metcalf Foundation and Garfield Weston Foundation, is directed towards program administration and farmer payments.

Table 4.4 Funding and supporting partners of ALUS in Norfolk County, Ontario.

Funding Partners	In-Kind Partners
Canadian Agricultural Adaptation Council	Agriculture and Agri-Food Canada
Delta Waterfowl Foundation	Christian Farmers Federation of Ontario
Long Point Region Conservation Authority	Ecometrica
Metcalf Foundation	Eman Rese
National Wild Turkey Federation	Keystone Agricultural Producers
National Wild Turkey Federation Canada	Local Food Plus
Ohio Department of Natural Resources	Long Point World Biosphere Reserve
Ontario Federation of Anglers and Hunters	Long Point Foundation
Ontario Stewardship Province of Ontario	Long Point Waterfowl and Wetlands Research Fund
Ruffled Grouse Society	Norfolk County
The Garfield Weston Foundation	Norfolk Federation of Agriculture
The Ontario Trillium Foundation	Norfolk Field Naturalists
	Norfolk Land Stewardship Council
	Norfolk Soil and Crop Improvement Association
	Ontario Federation of Agriculture
	Ontario Power Generation
	Ontario Wetland Habitat Fund
	Ontario Wildlife Foundation
	Prince Edward Island Federation of Agriculture
	TD Friends of the Environment Foundation

4.7.4 A Model Structure

Norfolk County was the first ALUS program to coin the term Partnership Advisory Committee, or PAC for short. Comprised of 16 members, the PAC of Norfolk County consists of one member representing each of Delta Waterfowl, the Norfolk Land Stewardship Council, the Long Point Conservation Authority, Ontario Ministry of Natural Resources, two representatives for Norfolk County’s municipal government, in addition to ten farmers. Within the farmer representation, five of the ten members act as liaisons.

These liaisons assist the ALUS coordinator in establishing communication with farmers and promoting the program. Assisting the PAC is a select team of technical advisors whom remain separate from the administration of the program.

ALUS projects in Norfolk County took the form of prairie, forest, and wetland projects (Figure 4.22). Establishment costs, such as seeds and wetland creation, were assisted through cost share funding while other expenses, such as fuel and ground cultivation, were not covered under ALUS. However, for farmers who could not afford this initial expense, arrangements could be made to cover these initial costs up front and deduct the amount from the first set of annuities. Payments were issued at \$375/ha, which was based off the 2007 land rent rates, for non-use of ALUS-enrolled lands. However, ALUS payments do not come without financial investment or farmer responsibility. Landowners, in addition to some establishment costs, must maintain the projects as recommended through activities such as burning and mowing prairie projects to prevent succession. Some farmers receive payments of \$185/ha for delayed grazing and haying, to accommodate nesting birds on native prairie project lands (Figure 4.23). This practice is regarded by ALUS participants and administrators as one of the greatest uses of the program, providing both wildlife habitat EG&S as well as food products. Drawing from the criticisms of the first ALUS program in Manitoba, existing natural areas and their natural capital were only eligible for enrollment under special conditions. These conditions were that the existing natural area proposed for ALUS enrollment had once been agricultural land and retired from agriculture after 1990, if there was an additional proposal submitted undertaking a new project to be undertaken by the farmer.

Currently, there is no method for prioritizing ALUS projects, with projects being accepted on a first-come, first-serve basis. Proposals are accepted by the project coordinator and reviewed by the PAC at an approval meeting, though the project proposal may need further investigation to determine feasibility for final approval. These proposals, are capped at 20 percent of each farm's land base to ensure that landscapes remain in agriculture, thus contributing to the rural economy. Some exceptions have been made that allow more than 20 percent to be enrolled under ALUS, with approval by the PAC.

Monitoring for proper participation in the program is administered by the ALUS coordinator and the Long Point Conservation Authority. The process of monitoring is done by farmer liaisons making first contact with the participant followed by the assessment by either the coordinator or the Conservation Authority.

4.7.5 Farmer Participation and Program Impacts

At the time of this research, 133 farms had participated and enrolled a total of 426 ha of land in the program since 2007. Most participants in ALUS program became aware of the program by "word of mouth", though some participants whose farms were of particular interest for conservation mandates were approached directly. Of the enrolled land, 50 percent has been converted to tall grass prairies, 30 percent planted as forests, and the remaining 20 percent in other habitat such as pollinator strips and wetlands. Annual recruitment goals of 30 landowners and 85 ha in 2011, the year prior to my case-study research had been surpassed with 50 participants signing ALUS contract. Of these 50, 17 were repeat participants.



Figure 4.22 ALUS projects in Norfolk County, Ontario. Wetland (top left), tree plantings (top right), tall grass prairie (bottom left), and pollinator strip (bottom right) projects.



Figure 4.23 Dual purpose ALUS projects in Norfolk County, Ontario. Delayed forage harvest production that provides bird nesting habitat.

Many farmers are pleased with the projects and have seen other benefits to their farms in addition to increased wildlife habitat. Farmers have reported that corn fields adjacent to ALUS projects have lower crop losses to black birds. While this claim at the time had not been investigated, it was assumed that the birds prefer to forage in the projects for a more natural food source. The decrease has been great enough for some to cease the use of noise deterrents, known as “bangers”. Creation of pollinator strips have also reduced the need for some farmers use domestic bees for pollination.

Farmers are not the only facet of the Norfolk County population that have been involved in ALUS. Outreach to showcase ALUS through tours and speaking events at colleges are being undertaken by the program, letting participants describe their ALUS experience and how it fits into their farm. Norfolk’s ALUS has also partnered with the Blue Box Program, a local program in which Ninth-grade students build bird houses and bat boxes. Using lumber donated by ALUS participants, these structures are placed in enrolled land to educate youth about the value of natural areas and the EG&S, such as wildlife habitat, that they provide

4.7.6 Critiques and Successes

Though successful in many ways, Norfolk’s ALUS is not without its criticisms and shortcomings. Program administrators and PAC members are quick to point out that there are individuals and organizations who criticize paying farmers for EG&S, believing stewardship should be an uncompensated responsibility. Proponents of ALUS are equally quick to point out that there is an annual opportunity cost to stewardship above and beyond

the cost of establishment of projects such as wetlands and prairies. A portion of these complaints also arise from competition for the funding for projects and environmental work in agriculture.

Critics will also highlight that when ALUS payments stop, with no easements in place, projects will be returned to agriculture. I did observe some farmers voice this concern during the 2012 ALUS demonstration tour, stating that to remain in business their farm's land had to be making money through either crops or ALUS payments; however, surveys of participating farmers have indicated that 75 percent of ALUS farmers in Norfolk would not disturb the established projects if payments ceased (Reid 2012a). This trend is not unique to Norfolk County, as the majority of the projects undertaken by the expired ALUS program in the RMB, Manitoba, are still intact. This is almost an exact opposite of a similar study on the Conservation Reserve Program (CRP) undertaken in North Dakota (Bangsund et al. 2004).

Looking back at the success of ALUS in Norfolk County, ALUS administration is quick to point out several points as to why the program was so successful. Communication between farmers and government can often be difficult, and in the case of Norfolk, many of the older farmers have a grade four to six reading level. This low education is not due to a lack of intelligence. Tobacco is a labor intensive crop and it was not uncommon to quit school to work on the family farm. A formal education, at the time, was not necessary to grow tobacco. By ensuring the program was driven by farmers, with liaisons to provide appropriate communication to interested individuals, participants were fully informed on the economic and environmental benefits of ALUS, and the administrative process.

During the pilot phase, most decisions and lessons happened “on the fly” in terms of how to create and maintain habitat as well as how to deal with the participants. Credit can also be given to good contractors and technicians who through tacit experience have been known to make on-site decisions to improve the projects. Some issues that are still being dealt with include how best to manage ALUS lands in terms of which methods work best on prairie land to prevent succession. Monitoring was also one of the self-admitted shortcomings of this program, relative to the greater effort in establishing the program. These issues will be dealt with as the program moves forward.

4.7.7 Looking to the Future

The overwhelming success and participation in ALUS by farmers in Norfolk County has strained the program’s administration. Moving forward, there will have to be more staff and an office created as the program grows in terms of acreage and participants. With funding in place until 2014, there is currently no financial crisis though many participants and administrators are looking at other sources of sustainable long-term funding. The ALUS concept is in a unique position to develop a market for EG&S production to real estate developers and other industries that would benefit by investing in environmental offsets.

Continued support from farmers and conservation groups that currently support ALUS will contribute to its survival and continuance. Through education and flexibility, ALUS offers Norfolk County an opportunity to preserve its natural capital as it transitions away from tobacco agriculture. As one of the most successful examples of the ALUS

concept, in terms of participation and program development, Norfolk County's program's successes and lessons have also played a major role in influencing subsequent programs across Canada.

4.8 THE PROVINCE OF PRINCE EDWARD ISLAND

Prince Edward Island, located on the Gulf of St. Lawrence, has long been known as the "million acre farm". With its fertile soils and temperate climate, the province is well suited to the production of many crops and forages. Prince Edward Island's agriculture is centered on cash crop farming, principally potato production with rotations of cereals, soybeans and oilseeds (Government of Prince Edward Island 2012b). Livestock farming is also prevalent with over 200 dairy operations and beef cattle production on 40% of island farms. Fruits, vegetables and organic production are also important to PEI's agriculture sector.

