WHAT ARE NATIVE PRAIRIE GRASSLANDS WORTH?

Why it Pays to Conserve This Endangered Ecosystem

Ranchers Stewardship Alliance Inc.
Prepared by: Chris Nykoluk Consulting

2013

EXECUTIVE SUMMARY

Today Canada lags other countries in the developed world in development of policy that recognizes the value native habitats provide. Funding for specific environmental programs is relatively insignificant compared to those for export grains. With the exception of the period following the BSE crisis in 2003, **the prairie livestock industry has remained essentially unsubsidized**. By not participating in income stabilization programs available through conversion of native prairie to cropland, livestock producers have forgone significant amounts of income since settlement. For example, the average cropland payout due to government programs was estimated at about $50/acre per year in the early 1990's (i.e. $73/acre in 2012 dollars). Yet, we now realize that **farmers and ranchers who sustainably manage native prairie are the stewards of much of the last remaining ecologically-rich places remaining in Prairie Canada** and research has shown that society continues to benefit greatly from the Ecological Goods and Services that these native grasslands provide.

Canadian agriculture policy has historically promoted practices that in many applications have been shown to impose a range of environmental costs. These costs have included increases in net greenhouse gas emissions and reduced carbon sequestration, increased soil erosion and degradation, permanent loss of biodiversity including species at risk, wetland drainage, and ultimately incremental climate change. Many of these practices can provide significant private benefits to the agriculture producer, and these private benefits are further augmented by the incentives introduced by the policy measures that encourage the management practice. However, these associated environmental costs are imposed primarily on society at large and less so on the individual producer making the management change. These types of costs are referred to in economics as external costs. **In the presence of external costs the market will fail to allocate resources efficiently**, meaning that the total net benefits to society (i.e. social welfare) will not be maximized. In these types of situations – where there are external costs and/or there are government policies that encourage specific management strategies – **natural capital may not be managed or maintained at levels that are optimal to society**.

Mainstream money-based arguments misrepresent the biophysical dimensions of human ecological reality. Where research exists in which Environmental Goods & Services have been valued, in every case the value of the loss of these "non-market" goods and services outweighs the market or commodity benefits of resource conversion. In some cases, **research has shown that the value of non-market goods and services can outweigh market values by up to 100:1**. Investigations undertaken in this project are consistent with these findings and **show an undervaluation of native prairie grasslands**. **Decision makers need to include this factor because failure to value the natural capital of native grasslands has long term negative implications for society.**

Results of this project investigation show that:

1. Using existing relevant studies on native grasslands, the **indirect values that native grasslands provide is on average $297.79 per acre per year** (in 2012 Canadian dollars). This could safely be considered a gross underestimate (due to lack of adequate data for full calculation purposes), however, the realization that this is an underestimated benefit is still useful for policymakers.

2. **Opportunity costs** for native prairie conversion to production of other agricultural crops **range between $21.58 and $1,836.80 per acre per year**.

3. Basic data provided by Partners who protect native prairie show that the **annual gross stewardship management costs range between $5.20 and $13.88 per acre** in the conventional market economy. However, the amount and nature of management applied by Partners varies greatly.

4. Taxpayers have paid significant amounts of money to support the grains and oilseed export industry, often at the expense of other forms of agriculture such as beef production using native prairie grasslands. The **total amount of direct payments made to producers** in Alberta, Saskatchewan and Manitoba during the period between **1981-2011 was $42 Billion dollars**. The bulk of this amount was **paid to farmers with cultivated crops**, not beef producers.

5. **Once native prairie is converted it is lost forever**. However, **government expenditures to reseed cropland back to a very basic native species mix have cost taxpayers up to $109 per acre.** The average cropland conversion payouts for all government and non-government programs examined and for both tame and native species combined was $71.82 per acre. The range of payouts was between $12.70 and 109.16 per acre. It is important to realize that producers have additional forage establishment costs beyond this payout – likely in the order of $57 per acre in 2012 dollars.

*****

Table of Contents

List of Tables

List of Figures

ACKNOWLEDGEMENTS

We thank the Commission for Environmental Cooperation for providing funding to complete the research for this project.

Primary research and writing was conducted by Chris Nykoluk, independent consultant. Sue Michalsky (Director, Ranchers' Stewardship Alliance Inc.) and Dr. Ken Belcher (Professor, School of Environment and Sustainability, University of Saskatchewan) provided valuable guidance, input and support throughout the project.

Many thanks to the following contributors for providing data, helpful guidance and insightful comments: Rob Dunn (Alberta Agriculture & Rural Development), Richard Escott, Bob Chambers, Mark Peterson, and Bill Bristol (Agriculture and Agri-Food Canada), Darcy Henderson (Canadian Wildlife Service), Matt Weins (Manitoba Agriculture, Food & Rural Initiatives), Renny Grilz (Nature Conservancy of Canada), Lacey Weekes (Nature Saskatchewan), Michael Fitzsimmons (Parks Canada), Michael Burgess (Ranchers Stewardship Alliance Inc.), Orin Balas (Ranchers Stewardship Alliance Inc.), Greg Riemer (Saskatchewan Ministry of Environment), Michel Tremblay (Saskatchewan Ministry of Parks), Jennifer Lohmeyer and Etienne Soulodre (Saskatchewan Water Security Agency), and Kathy Larson (Western Beef Development Centre).

Photographs used are courtesy of Branimar Gjetvaj, Orin Balas, Michael Burgess and Tamela Burgess, Iren Nagy, Dr. Steve Davis, Sue Michalsky, and Heather Peat Hamm.

Responsibility for the final product and its conclusions is not assigned to the contributors or reviewers or any other external party. Review of the report does not necessarily mean endorsement, and any errors remain the author's responsibility.

Introduction

Purpose

The Ranchers' Stewardship Alliance Inc. (RSAI) is a group of Canadian ranchers who are interested in conserving rare prairie native grasslands in perpetuity. RSAI is investigating various ways to estimate the value of the Ecological Goods and Services (EG&S) that native prairie grasslands used for livestock production provide to society. A useful way to quantify these values is using a monetary measure that can be compared to other alternative uses for the land.

RSAI hopes this project will help stimulate innovative thinking about how ranchers might possibly be compensated in future for the many non-marketed goods and services that they provide for society in this "working landscape". In order to prevent further destruction and loss, native grasslands have to be shown to be worth more alive than dead.

Additionally, RSAI hopes this document will help inform federal and provincial policy that can contribute to creating a more effective means of recognizing and supporting the long term conservation value of this endangered biome. Included in this report are five different products:

- A **literature review** of relevant studies regarding the value of grassland natural capital and their Ecological Goods & Services. Special focus will be on identifying a range of annual monetary values per acre that these grasslands are estimated to provide, especially within the Great Plains.
- An **examination of opportunity costs** - the dollars per acre forgone by the choice to retain native prairie, rather than convert it to cropland or rural residential property.
- An investigation of the **annual gross cost per acre to provide stewardship** for biodiversity, contributed by Partners who currently manage native grasslands in the Prairie Provinces.
- An examination of the **public funds historically invested in converting native prairie to cropland** or other uses, including annual and perennial crops.
- A brief summary of the provincial and federal **funds historically invested to convert cultivated lands back to perennial cover**.

Why is Conserving Native Grasslands Important?

Indigenous temperate grasslands are the most altered ecosystem on earth – more than 41% of the world grasslands have been replaced by intensive agriculture (Heindenreich, 2009). Here in Canada, aggressive federal and provincial agriculture policies targeted at promoting grain production for export over the last 100 years have resulted in the conversion of large areas of grasslands to annual crop production and the consequent increasing rarity of large tracts of native grasslands (Bailey, 2010; Riemer, 1998, and Rosaassen, 1996). Concurrent with this massive habitat loss, often more than 80%, most of our nation's Species At Risk also call these grasslands home; many are steadily declining despite efforts to halt their loss. Sadly, other less imperilled biomes have often received more recognition and funding than temperate grasslands (Heindenreich, 2009).

At a global scale, grasslands store 34% of the global terrestrial stock of carbon ecosystems, just behind forests (39%) with agro-ecosystems (17%) also important. However, disturbance of grasslands through such management practices as cultivation causes significant carbon emissions. Research has shown that even with restoration of these converted grassland soils, carbon recovery is slow (Wilson, 2009).

Private landowners have little incentive or ability to protect nature for the public good (Olewiler, 2004; Ma and Swinton, 2011). In the case of privately owned land the manager will tend to allocate that land to the use that provides the greatest benefits, albeit often short term. However, since there are significant public benefits provided by native prairie grassland while most of the benefits provided by annual cultivation are private benefits, recognized by the landowner, there is often a strong incentive to convert grasslands to the production of annual crops. This situation has been significantly exacerbated by a range of government policy that, through subsidies and other forms of incentives, increases the private benefits of annual crop production relative to the private benefits of maintaining native. These types of policies have often created "perverse incentives" to cultivate native prairie. In addition to many other EG&S, endangered species is not the sole responsibility of 2% of the population (i.e. rural farmers and

ranchers), it is the responsibility of 100% of the population (Prairie Conservation and Endangered Species Conference, 2008). This difficulty of "pricing what is priceless" has long been recognized re: social and cultural goods and services with non-use value (Smith, 1996). We now know that positive impacts from nature on health and well being exist, and we recognize the importance that a biome may have to regional psyche. Unfortunately, traditional knowledge is easily and irretrievably lost if it is not fully recognized and documented (Heindenreich, 2009).