Tree species of the area are classified as Acadian Forest, with a mixture of coniferous and deciduous species that naturally regenerate and succeed through lack of natural disturbance such as fire (Loo and Ives 2003). Little remnants of old growth and virgin Acadian forest as a result of agriculture and forestry.

Watersheds in the province are small with extensive cold-water tributaries important to brook trout (*Salvelinus fontinalis*) and Atlantic salmon (*Salmo salar*) (Harris et al. 2012). The province also has 1107 kilometers of coastline, filled with estuaries that support commercial and recreational fisheries as well as aquaculture production of shellfish (Government of Prince Edward Island 2012b)

4.8.1 Agriculture's Environmental Impact

The landscape of PEI, though very productive, is prone to environmental problems due to its erodible sandy soil. Low organic matter content makes the soil highly susceptible to water and wind erosion (Government of Prince Edward Island 2003a). When combined with intense rainfalls, a rolling landscape and exposed fields in potato production, losses due to soil erosion can be great. For example, rill erosion of just 1mm on a hectare of land has the capacity to export 16 tonnes of material from exposed fields (Government of Prince Edward Island 2003a), and wind erosion has been documented to transport soil particles from eastern PEI to Cape Breton Island, Nova Scotia, over 50 km away (Harris et al. 2012).

Agriculture's impact on PEI's water quality is well documented. Due to PEI's sandy soils, surface waters are vulnerable to sedimentation. This sedimentation along with the transport of nutrients and agrochemicals in field runoff has led to numerous fish kills in recent decades (Harris et al. 2012).

Nitrates levels in surface and ground waters have been increasing on PEI for over three decades (DesRoches et al. 2008). The result of these elevated nitrates has led to economic, environmental and health impacts throughout the province (DesRoches et al. 2008, Harris et al. 2012). Prince Edward Island is dependent upon ground-water for drinking water, and in 2008, 6% of 2,511 wells tested in the province were above the recommended 10mg/L guideline for Canadian drinking water quality (DesRoches et al. 2008). Marine estuaries suffer from anoxia due to nitrate eutrophication, which causes detrimental effects to not only wildlife but to aquaculture, commercial fishermen and tourism (DesRoches et al. 2008, Harris et al. 2012).

Prince Edward Island's forests have been extensively harvested and cleared since European colonization (Loo and Ives 2003). By the early 1900s close to 70% of PEI's forests had been removed. Due to farm abandonment, the amount of forests in the province rose to 48% by 1990 (Loo and Ives 2003; Government of Prince Edward Island 2012c), though this has since decreased to 45% due to agriculture expansion (Government of Prince Edward Island 2012c). Remaining forests show signs of heavy harvesting and lack genetic and biotic diversity (Loo and Ives 2003).

In 2003, it was documented that 5.2% (29,512ha) of the island's land base was classified as wetlands, of which over three quarters are freshwater (Government of Prince Edward Island 2003b). The historical amount of wetland loss in PEI is unknown but agriculture and coastal development are still impacting the province's existing wetlands.

4.8.2 ALUS

Alternate Land Use Services is structured as a top-down system in the province of PEI, similar to the CRP in the United States, and is administered jointly by PEI's Department of Environment, Labor and Justice, and the Department of Agriculture and Forestry, with payments issued by the latter. The program is overseen by an ALUS Implementation Committee (AIC) consisting of management staff of the departments and is chaired by the ALUS Coordinator. This group administers the program with the consultation of the External Advisory Committee (EAC) (Table 4.5) which is comprised of representation from major commodity boards, conservation and watershed groups, and academic representation. The EAC has a loose membership and meets annually to provide

community input for the AIC. During the initial development phases of PEI’s ALUS program, the EAC was consulted monthly.

Table 4.5 Members of Prince Edward Islands ALUS External Advisory Committee.

Organizations Represented	
Friends of Covehead and Brackley Bay	PEI Tourism Industry Association
National Farmers Union	PEI Roadbuilder's Association
PEI Federation of Municipalities	PEI Potato Board
PEI Aquaculture Alliance	PEI Federation of Agriculture
PEI Fisherman's Association	Souris Wildlife Federation
PEI Shellfish Association	University of Prince Edward Island

The province has numerous environmental problems. To be effective, the AIC and EAC opted to use an approach of tackling “low hanging fruit” or issues that were well known, of public concern, and financially viable. The PEI ALUS program focused on the goals of reducing soil erosion, improving water quality, increasing the amount of wildlife habitat and quality, and to reducing the impacts of climate change (Government of Prince Edward Island 2007).

The ALUS program of PEI is financially fortunate and stable due to ongoing support from the provincial government. Initially given a budget of \$750,000 annually for five years, the program’s funding was increased to one million dollars in the second year for the remainder of the initial five-year term, for a total budget of 4.75 million dollars (Delta Waterfowl 2009). Currently there is an annual expenditure of around \$750,000. There has been a decline in new applicants, indicating that the program is approaching full implementation within the set goals and objectives. The PEI ALUS program is now coming to the end of its first five-year term and must restructure future payments.

Payments were structured exclusively in annuities for the ALUS program with access to funding for tree plantings and other expenses being made available by other sources such as the federal government’s Growing Forward program (Hill 2012). To meet the goals set out by the AIC and EAC, the following activities (Table 4.6.) were included into the program. These projects targeted enhancing existing 15 metre buffer strips with vegetation, and expanding mandated setbacks with an additional 15 metre grassed buffer. High-slope land that was prone to erosion was eligible for retirement from production as well as establishing grassed waterways to reduce erosion’s impact on land that would remain in production. Large conservation terraces, which permanently remove the land they are constructed upon on out of production, to reduce erosion in adjacent fields, were eligible and received a higher payment as there were more opportunity costs in establishing them. PEI is the only province to exclude livestock from waterways and to help enforce this regulation, maintenance of exclusionary fencing was eligible under the ALUS program to remove the financial burden from farmers.

Table 4.6 ALUS projects and payment rates. Source: Government of Prince Edward Island (2007).

Projects	Annuity Payment
Maintenance of Waterway Livestock Exclusion Fencing	0.30 \$/m
Regulated Buffer Zone Tree Planting	185 \$/ha
Expanded Buffer Zones	185 \$/ha
Non-regulated Grassed Headlands	185 \$/ha
High Slope Land Retirement	185 \$/ha
Land Under Conservation Structures	250 \$/ha

4.8.3 Developmental Challenges

During development of the province's ALUS program, one issue that emerged was how to handle leased and rented land. Initially such land was to be ineligible for the ALUS program due to the legally grey nature and informal verbal contracts between owners and renters. However, due to the large amount of rented agricultural land in PEI (57,639 ha or 28% in 2011) (Government of Canada 2011h) this was restructured to appease the agricultural industry. For rental land to be accepted into the program, a letter was required that stated the rental agreement as well as identifying to whom the ALUS payments would be given. Leased land was also more heavily monitored by program administrators to ensure that land enrolled in ALUS was maintained properly.

In terms of environmental stewardship, the ALUS program has found that education is important for both farmers and program staff. The program staff members have found that farmers are often willing do environmental work in small steps. This approach allows farmers to feasibly become environmental stewards as well as to provide an opportunity to educate ALUS staff about the realities of agricultural businesses.

4.8.4 Producer Involvement

Prince Edward Island has been one of the most successful ALUS programs nationally and has had the most participation in terms of the total number of farmers, the high percentage of producers in the potato industry, and the total areal amounts of land enrolled (Table 4.7). However, the environmental problems the program had set out to resolve have not been

permanently resolved. To meet the erosion, water quality and wildlife habitat goals established, there must be an ongoing progress of working with landowners to ensure that ALUS projects (Figure 4.24) remain a more viable option than returning enrolled marginal land to agriculture.

Currently, ALUS applicants are accepted on a first-come, first-serve basis. Given that the program is operating under budget, there is no need for any sort of system to ensure fair allocation amongst farmers or to prioritize areas of ALUS work or maximize impact. However, it is acknowledged by ALUS staff that in the future, should ALUS expand, a process of prioritizing environmental targets will need to be developed. PEI's ALUS also has no cap on the total amount of land enrolled per farm, which differs from many programs across Canada (see Section 2.4.2, 4.7.4)

Compliance monitoring of enrolled land in the PEI ALUS program is administered by random audits. Annually, 10% of ALUS enrolled farmers are contacted and their farms are visited and assessed to ensure land enrolled in ALUS has not been returned to agricultural production. In the event of a total non-compliance, there is no attempt at cost recovery. However the farmer will be indefinitely excluded from the program. Fortunately, as of fall 2012, the program has never had to deal with such a situation, and most non-compliance is due to simple miscommunication between farmer and labourers, and can be easily fixed. The ALUS approach of management flexibility allows administration to accommodate farmers when weather conditions have caused non-compliance, similar to the arrangements in the County of Vermillion River, Alberta's program (Section 4.6.5).