Loss of native ecosystem services has been shown to impose significant economic impacts, threatening health, food production, climate stability and basic needs such as clean water (Wilson 2009). Natural capital is Canada's most important asset - as it enables all economic activity, yet it is not economically valued or is valued incompletely; it is excluded in our current measures for value and decision making, and so losses continue to occur. Much of our remaining native grasslands in the world are currently degraded or vulnerable to desertification, meanwhile, our understanding of the Total Economic Value of grassland biomes is limited at best (Wilson, 2009). However, it is well understood that these biomes contribute valuable services to society such as carbon sequestration, watershed stabilization, habitat for species at risk and native pollinators (Saskatchewan Forage Council, 2010). The non-market values of Canadian prairie grasslands have been conservatively estimated at 2.5 times the market valued contributions of these working landscapes (Costanza et al, 1997; Kulshreshtha and Pearson, 2006).

Given the estimates of very large benefits provided by native grasslands through the wide range of ecosystem goods and services, it is apparent that no public governance system can afford to pay landowners the full value of ecosystem services and functions in order to maintain them (Heindenreich, 2009). However, for decision makers to implement programs and management that provide the full range of benefits available from these systems, they must understand what those values are. Understanding the range of values puts into perspective any regulatory or market based compensation and allows for the determination of a comparative

value of not converting the land; recognizing non-market values can help make decisions about unsustainable projects that need to be modified or even cancelled. As population and consumption of natural resources increases, careful management is necessary to prevent scarcity and further degradation and irreversible change to Ecosystem Goods & Services (McClay, 2012).

The decisions we make every day are based on the values we ascribe to the goods and services we use, although not always expressed in monetary terms; as long as we are forced to make choices we are making decisions based on our perceived values. Estimating the monetary value of all goods and services adds authority and credibility and provides a common unit of understanding, enabling decisions that fully incorporate the tradeoffs inherent in decisions. It is important to note that the estimated values of EG&S that appear in published research are typically acknowledged as an underrepresentation due to the great lack of data and methodology that exists to measure EG&S. Where research exists in which EG&S have been valued, the non-marketed services outweigh the marketed benefits of conversion, often by a very significant degree (Balmford, 2002). Decision makers need to factor this in as it has long term implications for both humanity and the environment. Estimated values for non market ecosystem services are generally conservative due to incomplete understanding of all of the benefits provided by nature, the intrinsic value of nature itself, and the likely increase in ecosystem service value over time, as these become increasingly scarce (Wilson, 2009).

Loss of natural areas may require society to develop and discover substitutes, often technological, for all these services in future (Olewiler, 2004). However, this approach will be costly and slow. Beyond the new technology needed, necessary infrastructure to carry out such new technology may also be needed. What if there are no substitutes? Ecosystem based natural solutions often are cheaper than engineered solutions (Wilson, 2009).

Investigations undertaken as part of this project show that there is excellent potential for “working landscapes” - either Crown or privately owned - to provide a range of Ecosystem Goods & Services (EG&S) in a way that provides considerable return on investment to society (Kulshreshtha and Pearson, 2006).

The work of experts from separate disciplines is too one-dimensional to be useful in solving today’s issues, especially concerning the economics of environment (Rosaassen, 1996; Heindenreich, 2009). It is critical that the issue is approached very soon in an inter-disciplinary manner.

*****

PART ONE

Non-Market Valuation of Native Grasslands – a literature review

Value of the World's Ecosystem Services and Natural Capital

Costanza et al (1997) provided one of the first attempts to comprehensively assign monetary values to the full range of natural capital and the associated ecosystem goods and services. This study led to an increase in the research on the value of natural capital around the world. Costanza et al investigated the economic value of 17 ecosystem services, using results from existing studies and some original calculations. Average annual global value contributed by ecosystem services was US$33 Trillion. About 38% was from terrestrial systems, the rest being provided by marine ecosystems. Gross National Product at the time (1997) was about US $18 Trillion. The researchers used supplementary information from over 100 studies, and converted all of the study values to US1994 dollars. The value was about $93.93/acre; this is equivalent to $127 per acre in 2012 dollars. What would it cost to replicate these services in a technically produced, artificial biosphere?

Costanza et al (1997) found that the ratio of ecosystem services to Gross National Product based on data from the 1970's was about 2.4:1. This ratio based on the more recent data used in Constanza's evaluation was about 1.8:1. Interestingly, Kulshreshtha and Pearson (2006) calculated a benefit to cost ratio of 2.5: 1 for 2.2 million acres of community pasture program lands on the prairies. Once again, it is critical to reiterate that these benefits are understated since we know that we currently lack data and methodology to measure ecosystem services comprehensively. Costanza summarizes the problem by writing that not valuing EG&S typically leads to the error of constructing projects where social costs often outweigh their benefits.