Table 4.7 ALUS enrollment in PEI. Source (ALUS 2011a).

Activity	Amount of Land/ Fencing
Tree Planting in Legislated Buffer Zones	251 ha
Grassed Headlands	455 ha
Expanded Buffer Zone	553 ha
Land Under Soil Conservation Structures	784 ha
High Slope Land Retirement	1411 ha
Livestock Exclusion Fencing from Waterways	200,000 m



Figure 4.24 Representative ALUS projects located in the Tyne Valley, Prince Edward Island. Forested riparian buffer strips (left) and high slope land retired from cultivation (right).

4.8.5 Lessons Learned

Prince Edward Island's ALUS was fortunate in that it had a previous EG&S delivery pilot project, undertaken in the province's Souris River Watershed, to provide a base from which to develop the current, province-wide program.

This pilot project, undertaken from 2007-09, had the objective of evaluating the effectiveness of an EG&S delivery system in an agricultural landscape (Crane et al. 2009). Sub-objectives of the project included assessing the value of natural capital, estimating the cost to producers for delving EG&S, assessing the roles of community, industry and

government in delivering EG&S, and the cost/benefits of the program. The Souris River Watershed pilot project was used to develop the PEI ALUS program and helped program administrators and farmers avoid the growing pains seen by the Rural Municipality of Blanchard in their ALUS pilot (Section 4.2.4). The PEI ALUS program has been deficient in collecting preliminary quantitative data at project sites to enable a before-and-after comparison. Managers regret this absence of data although it has been noted by farmers, researchers and government officials that there has been observable environmental improvements. Government officials have also stated that they feel there has been more environmental progress through ALUS projects than years at attempting to regulate agriculture.

Findings from an independent survey have also noted that farmers, although pleased with the ALUS program overall, would like to have more consultation in future developments, better monitoring and increased outreach on the benefits of the program to non-participants (Lantz et al. 2012).

4.8.6 Summary

The ALUS program in PEI, in addition to farmers and eNGOs, consulted communities heavily to define its target EG&S goals. Using this approach, the program has been environmentally effective, financially viable, and appealed to more than 400 enrolled farmers. As the program enters its final year of its five-year term, the EAC and AIC will begin renegotiations for continued funding and discussion about redefining the program for its second term and extend the reach of ALUS by setting higher and redefined environmental goals.

CHAPTER 5

DISCUSSION

5.1 INTRODUCTION

This chapter distills and summarizes the descriptive case-studies, highlighting the recurring lessons and themes that have emerged from this cross-system study of Alternative Land Use Services (ALUS) programs. These themes are based upon the comparisons and contrasts of the findings from the studied programs and demonstrate how the general ALUS concept was modified to fit the idiosyncrasies of each location's environment, economic structure and cultural milieu. Presented in four sections, the lessons are organized under the following overarching categories: physical locations, administration, delivery, and development.

5.2 PROGRAM LOCATION

As with any environmental program, the location heavily influences the development, and final ecological goods and service (EG&S) products that were delivered by each ALUS program. There were many similarities and contrasts between the regions, some of which are to be expected, and some which came as a surprise through the examination.

5.2.1 Natural Ecosystems

Across Canada, the regions that are home to ALUS programs boast different natural ecosystems. There does not appear to be any relationship between environments and the establishment of an ALUS program in that area other than the presence of agriculture and environmental concerns about the industry. Some ecosystems have been more drastically altered, such as prairies in Ontario and Western Canada, due to their ease in being converted to agriculture. Wetlands have been disturbed and drained in all of the regions studied, although in many areas the exact magnitude of the disturbance is unknown due to poor historical records.

In summary, ALUS is applicable to any area with environmental problems caused by agriculture, which can be addressed by retiring marginal land to provide EG&S. An ALUS program, which is meant to preserve and promote natural capital in working agricultural landscapes, could not be used as a solution where large-scale land retirement and restoration would be needed such as wildlife sanctuaries or cases where severely impaired ecosystem functions must be restored.

5.2.2 Economy

Agriculture is an important economic component in all of the counties and municipalities with ALUS programs. In remote locations, such as the Rural Municipality of Blanshard (RMB), Manitoba, agriculture may be the sole economic basis of the region. This is reflected in the capping principle of the ALUS program, which maintains agricultural

landscapes by setting a limit on the amount of land individual farmers can enroll in the program (Bailey and Reid 2004; Reid 2005; ALUS 2011d). The capping principle was well displayed in the ALUS of Norfolk County, Ontario and the expired program of the RMB, Manitoba. Developing and pilot programs in other locations have less emphasis on capping as ALUS demonstration projects are unlikely to have economic impact due to the small area of land encompassed by the pilot program that's removed from production. Prince Edward Island (PEI) has not implemented capping as its program is addressing serious water quality and erosion issues caused by potato agriculture.

In most of the regions with ALUS programs, agriculture was not the only economic driver. In Western Canada, the County of Vermillion River (CVR), and Parkland County, Alberta, are heavily involved in the oil and gas industry, and in PEI and Ontario the ALUS program locations also have important tourism sectors. The ALUS programs benefit these sectors, as a potential offset for oil and gas production, as well as protecting and promoting environmental resources and aesthetics as a potential to draw tourists to rural areas.

5.2.3 Environmental Impact of Agriculture

All of the areas where ALUS programs have been implemented have documented previous environmental disturbances related to agriculture. However, those with less intensive agriculture, such as Norfolk County and Grey and Bruce Counties in Ontario still retain a substantial amount of their existing natural capital. Areas with more intensive agriculture such as Western Canada and PEI, have less natural capital often accompanied by more

severe environmental disturbances such as PEI's fish kills due to pesticide runoff and improper buffering and the eutrophication of prairie lakes.

Other areas have also experienced severe environmental problems caused by agriculture. Caledon, Ontario, which at one time was heavily involved in cash crop production, has environmental scars in the form of the most easterly example of badlands topology in Canada, the Cheltenham Badlands (Figure 5.1). Western Canada's infamous dust bowl of the 1930's due to improper agriculture and drought has left a lasting effect, on agricultural practices and policy in the prairie provinces of Alberta, Saskatchewan and Manitoba.

5.3 ADMINISTRATION STRUCTURE

Most ALUS programs I visited in my investigations were very similar at first glance, each having been built upon the strengths and successes of previous programs in other locations. Upon closer inspection, there are subtle difference between the programs which allow each to be unique and to cater to the needs of its supporters and participating farmers.



Figure 5.1 The Cheltenham Badlands, Caledon, Ontario.

5.3.1 Composition

In all of the ALUS programs studied, there was a diverse portfolio of stakeholders and supporters, comprised of farmers, environmental non-government organizations (eNGOs), and various branches of government. This diversity offers the strengths of achieving multiple goals targeting the environment, agriculture, and the surrounding community. In addition to helping create a more multifunctional program, diversity in the administration also brings additional expertise and in-kind support, as well as networking to financial

partners.

5.3.2 Structure

All ALUS programs engage numerous stakeholders that have an interest in EG&S produced in agricultural landscapes. During the initial ALUS pilot program in the RMB, Manitoba, non-farmer stakeholders consulted with agricultural producers to develop the program and prove the concept. By tailoring the program to suit farmers and administer funding, this first ALUS program focused on finding a solution to the conservation needs of the non-farmer stakeholders, funding bodies which included foreign natural resource agencies, and farmers.

Prince Edward Island utilized a different approach for their provincially funded program. Although administered exclusively by the provincial government, during the development of the program the external stakeholders from industry, communities, and eNGOs were relied upon for the development of an acceptable and sustainable program. Currently, the government administration meets annually with these stakeholders to review the program and to suggest modifications if needed.

The Partnership Advisory Committee (PAC) model, since being formalized in Norfolk County, Ontario, has become the central structure in all of the current ALUS programs across the country, with the exception of PEI's top-down program. With representation on the PAC from municipal and provincial governments, eNGOs, and predominantly farmers, this model keeps all of the program development and administration at the grassroots level. Many proponents of ALUS have pointed to the

strength of this model as part of the success of ALUS for farmer involvement in the program. Norfolk County's PAC further engages producers by appointing five of its ten farmer members as liaisons. These liaisons will assist the ALUS coordinator by providing initial and continuing communication with interested farmers, helping to establish trust.

Currently, there does not appear to be a relation between the administration structures and the effectiveness of the program. However, many farmers are often distrustful of government and eNGOs (Atwell et al. 2010; Johnston 2012). Therefore, the involvement of farmers in the ALUS administration process is viewed by many as being important to the acceptance of the program by the agricultural community.

5.3.3 Funding

As seen in the case-study descriptions (Chapter 4), eight of the nine ALUS programs were not primarily supported by provincial or federal funding. Relying on grants through funding agencies to administer ALUS payments, there are concerns about the longevity of these programs. However, the Norfolk County ALUS has extended past the initial three-year pilot stage to become a full-fledged program in the absence of significant government funding. Due to the continued support and interest from funding partners, this fear has not materialized in any program since the original ALUS Pilot of the RMB.