The Value of Saskatchewan's Forage Industry

In a recent report called "The Value of Saskatchewan's Forage Industry – A multi-level analysis". (Saskatchewan Forage Council, 2010) the researchers reviewed both direct and indirect values of forage systems in Saskatchewan through extensive research and stakeholder consultation. In this report direct values included all of the benefits flowing directly to the farmer through the production of market commodities such as beef while EG&S were included as part of their research on indirect costs. Direct economic value of forages generated was in the range of $740.4 million annually, through economic activity generated across a wide variety of sectors (Saskatchewan Forage Council, 2010). If economic activity was estimated equally across all forage types, this would equate to about 56% of benefit generated on native grasslands, or $412 Million annually. There are 12.8 million acres (56% of total) of native grasslands of a total of 23 million acres of forage lands in Saskatchewan (Statistics Canada, 2006). On a per-acre basis, this equates to $32.19 per acre direct benefit for native grassland.

The indirect values that were evaluated as part of the Saskatchewan Forage Council report included such EG&S as erosion, consumptive and non-consumptive wildlife use, recreational fishing, climate change services, and pollination services. The values of these benefits were used to derive a total indirect value generated by forages in Saskatchewan (based on published values, and presented as a range of values). These indirect items contributed significantly to the total estimated value of forage land in Saskatchewan. The largest indirect values were from erosion control, carbon sequestration and pollination services.

The Saskatchewan Forage Council determined that all forages provide an indirect value between $894.5 Million and $1.9 Billion annually in Saskatchewan. By proportion, native rangelands would provide net indirect benefits between $501 Million and $1.064 Billion annually. On a per-acre basis, this would represent benefit in a range between $39 and $83 per acre (that is, between $40.46 and $86.11 per acre in 2012 dollars).

If the indirect benefits of native grassland were separated out compared to seeded grasslands within the Saskatchewan Forage Council research, it would be expected that the indirect benefits would be higher for native grasslands. To understand why native grasslands provide higher indirect values than estimated for seeded grasslands, recall that native grasslands have much greater biodiversity than do seeded stands; it is also a preferred habitat by native ungulates year round (Saskatchewan Forage Council, 2010) and a number of Canada's Species at Risk depend on native prairie grasslands. Critical crop pollinators are also found on native grasslands (Saskatchewan Forage Council, 2010).

Another category of public benefits included in the Saskatchewan Forage Council report were related to the differing levels of government financial support paid to farmers. Compared to crop lands, forage lands have not qualified for many government income stabilization programs and subsidies. This means that more forage lands on the landscape will result in a reduction in the amount of agriculture payouts by both provincial and federal governments. This reduced payout can be thought of as a "fiscal benefit" to taxpayers of forage lands over croplands. Savings from government programs such as crop insurance and stabilization programs for forage lands in Saskatchewan were estimated at $401.6 Million per year.

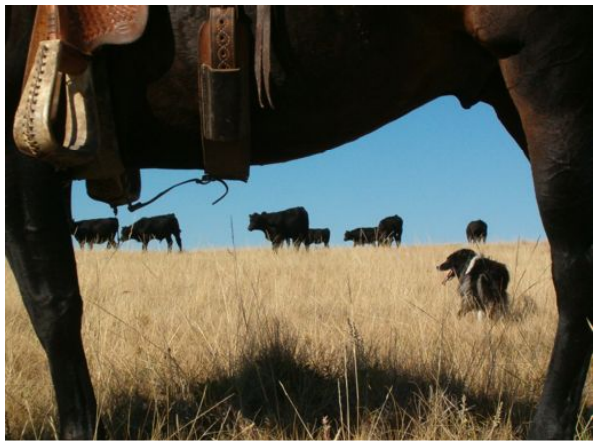
By proportion, the Saskatchewan native grassland component saves taxpayers about $224.8 Million per year.

Determination of a Cost Recovery Framework and Fee Schedule Formula for the Agriculture & Agri-Food Canada – Prairie Farm Rehabilitation Administration Community Pasture Program

One of the most local, recent, and extensive cost:benefit studies for grasslands managed within the Canadian Prairie provinces was undertaken by Kulshreshtha and Pearson (2006), University of Saskatchewan, on behalf of Agriculture & Agri-Food Canada's (AAFC) Community Pasture Program (CPP). The Pasture Program's aim was to separate out the private patron benefit from the public benefits of the program, in order to set equitable grazing fees for pasture patrons. This 75 year old Program was quite extensive (i.e. 2.2 million acres of pasture with 80% of it being native vegetation, located in Manitoba, Saskatchewan and Alberta). The program originated during the 1930's in response to prairie wide natural and human-induced drought. The two program objectives were conservation (including biodiversity) and the use of livestock grazing in summer. Kulshreshtha and Pearson (2006) attempted to utilize the most up to date environmental economics valuation methodology and the report outlines the specific methodology applied for each EG&S item in the report Appendix.