The ALUS program of PEI is fortunate with its budget of one million dollars allotted annually by the provincial government. Although this budget has allowed PEI to have some of the highest levels of ALUS participation and annuity payments across Canada, the program's long-term survival is dependent upon the political support of the

governing party (Johnston 2012). In comparison, other ALUS programs which are partially funded by provincial or municipal governments or supported with in-kind support would not be subjected to these unmanageable and abrupt changes by a new political landscape.

Despite not being funded directly by government, many programs have had notable support. In Alberta, the designation of the County of Vermillion River (CVR) as a wetland restoration agency has enabled the county's program to access provincial money for wetland restoration (Delta Waterfowl 2013b). Although this funding cannot be used for annuities, it will help with the initial costs of establishing projects. The initial ALUS pilot in Manitoba was supported by the provincial government, crown corporations and American fish and wildlife agencies. This highlights that there is a place for government funding in ALUS, though most are not primarily reliant upon that form of financial support.

5.4 PROGRAM DELIVERY

Every ALUS program was distinct in the way that the program was delivered to farmers. Differences in payments, monitoring, and criticisms reflected how the needs of each location were slightly different environmentally, economically and culturally.

5.4.1 Payments

Providing a positive market signal for the production of EG&S is the fundamental function of all the ALUS programs. The payment levels vary greatly, depending on the location

and agricultural practices. For example, annuities paid for marginal land enrollment in the CVR, Alberta is as low as \$12.50/ha, while payments in Norfolk County, Ontario are as high as \$375/ha.

The highly variable payment rates seen across the country reflect differences in opportunity cost and land values. Despite the low payment rates offered to some farmers are offered, most are appreciative of the recognition and consider the payment as fair compensation for their efforts. Supporting evidence can also be found in research undertaken on the PEI ALUS program (Johnston 2012, Lantz et al. 2012). However, these studies also reported that many farmers would like to be paid more for ALUS enrolled land in PEI. A lower ALUS payment, while less appealing to individual farmers, is beneficial for PEI agriculture as it prevents market distortion by artificially increasing land value. Examples of this were seen in the American Conservation Reserve Program (CRP) in the 1980's in which the CRP payments, which were larger than land rent, caused the value of farmland to increase because of a capitalization of this potential revenue. (Shoemaker 1989).

5.4.2 Compliance Monitoring

Compliance monitoring is undertaken in all ALUS programs. Monitoring ensures that farmers are carrying out projects to deliver EG&S on enrolled lands. However, the monitoring procedure is not universal and varies in its implementation between the programs.

The CVR's ALUS conducts annual compliance monitoring prior to making annuity

payments. Within this program there have been cases where farmers were unable to complete the intended project due to weather. Given that this was beyond their control, in these cases the CVR ALUS honoured their payment.

Prince Edwards Island's ALUS program randomly audits ten percent of its ALUS enrollments every year. The province's program has adopted a non-compliance protocol which stops subsequent payment to non-compliant participants. Currently, the administration of PEI's program has not had to enforce this policy. Issues of non-compliance in PEI have been caused by miscommunication, often between the farmer and his employees, and not due to a deliberate abuse of the program.

In the RMB, Manitoba, compliance monitoring was found to be inconsistent. Agents of the Manitoba Crop Insurance Corporation, responsible for compliance monitoring, were found to vary their interpretations of ALUS enrollment. Some expected to see total non-use and undisturbed projects, and subsequently disqualified farmers based on the presence of foot prints or all-terrain vehicle tracks in pothole wetlands. This disgruntled many farmers who subsequently vocalized their discontent at public gatherings and meetings.

As seen in the previous examples, compliance monitoring does not need to be consistent between programs. These differences vary due to location, and the resources of the program to undertake monitoring. However, it is essential to have uniform compliance monitoring with any ALUS program to ensure that farmers and technicians have the same understanding of the expectations.

5.4.3 Acceptance and Criticisms

The ALUS concept has been received with a mixture of supportive recognition for its novel nature as well as criticism. Each individual program has had their own successes and shortcomings.

Participation in ALUS has been embraced by different types of farmers, ranging from large business-oriented farms to small-scale hobby farmers. By eliminating financial penalties and offering modest incentives for environmental work, financially motivated farmers are willing to participate in ALUS. For environmentally-minded farmers, whose properties range in size from small hobby farms to larger, progressive operations, ALUS is viewed as a tool to help implement environmental projects faster than would otherwise be possible.

One recurring criticism is the belief that farmers will only maintain ALUS projects on marginal land if payments are maintained. Although this concern should not be overlooked, promising indicators have come from Norfolk County, Ontario, with over 75 percent of surveyed farmers saying they would leave ALUS projects intact should payments cease (Reid 2012a). In fact many farmers participating in ALUS programs see more reward from societal recognition of their role in environmental stewardship, with the financial incentive, while important, often of secondary consideration. Similar findings were also found in a survey-based study of ALUS participants in PEI (Johnston 2012, Lantz et al. 2012).

Reactions from governments about ALUS have been mixed. While the provincial government of PEI has fully endorsed ALUS, other provincial governments have been less

supportive. Some programs have noted that their provincial governments, although interested in ALUS, often do not fully understand its potential or use. The first ALUS in Blanshard County, Manitoba, for example, was heavily criticized by government and eNGOs for focusing on maintaining existing natural capital and only slightly increasing habitat and wetlands.

Numerous ALUS proponents have commented on the federal government stances that ALUS on a national scale is not financially feasible. Program managers and proponents also concur that ALUS at a national scale would be unfeasible, due to centralized control. By maintaining control at smaller geographical areas, the programs can be more focused and efficient at delivering targeted and meaningful environmental solutions.

5.5 PROGRAM DEVELOPMENT

All of the ALUS programs were developed similarly, EG&S that were needed were identified and the ability of farmers to provide them formed the basis of the programs. Although the goals of each program were often similar, the motivation and process to select these goals often differed between the programs. Slight differences could also be found in program development with regard to integrating with existing environmental programs and how ALUS was launched in each respective location.

5.5.1 Integration with Existing Environmental Programs

Integration of ALUS into existing environmental programs is a core principle of the ALUS concept to complement rather than to compete (Reid and Bailey 2004). Multiple programs have been integrated with provincial Environmental Farm Plans (EFP), requiring the participation in these programs in order to qualify for receiving ALUS payments. This allows the farmer to access cost-share funding, through the EFP, for on-farm projects and therefore leaves the ALUS funding to be used for annuity payments. One notable exception is PEI's ALUS program which does not mandate farmers to participate in EFP. However, the province of PEI does integrate ALUS into existing cost-share funding for provincial mandates through the construction of erosion control structures and riparian zone enhancement.

ALUS programs have also partnered with local organizations and programs. The ALUS program of Grey/Bruce in Ontario is partnering with the Sydenham Sportsman Association, a local group interested in preserving cold water fisheries, to facilitate targeted on-farm projects.

In summary, ALUS programs are very effective at complementing and enhancing existing conservation programs and directives. By offering prolonged payments for the production of EG&S, ALUS makes many cost-share programs more attractive and feasible for farmers.

5.5.2 Implementation Strategy

Demonstration of the ALUS concept with the unveiling of each program to the agricultural community has been a critical component for seven of the nine case-studies that I examined. Following an initial development phase, where the PAC identifies the goals and deliverables of the program, ALUS is first delivered through a pilot phase. Usually lasting three years, the pilot phase generates support for the program by demonstrating to farmers how ALUS can work on their farms and that it is a worthy investment to financial supporters. Following this pilot phase and any fine-tuning in ALUS's delivery, the program becomes fully established and expands to involve more farmers and increased land enrollment (Figure 5.2).

Only two case-studies did not have an ALUS pilot demonstration: the RMB in Manitoba, and PEI's province-wide program. The Manitoban program itself was a pilot to test the effectiveness and suitability of the concept for conservation in agriculture. Originally intended to be the base for a nationally launched program, there was never a serious attempt to ensure the long-term viability of the program in the Rural Municipality of Blanshard. At the time of my research, work was underway to re-launch ALUS in Blanshard, using the new established procedure of beginning with a pilot phase before developing into an established program.

Although PEI's ALUS was not formally trialed before being implemented in provincial policy, EG&S projects were undertaken in the watersheds of Souris and Foundry Rivers to set the groundwork for the program (Crane et al. 2009). This trial, which lasted two years, assessed farmer involvement in delivering EG&S, as well as support from the

community. The findings at the conclusion of the trial were positive, in that many farmers participated, altering their practices, and watershed residents were found to be willing to pay for the expense of producing EG&S.

In summary, demonstration of benefits through a pilot phase and ongoing development is critical to introducing ALUS to farmers and other residents in the target areas. By building support and reworking the program to suit the environmental and agricultural goals of the program, the long-term viability of the program is more secure. However, as highlighted in the PEI case-study, it is possible to bypass the pilot phase of an ALUS if a program of similar scope has been previously undertaken and well received.