The study used Separable Costs – Remaining Benefits (SCRB) methodology and the analysis relied on previous research and analysis conducted by the authors on the CPP over multiple years and on pasture patron survey data, as well as data drawn from secondary sources. Interestingly, the study also included the service costs of AAFC headquarters (i.e. communications, program administration, range management assessment etc.). Thus, these results should be considered some of the best available for study of comprehensive biodiversity management costs on large scale "working landscapes".

Of the range of EG&S provided by the CPP included in this study, carbon sequestration provided the largest annual public benefit of the program ($6M), followed by wildlife hunting ($1.1M) and then soil conservation ($0.8M). The researchers found that the total private and public benefit of the Community Pasture Program was at least



2.5 times the cost of the program; this means that for every dollar spent, 2.5 times the benefit was generated for society. Thus, society at large derived a relatively large net benefit from the investment of public funds by the government in the CPP.

Once again, most EG&S researchers find that many of the societal benefits generated by native biomes are underestimated due to lack of data and knowledge regarding how to estimate all specific costs (Kulshreshtha and Pearson, 2006; Costanza et al, 1997). For the CPP, researchers noted that the total benefits were underestimated, due to difficulty in calculating benefits for aspects such as the value of the CPP providing access for scientific research by external Partners, tech transfer activities, program development for protocols for health of animals or grassland assessment methodology, or flood control benefits on stabilized fragile landscapes. Therefore, if measureable, it could be expected that the actual benefit-cost ratio of the CPP would be much greater than 2.5: 1.

Kulshreshtha and Pearson also estimated benefits of the physical presence of the AAFC Community Pastures to Rural Municipalities. There was an assumption that the large size of many CPP pastures (ie. often 40,000 acres in size or more) reduces cost to municipalities. These reduced costs might include reduced school costs (i.e. fewer children over the land area) and reduced road maintenance for rural municipalities per year because of large pasture size

Private user's costs of the CPP were 52.8% of the total program costs while costs for the public goods represented 47% of the costs. However, private benefits represented 38% of the program benefits while the public benefits were estimated to be 62% of the benefits (Kulshreshtha and Pearson, 2006).
The authors highlighted in this report that the availability of data for society's valuation of non-use values continues to be a partial limitation on the concept of TEV (Total Economic Value) (Kulshreshtha and Pearson, 2006). The authors noted that a specific value for biodiversity for pastures in the CPP does not yet exist. A recommended estimate by authors for the specific value of biodiversity alone was $2.73/ha (or $1.10 per acre) for the year 2004.

The 2004 value for saved government programs (ie. "fiscal benefit") on CPP land was $12.83/ha (or $5.19/acre) and saved crop insurance payments was $3.51/ha (or $1.42/acre) per year. This is similar to the amount calculated by the Saskatchewan Forage Council for all forage lands in Saskatchewan (2010).

In summary, the Kulshreshtha and Pearson study (2006) shows that considerable benefits accrue to Canadians from well managed "working landscapes". For pasture patrons, the fair share of apportioned costs was approximately half the total cost of the Community Pasture Program. A program in which the government manages landscapes for multi use benefits, and where government pays the public benefit portion, ensures that society continues to receive such benefits (Kulshreshtha and Pearson, 2006).

What Are Global Temperate Grasslands Worth?
A Case for Their Protection

Heindenreich (2009) highlighted the most significant studies from over 2,000 publications reviewed in the report "What are Global Temperate Grasslands Worth? A Case For Their Protection - A Review of Current Research On their Total Economic Value". The following items in her review pertain to this project.

Pastoralism was identified as one of the few agriculture uses compatible with nature conservation (Rass, 2008). The cow-calf industry is an extensive use of the land that produces high quality food at low environmental cost (Riemer, 1998). Heindenreich found that the high estimate value for native grasslands was $1,618/ha/yr (or $655/ac/yr; this is equivalent to $741.36 in 2012 dollars) (source Wilson, 2009). The low estimate value found in reviews was $190.27/ha/yr (or $77US/ac/yr; this is equivalent to $89 in 2012 dollars)(Costanza et al, 2006).

Heindenreich reminds us that there are hundreds of ecosystem service projects underway around the world using some adaption of the Costanza methodology. Costanza (2006) identified the following research gaps for non-market valuation of grasslands: disturbance regulation, water regulation, water supply, nutrient cycling, waste treatment, pollination, biological control, habitat-refugia, and cultural spiritual values. In one of the papers that Heindenreich reviewed, Bean (2004) estimated the yearly grassland ecosystem value to be $142.50 per ha or ($57.69/acre; equivalent to $66.59 in 2012 dollars), which is quite close to the grassland values estimated by Costanza.