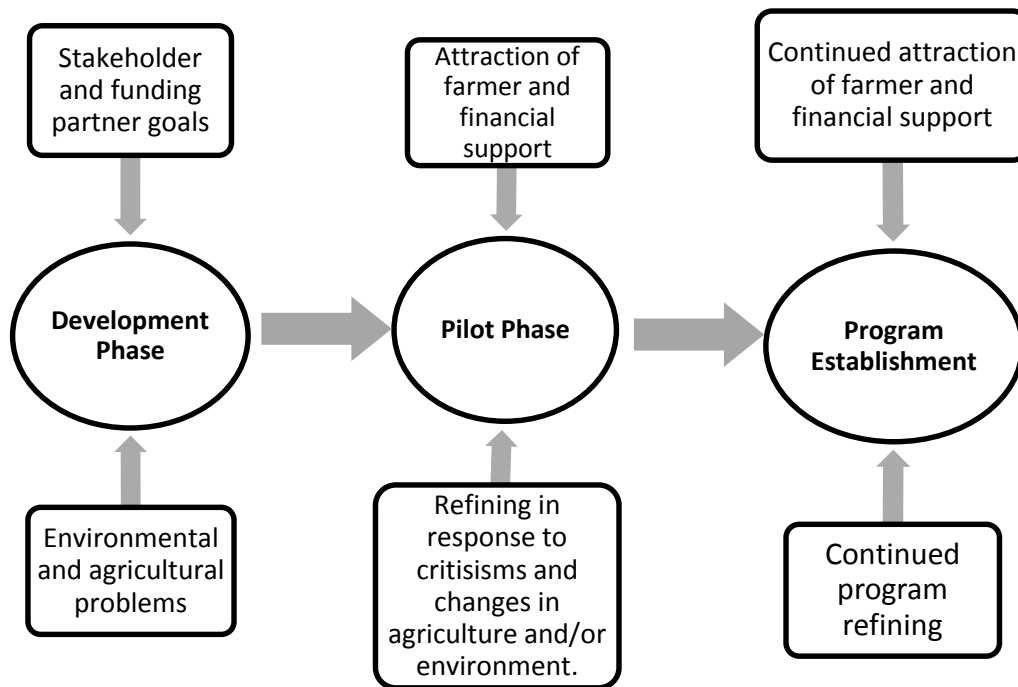


Figure 5.2 Typical implementation flowchart for an ALUS program.

5.5.3 Goals

Across all of the ALUS programs I examined, the dual goals of environmental protection and restoration, and empowering farmers were recurring themes. In more established programs, such as those in the CVR, Alberta, Norfolk County, Ontario, and PEI, goals are targeted to address specific environmental and social problems, such as riparian zone enhancement for erosion protection or establishing native prairie. In programs in their infancy, such as Caledon, Bayham, and Grey/Bruce counties in Ontario, and Parkland County, Alberta, goals were less specific, focusing on environmental benefits, such as general water quality issues, and attracting farmers to be proactive to prevent outside regulation of agriculture. This difference due to the developmental stage of the programs is likely due to a combination of increased farmer awareness of specific environmental issues, and increased stakeholder interest in using ALUS as a tool for their own conservation goals. Uniquely, PEI's ALUS program is used as a means to complement existing environmental regulations, increasing their effectiveness, rewarding compliance.

5.5.4 Prioritization of Goals

Whereas ALUS projects are often similar between different programs, patterns in their justification appear to be dependent upon population density and the intensity of agriculture in the region. Water quality protection through establishing wetlands, riparian buffer zones, livestock exclusion fencing, and off-stream livestock watering were higher priorities in areas with higher population densities and more intensive agriculture (Figure 5.3). These

areas included Bayham, and Grey and Bruce counties, Ontario, PEI, Parkland County, Alberta, and the Rural Municipalities of Francis, Lajord, Indian Head and South Qu'Appelle in Saskatchewan. More rural and less densely populated areas, such as the Rural Municipality of Blanshard, Manitoba, and the CVR, Alberta, place more emphasis on retiring marginal land and increasing the area of wildlife habitat. Interestingly, priorities of Norfolk County, Ontario, were not on water quality despite its relatively high population density. This may be due to its history in tobacco agriculture, which required a small working land base, and the adjacent natural capital that has protected waterways from degradation. Also with the presence of over 1,300 farms in the southern Ontario County (Government of Canada 2011g), most of a small size, the impact on waterways may not have been as great as in areas of high intensity agriculture such as PEI and Prairie Provinces.

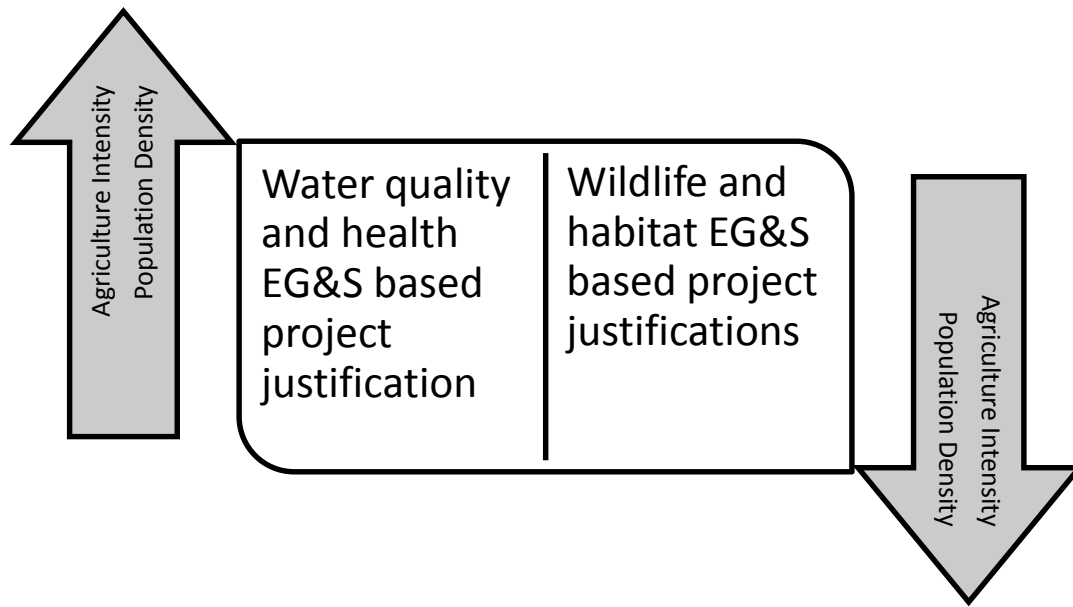


Figure 5.3 The effects of agriculture intensity and population density on the justifications behind EG&S provided by ALUS projects.

5.6 IMPORTANCE OF DEDUCTED THEMES ON ALUS PROGRAM DEVELOPMENT

The importance each of the themes deducted from the cross-system analysis differed in shaping the goals, projects and implementation of each individual ALUS program (Table 5.1). Concepts that were considered of major importance to individual programs were often a principle reason for of the initiation of ALUS or heavily considered during program development. Considerations of minor importance were developed upon, but were not critical in the administration, goals or implementation of the particular ALUS Program. While some of the deducted themes were not yet applicable in developing or recently established programs, only three were not applicable in two programs. The first ALUS program RMB, Manitoba did not place an emphasis on the administration structure or an implementation method to build support and guarantee longevity. Prince Edward Island's

provincial program made very little attempt to integrate with existing environmental programs as this program was meant to complement regulations.

Table 5.1 Assessment of the importance of the deducted cross-system themes in the development and delivery of studied ALUS programs in Canada. 1 – Major importance, 2 – minor importance, N/A – not applicable, N/Y – not yet applicable.

Cross-system Theme	ALUS Program						
	RMB ¹	PC ²	SK ³	GB ⁴	CVR ⁵	NC ⁶	PEI ⁷
Program Location	-	-	-	-	-	-	-
Natural Ecosystems	1	2	1	2	1	1	2
Economy	1	2	1	2	1	1	2
Environmental Impact of Agriculture	1	1	1	1	1	2	1
Administration Structure	-	-	-	-	-	-	-
Composition	2	1	1	1	1	1	1
Structure	N/A	N/Y	1	1	2	1	1
Funding	1	2	N/Y	N/Y	2	1	1
Program Delivery	-	-	-	-	-	-	-
Payments	1	2	2	2	2	1	1
Compliance	1	N/Y	N/Y	N/Y	1	1	1
Monitoring							
Acceptance and Criticisms	1	1	1	N/Y	2	1	2
Program Development	-	-	-	-	-	-	-
Integration with Existing Environmental Programs	1	N/Y	N/Y	1	2	1	N/A
Implementation Strategy	N/A	1	1	1	1	1	2
Goals	1	1	1	1	1	1	1
Prioritization of Goals	1	2	2	2	2	1	1

¹Rural Municipality of Blanshard, Manitoba. ²Parkland County, Alberta. ³Rural Municipalities of Francis, Lajord, Indian Head and South Qu'Appelle, Saskatchewan. ⁴Grey and Bruce Counties, Ontario. ⁵County of Vermillion River, Alberta. ⁶Norfolk County, Ontario. ⁷Prince Edward Island.

5.7. OVERALL EVALUATION OF ALUS

The ALUS programs have been well received in the areas where they are implemented, although they have not been free of criticisms. To be successful, agro-environmental programs must meet environmental and social objects, and be financially feasible. This

section is an overall evaluation of the ALUS programs in regards their environmental and social impacts, and the financial viability the programs.

5.7.1 Environmental Impact

The grass-roots approach of ALUS caused the various programs to fall under both land-sparing and land-sharing. Being attuned to local conservation goals, the program is molded by regional agriculture, natural ecosystems and cultural values. In western Canada, ALUS is more comparable to a land sparing tool, retiring large areas of high slope and marginal land. In Ontario, ALUS appears more as a land sharing program, retiring small marginal land, enhancing streams and wetlands, and incorporating EG&S such as bird and pollinator habitat into agriculture. The program of PEI has hints of both, retiring high-slope land, while also improving the function and biodiversity of riparian zones.

Although ALUS is an environmental program, its outcomes and benefits have not been consistently assessed by the individual programs. Upon visiting ALUS projects across the country, it was very apparent that the sites were in better environmental condition compared similar sites that had been unaltered. And while the improvements can be seen and expressed anecdotally, there is a shortage of quantitative and qualitative data on environmental improvements except for the areal size of projects. There has not been a thorough evaluation of the extent of EG&S the projects are providing and the value of it's the natural capital in its enrolled projects. I believe that some of the criticisms about the initial ALUS pilot in the RMB, MB may have been due to a lack of outreach behind the benefits, in addition to a lack of emphasis on reestablishing new lands. Later ALUS

programs have focused on expanding of natural capital in addition to protecting existing land. However, attempts at preserving existing natural capital may be boosted by increased data collection to build a case for the value of existing natural capital. Given ALUS's stated objectives to integrate with existing environmental initiatives, I believe that the programs should engage with the government agencies that have the resources to collect better environmental data, allowing ALUS administrators to focus on collecting data on farmer engagement and administration.

During my research, the term EG&S services was thrown around loosely to include wildlife habitat, erosion control and water quality. Although there can be little doubt that marginal land taken out of agriculture has positive environmental benefits for water quality and wildlife habitat, there was an immediate implication of multi-functionalism for providing numerous EG&S. This problem is not unique to ALUS and is symptomatic of a recurring attempt to simplify ecosystem function by many different programs that use MBI's (Burgin 2008; Walker et al. 2009; Robert and Stenger 2013). Whereas ecosystem services such as native pollinators, or goods such as enhancement of game species may be quick to assess, other EG&S may take far longer to establish and access.

The voluntary nature of the programs, although promoting the production of EG&S such as erosion control and wildlife habitat, may limit the desired environmental goals that are attainable. Farmers who have no desire to participate in ALUS, or consciously farm in a manner that is environmentally damaging can hinder the programs. In such cases, ALUS would have little regional impact, necessitating reliance on legal regulation would become the primary means to stop environmental degradation. In the province PEI, which uses its

ALUS program as a compliment to regulation, could set a model for situations where voluntary stewardship is not sufficient to ensure regional environmental conditions are at an acceptable level.

5.7.2 Social Impact

ALUS has had far more benefit in terms of socially empowering farmers than it has on environmental rehabilitation. By including farmers in ALUS development and administration processes, barriers of mistrust and uncertainty work have been broken down while creating realistic environmental goals for all stakeholders. Program managers have observed this in many programs such as the CRV, Alberta, which at first had attracted only a handful of skeptical farmers. Within a year, a similar meeting promoting ALUS in the CVR attracted a hundred farmers and ranchers, all acutely interested in ALUS. I feel that this social empowerment is the true strength of the ALUS program, and can set the foundation for more sound environmental work.

From my conversations with participants and administrators, it became apparent that farmers felt that the main benefit for ALUS programs was the societal recognition for their undertaking of environmental work. This supports research by Knowler and Brashaw (2007) that indicated increased social capital was one of the most important influences on why farmers undertake environmental work. It is this social capital that is the main driving force behind ALUS participation, with the financial incentives, which can be very modest, being viewed as a secondary benefit.

5.7.3 Financial Sustainability

During my research there was an ongoing concern about long-term financial stability of the ALUS programs since, with the exception of PEI, they all lack major government support. While this concern is well-grounded, the continued funding of the Norfolk program beyond the initial three-year pilot, through the support of the Garfield Weston Foundation and other funding partners, shows an optimistic model. Similar success has been had by the ALUS program of the CVR, Alberta, due to being recognized as a wetland restoration agency.

PEI's ALUS program, which has had continued financial support from its provincial government of one million dollars annually, does not have the short-term financial concerns of other ALUS programs. Although it is provincial policy and relatively stable, it could be subject to a change in political will, whereby the program could quickly lose its funding. However, in PEI's case this is very unlikely as the program has been very successful when used in conjunction with existing environmental regulations in the province (Hill 2014).

Some ALUS programs were looking at developmental offset-and-trading mechanisms to bring in revenues for ALUS. The lack of data about the value of the natural capital may limit this as well as the risks about offset credits that protecting natural capital or providing offset is acceptable to remove some. The literature is clear that credit and banking style restoration may not provide the same ecosystem services as those lost in the area being developed (Burgin 2008; Walker et al. 2009; Robert and Stenger 2013). However, it does provide opportunity to mitigate and allow economic development while

encouraging the production of EG&S in agricultural landscapes, which may already be highly disturbed.

The financial efficiency of the ALUS program is something that was only briefly mentioned by administrators. By engaging farmers, who already have both land-working equipment and operation experience, the programs do not have to significantly invest capital or labour to undertake ALUS projects. There are some exceptions where specialized equipment has had to be purchased, such as the grass seed harvester in Norfolk County, Ontario, or where wetland restoration has been subcontracted to local contractors.

5.7.4 Summary

The ALUS programs I visited, despite being touted environmental program, lacks quantifiable data on their ability to increase EG&S. This is a serious shortcoming that should be explicitly addressed in the establishment of any future programs. However, in the case of past and present ALUS projects, the environmental improvements have been qualitatively observed. Such deficiencies in quantifiable data is common in many attempts to simplify the complex relationship between natural capital and the EG&S provided (Robert and Stenger 2013).

Financially, ALUS does have uncertainty about funding, but this is typical of most environmental programs. The continued financial support of ALUS, as well as its ability to use the participant's on-farm assets and experience increase its viability, thereby reducing the resources needed to operate the program, compared to other environmental programs, suggests an optimistic future for its continuation as an efficient program of

agricultural stewardship and environmental improvement.

There are two distinct models, that have been used for the administration of ALUS, bottom-up and top-down, each have their advantages and disadvantages. Prince Edward Island's top down model has many strengths including financial security, and resources for compliance monitoring, and access to government resources. Despite using a grass-roots approach to develop the program there are still members of the farming community that feel more consultation to farmers is needed, and outreach to encourage those that are not implementing ALUS on their farm (Lantz et al. 2012). The bottom-up approach has been adopted by all other past and present ALUS programs has been extremely successful in engaging farmers. Despite this advantage, there are concerns about the long-term financial longevity of the programs, and access to technical knowledge.

The social impact of the program has been the greatest success of ALUS. By engaging farmer for the initial and ongoing development, and/or administration, ALUS has managed to overcome the mistrust and apprehensions that many farmers have of environmental programs (Lawrence et al. 2004). This work can pave the way for farmers, who appear to be driven more by social capital, than financial incentives, to work with eNGOs and governments to attain mutually agreeable environmental outcomes. In this regard, ALUS is representative of a growing body of research that suggests the process of participation in environmental restoration may ultimately be more significant than any ensuing environmental products (Baker and Eckerberg 2013, Petursdottir et al. 2013).

5.7.5 Future Research

My research was an overarching, cross-system analysis of all the ALUS programs. Being generalist in nature, my work has left many questions unanswered and brought up new questions that should be focused for future research endeavors.

Monitoring has only been implemented to ensure compliance on the ALUS programs, and biological data on the impact of ALUS is lacking. Research on the environmental impacts and the EG&S facilitated by ALUS projects is needed as the program grows and expands. This research should be initiated in-house to assure that the scope of the research is regionally relevant, but overseen by experts.

Financially, research should be undertaken on how to most sustainably finance ALUS. Currently, direct payments are issued to farmers, with funding coming from private as well as government grants. Building on findings from Norfolk county as well as literature, the use of developmental offset credits should be further examined, as well as methods other than direct payment. To assess the economic value of the EG&S facilitated by ALUS, building on a more thorough research of the environmental benefits of undertaken projects, a more comprehensive valuation analysis should be undertaken to examine the regional benefits and those that are more further reaching.

My research involved conversations with farmers, administrators, supporters of ALUS. The case-study methodology (Table 3.1) was designed to prevent bias and limit opinion-based answers, although the lack of interaction with farmers that did not participate as well as individual opinions of ALUS points to a need for further research. A more comprehensive survey of farmers, administrations, and the general public, should be

undertake to determine the social impact and acceptance of ALUS, similar to that undertaken in PEI (Johnston 2012, Lantz et al. 2012)

5.8 DEVELOPMENTAL CONSIDERATIONS FOR A NOVA SCOTIAN PROGRAM

At the present, there is no shortage of environmental programs tailored to agriculture in Nova Scotia including a provincial environmental farm plan (EFP), the Federal Growing Forward 2 program, and the Agriculture Biodiversity Conservation Plan, as well as countless local initiatives undertaken by environmental non-government organizations (eNGOs). I believe that despite the abundance of these programs, there is a niche that Alternative Land Use Services (ALUS) can fill. ALUS could be used as a tool to increase crop farmer participation in the EFP, which is has been more commonly undertaken by livestock farmers (Atari et al. 2009; Yiridoe et al. 2010). Also, by providing social empowerment, ALUS would complement and increase the impact of existing programs.