The Value of Natural Capital in the Settled Areas of Canada

In Nancy Olewiler's report (2004) the author recommends that **efforts to measure, protect, and enhance the natural capital of Canada must accelerate immediately.** Therefore we must invest in the science to measure, value and monitor ecological goods and services, and develop economic instruments that recognize and protect natural capital, rather than continue to reward its destruction.

Olewiler (2004) states that case studies reveal that governments and society in general, may be making inefficient choices when they allocate land to uses that destroy natural capital; she provides a list of what the role of governments should be regarding natural capital.

As we lose areas with natural capital to other land uses, we also have a coincident increase in wastes going into the natural environment. Engineered solutions will often be more expensive to build and operate than those supplied by nature. This is inefficient for society today and costly for generations to come. Plus there often becomes a need for annual operating costs where nature was supplying the service for free before. Loss of natural capital is becoming a limiting factor in sustaining production over time; while we have the technology to measure land use changes over time though satellite imagery, Olewiler states that governments in Canada have failed to provide the funding for detailed analysis of this data and the subsequent progressive policy that could be developed and implemented. For example, Canadian farms could significantly decrease greenhouse gas emissions through the adoption of more conservation-oriented farming practices. This would generate savings, if emissions were not released, of between $5.48 and $34.34/ha per year in Saskatchewan (2003 dollars) (Olewiler, 2004). This is equivalent to $16.43 per acre in 2012 dollars.

The Value of BC's Grasslands: Exploring Ecosystem Values and Incentives for Conservation

In the report "The Value of BC's Grasslands: Exploring Ecosystem Values and Incentives for Conservation" (2009), Wilson found that the value of carbon stored in grassland soils is worth an additional annual value of $438/ha (or $177 per acre; that is, $187 in 2012 dollars), and the value of carbon uptake is worth an estimated $28.46/ha (or $11.52 per acre; that is $12.19 in 2012 dollars) each year. In an Ontario Greenbelt study mentioned in this BC grassland study, pollination services provided by natural land cover types including grasslands were estimated to be worth $1,109/ha/yr (or $449 per acre per yr) based on the proxy value of the food production that depends on pollination (in that case, about 30% of the nearby crops).

Wilson reports that other values included in the assessment of grasslands were applied based on a benefit transfer approach using other studies that were appropriate to the BC study and include:

- water regulation $7/ha/yr
- erosion control $50/ha/yr
- soil formation $10/ha/yr
- waste treatment $146/ha/yr
- biological control $40/ha/yr
- recreation and aesthetics $3/ha/yr

Total = $1,831/ha/yr ($741.30/ac/yr; $784.31 in 2012 dollars)

As the above numbers show, governments and other entities may be making inefficient choices in allocating land to uses that destroy or degrade natural capital (Wilson, 2009).

Wilson (2009) cites Dodds (2008) who compared EG&S for restored and native lands across the US; restored lands offer 31-93% of the EG&S benefits from native lands within a decade after restoration; annual value of EG&S /ha of native grasslands in the Great Plains totalled an estimated $1354/ha/yr (or $548.18/ac/yr; that is, $585.65 in 2012 dollars). The value increased to $5,207/ha/yr when including market commodities such as hay (or $2,108/ac/yr; that is, $2,252.11 in 2012 dollars).