This chapter section attempts to illustrate examples of how ALUS attributes could be applied to Nova Scotia. Building upon the recurring lessons and themes collected from the programs studied, this section highlights the agricultural and environmental concerns of the province and illustrates how ALUS could play a role in facilitating the production of EG&S and provide a base for the development of a Nova Scotian program to meet the needs of both farmers and society.

5.8.1 Nova Scotian Agriculture

Agriculture in Nova Scotia is clustered in multiple areas of the province. Much of the province's agriculture is located within the Annapolis Valley, with other pockets located along the Minas Basin, at the top of the Bay of Fundy, and along Nova Scotia's north shore on the Northumberland Strait. These pockets are separated by areas of woodland, wetlands and areas unsuitable for agriculture. As of 2011, 3905 farms in the province were cultivating 113,672 ha of crops and using 46,301 ha for pasture (Government of Canada 2011i)

Nova Scotia, as with all of Atlantic Canada, has seen a reduction in net farmer income due to decreased commodity prices and increased input costs (Cameron and Benjamin 2010). This strain has caused many farms to go out of business or not be continued by the next generation. Some agriculture sectors have fared better than others. Mink fur farmers have been receiving record prices leading to rapid expansion in the past decade (Smith 2013), and the supply managed industries, dairy and poultry, have remained stable. However, these sectors are not without their own challenges. Supply management has long been opposed by Canada's trading partners and is only sustainable as long as political will keeps it in place. Fur farmers are facing environmental regulations due to waterway eutrophication, animal welfare concerns, an outbreak of Aleutian Disease Virus, which can devastate an operation, reducing fur quality and the overall health herd health of the mink ranch.

With these strains on agricultural business, environmental stewardship can be easily overlooked. Nevertheless, many farms have integrated proper crop rotations and

animal husbandry into their operations (Cameron and Benjamin 2010) and the Nova Scotia Federation of Agriculture's (NSFA) EFP, which provides cost-share assistance for environmental stewardship projects, and has high participation (Fulton 2012). This shows that although some farmers may be financially constrained in the amount of stewardship they can undertake, many of them are interested and willing to undertake environmental projects under feasible conditions.

5.8.2 Nova Scotian Environmental Issues Relevant to Agriculture

Water quality and the associated aquatic habitats in Nova Scotia are of concern in many agricultural areas of the province (Nova Scotia Department of Environment 2012; Nova Scotia Salmon Association 2013). The removal of riparian vegetation, poor stewardship, and/or nonpoint-source pollution have caused deterioration of water quality in multiple areas of the province. Notable areas in this regard include eutrophication that has been linked to fur farming in south-western Nova Scotia (The Yarmouth County Vanguard 2012), and poor water quality in the Annapolis Valley due to agriculture and other human disturbances (Sutherland 2003).

Many wildlife species have benefitted from agriculture in Nova Scotia. Gamebirds, deer, waterfowl and other species have benefitted from increased food resources from unharvested and post-harvest crop losses. However, not all species have benefited from agriculture. A shift to earlier spring harvest of forage crops for increased feed quality, has decreased populations of grassland birds across North America (Herkert 1997; Nocera et al. 2005). For example, in Nova Scotia, mid-June forage harvests have been shown to

cause total nest failure of grassland birds (Nocera et al. 2005). Native insect pollinators are negatively impacted by monoculture's high intensity agriculture (Levy 2011). Although not all agriculture in Nova Scotia is intensive, some sectors could benefit from the establishment of increased pollinator habitat.

5.8.3 Nova Scotia's Environmental Farm Plan

Nova Scotia's EFP is designed to help farmers identify and assess and identify on-farm environmental risks and mitigate them (Nova Scotia Federation of Agriculture 2014a). Administered by the NSFA, this program assists farmers with identifying areas of environmental potential improvements by an EFP coordinator (Nova Scotia Federation of Agriculture 2014b). Once identified, the risks are assessed by their severity and an action plan is determined to implement on-farm upgrades, providing access to financial and technical resources (Nova Scotia Department of Agriculture 2011).

The EFP has been extremely well received with over 1700 farms participating (Fulton 2012). Participation in the Nova Scotia EFP is most strongly attributed to larger farm size, livestock farming, and higher farm income (Atari et al. 2009, Yiridoe et al. 2010). There was no correlation between participation and age or education of the farmer. Larger farms have attributed participation to maintaining positive relationships with non-farming neighbors, and mitigating conflicts (Yiridoe et al. 2010).

Research indicates that social capital and social participation may be the most important part of environmental work (Baker and Eckerberg 2013, Petursdottir et al. 2013). The EFP program is currently administered top-down and despite its high participation, the

bottom-up approach of ALUS would have benefits to not only farmers but the entire agricultural industry. By encouraging farmers to participate in the governance of ALUS, there will be increased stewardship and wiliness to undertake these projects. Engaging eNGOs and community stakeholders, will also provide positive media for the agriculture industry, soothing the often strained relationship between farmers and their non-farming neighbours.

5.8.4 How ALUS Could Fit Into Nova Scotian Agriculture

With the ability of the ALUS concept to facilitate conservation and empower farmers, there is no reason that a program would not be feasible in Nova Scotia. The following are some possible applications that ALUS might provide in Nova Scotia. However, given that ALUS is developed at a grassroots level, the following recommendations should be viewed as starting points to be expanded upon or altered to match the EG&S that are demanded by society and the ability of farmers to deliver them.

5.8.4.1 *Pollinator Habitat*

Pollinator habitat projects have been effective in Norfolk County, Ontario, and may be a good fit for Nova Scotia's fruit industry. This type of project provides both habitat and food to sustain native pollinators prior to and after crop bloom. Many producers would be able to increase the pollination of their crops and reduce their reliance on domestic bees. This pollinator habitat would also serve as habitat for other wildlife, such a song birds and small mammals. Farmers in Ontario have expressed anecdotally that pollinator habitat

projects have reduced crop loss from wildlife by providing natural food sources and habitat.

5.8.4.2 Delayed Forage Harvesting

Grassland birds, whose declining abundances are a concern in Nova Scotia, could be accommodated by delaying forage harvesting until after young birds have fledged. Modeling after Norfolk County, Ontario's system, a partial payment for delayed harvest could be made to farmers. This could be met with some resistance, especially by dairy farmers who require a high quality feed for their animals. For these cases, where the grass would be worthless to the farmer, a non-use payment for small sections of fields or a partial payment if the forage can be used as a livestock bedding material may be more appropriate.

5.8.4.3 Riparian Zones

All of the ALUS programs I examined have riparian zone projects. These projects range from simple enhancements and tree plantings in PEI projects, to complete reclamation and restoration work in Western Canada. Nova Scotia's riparian projects should be focused on protecting small streams, which are important fish habitat, and in establishing trees and vegetation. Near larger water bodies, setbacks and grassed waterways to prevent agricultural run-off would be adequate as tree cover is not as important for protecting fish habitat as they are in small tributary streams (France 2002). Currently this type of restoration work is addressed with cost-share assistance and there is no ongoing incentive to compensate opportunity cost of removing land from agriculture, ALUS would make these long-term projects more attractive and feasible.

5.8.4.4 Wetland Enhancement

Wetland enhancement was a recurring theme across all of the ALUS projects. Given Ducks Unlimited Canada's programs that fully subsidize wetland creation projects in Nova Scotia (Nova Scotia Department of Agriculture 2011), a new ALUS program should partner with this established program, offering annuity payments on land removed from agricultural production. Wetlands to treat tile drainage effluent and other agricultural wastewater should also be examined for viability under ALUS.

5.8.4.5 Marginal Land Retirement

In Nova Scotia, marginal land should be removed from production or be used for agriculture with a lower environmental impact. High slopes under regular cultivation should be targeted, as well as land that could fall under wetland or riparian zone projects. With much of Nova Scotia's agriculture being focused on livestock, marginal land may not be as prominent an issue as elsewhere, such as in PEI, and Bayham and Norfolk Counties in Ontario, or the Prairie Provinces. However, high-slope wild blueberry fields that are unable to be mechanically harvested may have potential for a managed retirement and conversion into native pollinator habitat.

5.8.5 Program Governance

In Section 5.7.4, I summarized the two that have been used to develop and administer ALUS. For a Nova Scotian ALUS program I recommend using the bottom-up approach, building trust and empowering farmers with the Partnership Advisory Committee (PAC)

model (Section 4.7.4). By building upon regional environmental concerns, PAC discussions between representative farmers, eNGOs, and government representation can develop mutual and realistic environmental projects. Day to day operations and resources management for the new ALUS program should be overseen by the NSFA, with minimal direct contact from the provincial government. The NSFA is also in a unique position to implement ALUS with its current involvement in the EFP with coordinators that already do on-farm environmental audits as well as undertake compliance monitoring. More in-depth environmental monitoring should be undertaken by eNGOs and universities as to not burden ALUS or the NSFA with the need to manage resources necessary for this aspect of ALUS.