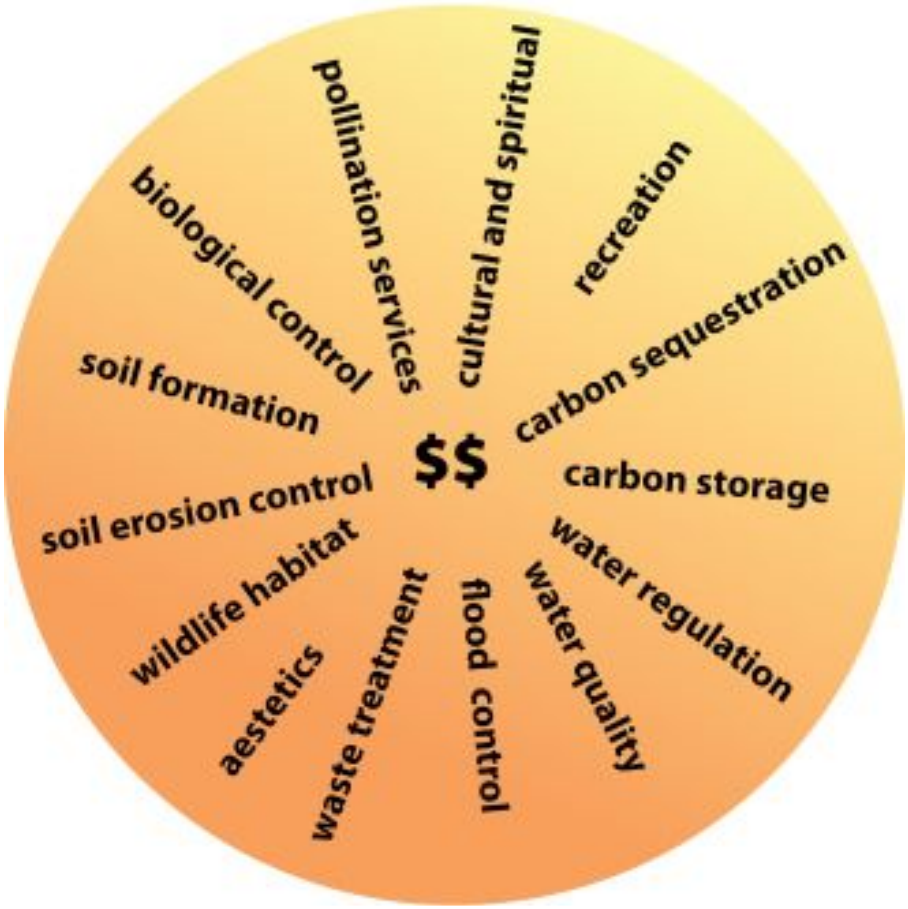
Meanwhile, the annual value of non-market EG&S/ha of restored grasslands totalled $1,275/ha/yr (or $516.19/ac/yr; that is, $551.48 in 2012 dollars) and this was estimated to increase to $3,765/ha/yr (or $1524.29/ac/yr; that is, $1628.18 in 2012 dollars) if commodities such as hay were included.

Soil organic carbon stored by native prairie catchments is on average 15 tonnes/ha greater than on restored areas (Dodds, 2008).

Wilson (2009) also cites Sala and Paruelo (1997) who found that carbon accumulation after 50 years of abandonment of croplands did not reach the levels of uncultivated native grasslands soils, increasing very slowly at about 60 kg/ha/yr. This reaffirms the importance of conserving rare ecosystems such as native grasslands. Croplands uptake only half the methane that native grasslands do, and croplands emit nitrous oxide at a higher rate than do native grasslands (Sala and Paruelo 1997).

Food for Thought – New Solutions for New Challenges

In a very recent work undertaken by a group called "Action for Agriculture" (a consortium of ranchers and farmers interested in conserving Alberta's agricultural lands), estimates of goods and services provided by the Upper Bow River area to the city of Calgary were derived and presented by YouTube video. Their modelling showed that since settlement times, human use has increased greatly while the EG&S provided by the region have been declining steadily over time due to human uses. Agricultural land loss in 2012 alone was 15,000 hectares in this pilot area – due to new roads, acreages, expansion of industrial sites and other uses. This fragmentation has led to loss of biodiversity. **At current rates of expansion it is projected that Alberta will become a net importer of food (instead of a net exporter) by 2055.** In 70 years, the region will experience $8Million in additional ecosystem related costs if current land use practices are continued; however, the region could reduce these costs by 50% if different land management practices are adopted now (Action for Agriculture, 2013). Changes in current municipal land use regulation are also required.



Native Prairie Pie: Non-market values of native grassland.

Table 1 Summary of Direct and Indirect Benefits of Prairie Native Grasslands

Description	Indirect** Benefit/acre /yr	Direct** Benefit/acre /yr	Savings** Government Programs/ acre/yr	Total** Economic Value (TEV)/ac/yr	Source
First ever estimate for grassland ecosystem services	$126.52				Costanza, 1997
EG&S valuation for erosion control, flood control, water quality, wildlife habitat, pollination, carbon sequestration	$40.46 to $86.11 (midpoint = $63.28)	$33.40	$32.16		Sask Forage Council, 2010
AAFC-CPP Biodiversity & Fiscal benefit (2004)	$1.27*		$7.63		Kulshreshtha and Pearson, 2006 Olewiler, 2004
AAFC - CPP Private and public benefit (2004)	$17.08	$10.54		$27.62	Kulshreshtha and Pearson, 2006
High estimate TEV Direct and indirect (2005) Low Estimate TEV Direct and Indirect (2004)				$741.36 $89.00	Wilson, 2008 Costanza et al, 2006
Grassland ecosystem value estimate	$66.59				Bean, 2004 in: Heindenreich, 2009
Value of carbon stored in grasslands; Value of annual carbon uptake	$187.29 $12.19*				Wilson, 2009
Carbon sequestration, pollination services, water regulation, erosion control, soil formation, waste treatment, biological control, recreation & aesthetics	$784.41				Wilson, 2009
Valuation of Great Plains grasslands	$585.65	$1,666.64		$2,252.11	Dodds, 2008 (in Wilson 2009)
Valuation of restored grasslands, Great Plains	$551.48	$1,076.91		$1,628.18	Dodds, 2008 (in Wilson 2009)
Average	**$297.79**				