5.8.6 Program Developmental Considerations

Although most ALUS programs are administered on a county basis, the province of Nova Scotia, with its small size and clustered agriculture, could administer the program provincially, as in the case of PEI. Developing ALUS for Nova Scotia could follow the developmental process shown in Figure 5.2. Potential partners to assist in the developmental stage should include environmentally aware farmers, environmental and agricultural groups, and some government representation. Given the precedence for a key agricultural organization to overtake a leadership role in the development of ALUS programs, I believe that the NSFA, with its role in administering Nova Scotia's EFP, connections to other agricultural programs, and their general support by the agricultural community, should take on this role. In the beginning the organizing organization should

take a leadership role organizing the stakeholders and initiating demonstration projects. With time the leadership role of the NSFA in administering ALUS could be reduced in line with other the other stakeholder partners.

Some of the ALUS programs are rural, remote, and not easily access without long commute. The demonstration phase could occur in an area that is proximal to Halifax and the Stanfield International Airport to increase its visibility to the public and to easily showcase Nova Scotia's adaption of the ALUS concept to visiting out-of-province proponents and partners, such as the Delta Waterfowl Foundation. Suitable candidate locations that meet this requirement could include the Truro, or the Annapolis Valley region, which both approximately an hour commute from Halifax. These areas also contain local universities which would be advantageous to the establishment of an ALUS program, providing technical support, research assistance, and economical student labor for running the programs.

Most ALUS programs, with the exception that in PEI, are partnered with provincial EFP programs to provide some upfront funding for on-farm project construction, thereby allowing ALUS to focus primarily on making annuity payments for EG&S. Some ALUS payments do provide funding for upfront costs, although it is often treated as an advance on future annuities. The potential integration of ALUS payments into Nova Scotia's EFP could also improve the compliance monitoring of the EFP program. This is important for Nova Scotia's EFP as compliance monitoring has been a criticism of all of the EFP program nation-wide (Government of Canada 2008b). Alternative Land Use Services could further incentivize Nova Scotia's EFP program, making it more beneficial for farmers to carry out

proposed EFP projects.

With the ability of the bottom-up ALUS approach to address local concerns, often far better than top-down programs, local farmer and environmental groups should be approached for financial and technical support. For example, in Nova Scotia, local watershed groups, conservations groups, the “Adopt-A-Stream” program funded through the Nova Scotia Liquor Corporation, the provincial government’s “Clean Nova Scotia” program, county-based agriculture groups, and many others should be treated as potential and valuable stakeholders.

Ongoing monitoring and development could utilize a before after control impact analysis (BACI) approach. Although more commonly associated with assessing negative environmental impacts, the BACI approach provides a way to allow temporal and spatial variations to be accounted for and would be particularly useful for evaluating the short-term environmental benefits that would be achieved through ALUS (Smith 2002, Schwartz 2012). Factors to be monitored such as water chemistry (nutrients, TSS, aesthetics), wildlife (fish, invertebrates), vegetative communities, would be measured in ALUS projects, as well as control sites, and plotted against temporal variation. Parallel data, when plotted against time, indicated no impact while non-parallel findings are indicative of environmental changes caused by ALUS (Figure 6.1).

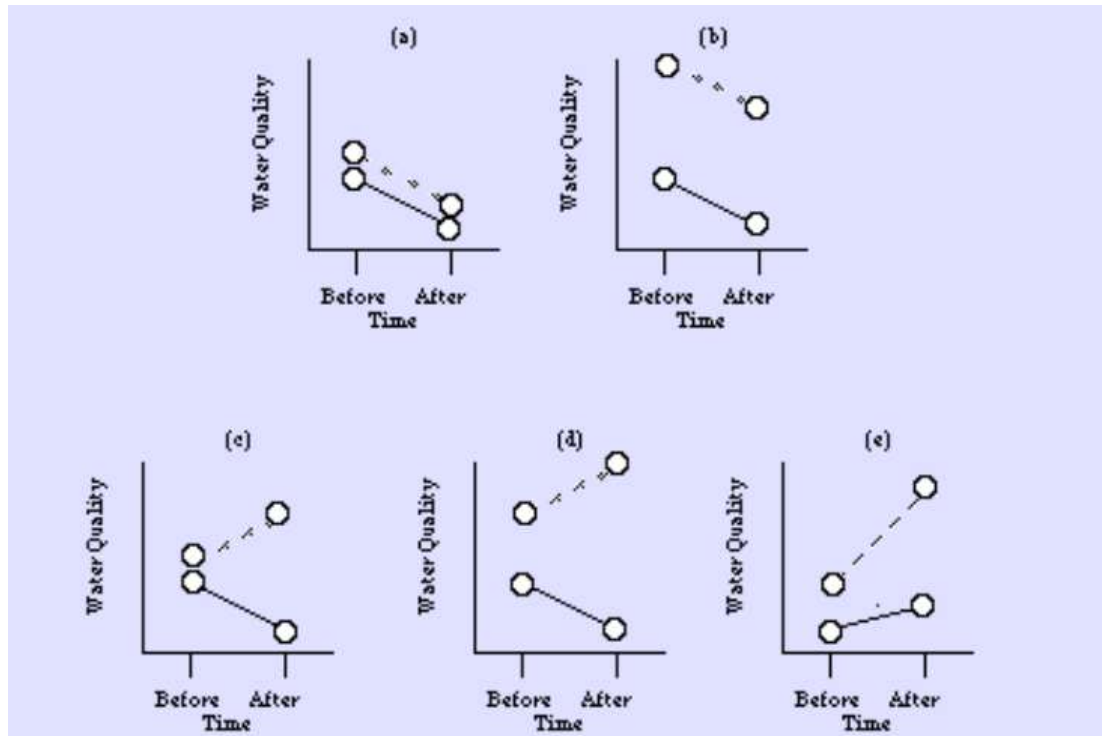


Figure 5.4 BACI design results. Example data that show no environmental impact (a,b) compared to results that indicate a change in condition (c,d,e) not caused by time. Source: Smith (2002).

5.8.7 Developmental Timeline

All of the established ALUS programs has developmental phases that spanned over many years. Most ALUS programs began with a three-year pilot phase; those that did not either relied on reference from similar EG&S programs or were not concerned about long-term development. Using this successful formula, a hypothetical five-year time is suggested (Table 5.2), with the first year for developing the goals, followed by a three-year pilot phase to demonstrate and modify ALUS before being launched as a fully developed program. This timeline also emphasizes the use of environmental monitoring to quantify environmental improvements and showcase ALUS to future partners and participants.

Table 5.2 Hypothetical timeline for development of an ALUS program in Nova Scotia.

Timeline	Objectives
Year 1	-
Winter	Bring together representatives from farmer organizations, eNGOs, government and environmentally-minded farmers to establish PAC and administrative structure. Set goals for ALUS program.
Spring	Assess program resources (technical, financial) and fill in deficiencies Hire program coordinator. Determine EG&S farmers are willing and able to do. Determine annuity payment amounts and cost-share details. Determine how ALUS will fit into existing environmental programs (i.e. environmental farm plans, local conservation groups, government policy)
Summer	Send coordinator to other ALUS program to meet and network with participants and administrators.
Fall	Identify farms (four or five) for demonstration phase.
Year 2	-
Winter	Arrange for university-led environmental monitoring research (undergraduate honors or graduate students). Identify important environmental indicators for monitoring and BACI..
Spring	Study initial environmental conditions for BACI. Farmers undertake projects. Compliance monitoring.
Summer	Continued environmental monitoring.
Fall	Showcase ALUS projects to current and potential funding partners, farmers, general media and academia. Continued environmental monitoring. Follow-ups with farmers to ensure satisfactions with program. Seek more farmers for ALUS demonstration phase.
Year 3	-
Winter	Meet with all partners, modify ALUS as needed. Begin discussion for program extending past demonstration. Evaluate environmental impact based on findings from BACI research and adjust goals or monitoring.
Spring	Continued environmental monitoring. Continued compliance monitoring. Farmers undertake new ALUS projects.
Summer	Continued environmental monitoring. Demonstrate ALUS to funding partners, supporters and participants for future established ALUS program.
Fall	Continued environmental monitoring.
Year 4	Evaluate environmental impact based on findings from BACI research and adjust goals or monitoring. Continued environmental monitoring. Enroll new farmers. Demonstrate ALUS to finding partners for future established ALUS program. Follow to ensure.
Year 5	Launch ALUS as fully developed program.

5.8.8 Summary

More work is needed to determine how to best implement the ALUS concept to Nova Scotian agriculture. Being unique in many ways there are still enough parallels to draw lessons from other programs that have been or are being established across the country. Research from the case-studies, with the diverse variations in agriculture and geography, has shown that ALUS can be implemented in any agricultural landscape where EG&S come at an opportunity cost to farmers. With leadership from the farming community and eNGOs, there is no reason to suggest that a program could not be developed and implemented, assuming financial support can be obtained.

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