**Adjusted for inflation to 2012 CDN dollars.
*Not counted in average.

*****

PART TWO

Opportunity Costs of Retaining Native Prairie

The opportunity cost of allocating lands to native grasslands is represented as the income foregone that would have been available if the land had been allocated to its next most economically productive use. Opportunity cost ventures may be more profitable for ranchers in terms of market valued goods in the short term, but the full cost of cultivation may be compromised in the decision making process since producers currently do not have a mechanism to be compensated for the non-market values of native prairie. As discussed earlier, there are no effective signals representing the full value of the range of goods and services provided by native grasslands that the private landowner can include in their decision making. As a result, land allocation decisions, as influenced by the range of opportunity costs will tend to be dominated by commodity outputs that are represented by market prices and the collection of EG&S provided by native grasslands may be ignored. This incomplete representation of values in land allocation decisions can result in a failure of the market to allocate land efficiently from society's perspective.

Unless land use decision makers have access to full information on the range of values that alternative land allocations provide, it is inevitable that more native grasslands will be converted to uses that provide direct monetary benefits through existing markets. One way to evaluate the magnitude of "payments" required to encourage landowners of native grasslands to not convert these lands to other uses is to estimate the opportunity costs that these landowners are faced with when considering land allocation options.

Since the elimination of the Western Grains Transportation Program and the Gross Revenue and Insurance Plan (which provided a direct subsidy to grain production) in the mid 1990's, Canada's share of the international trade in beef quintupled, to over 10% of the world market (Martin and Stiefelmeyer, 2011).

This period of herd expansion was soon followed by a rapid reduction in the amount of beef exported from Canada when bovine spongiform encephalopathy (BSE) was reported in 2003. A reduction in exports persisted for a number of years and had considerable impact on cow-calf enterprise profitability on the prairies.

From data obtained on Alberta cow-calf operations for the period 1995 to 2010 (Kaliel, unpublished data, 2013) the average

Return on Investment (ROI) for beef producers was negative - an annual average loss of 3.5% had occurred in Alberta, which represents the province with the largest beef herd. The range of ROI included a high of 12.5% in the year 2000, to a loss of 31.2% in 2003. Losses on ROI were incurred in 11 of the 16 years that cost of production data was collected. The numbers were weighted by size of operations.

The ROI program that is used in the Saskatchewan Cost of Production Benchmark Study is not as intensive as the Alberta study (Larson, 2013), however, it also charges fair market value for grazing and hay used in the cow-calf enterprise. Return on investment was more positive for Saskatchewan beef herds during the specific study years 2001, 2002, 2003, 2004, 2005, 2010 and 2011. The overall average ROI for the seven study years was 3.9%. The lowest ROI occurred in 2002 (a loss of 1.9%) while the highest ROI occurred in 2001 (9.4%). Losses on ROI were incurred in one of the seven years that cost of production data was collected.

It is important to note that investment in land is not included in the above calculations, rather, the cost of land was captured by charging the cow enterprise market value for any homegrown feed, bedding and pasture. The ROI is a simple average over all producers and it must be understood that there is a great deal of variation between producers in a given year.

Livestock production using native prairie is often touted as one of the most sustainable forms of agriculture known. Clearly, native prairie conservation is threatened by a wide variety of internal and external factors – including the real potential for low profitability at the livestock producer level.

In general, opportunity cost represents the value of the next best use of a resource. It is important to recognize though, that the opportunity cost generally only considers those alternative uses that are economically competitive. For example, for a pasture parcel that has very poor quality soil, or some other limitation, such as topography, to crop production, the value of annual crop production may be too low to ever be considered as an alternative land use – the highest and best use of that land is perhaps as extensively grazed rangeland. Also, opportunity cost analysis could be used to consider non-market values (Belcher, 2013). For example a parcel of land may have its greatest use value in providing a range of ecosystem services (i.e. biodiversity, water filtration etc.). **Although it is difficult to assign dollar values to non-market applications it does not mean those values do not exist.**

Basically, opportunity cost can be viewed as the income foregone as a result of retaining native prairie. Competing uses for native prairie across the Prairie Provinces include sale for residential or recreational purposes, cultivation to either dry land or irrigated crops that presently have high value (that is, if the land is currently cultivable, or if technology is developed that makes the land cultivable in future). For example, one threat to sandy native grasslands in all three provinces is potato production.

A brief examination of real estate values for acreages composed of native grassland within commuting distance of a city showed that the current real estate value of native grassland in the Longview and Nanton, Alberta areas was between $2,650 and

$4,500 per acre (Homes and Land – Calgary, 2013). In the Lumsden area near Regina, Saskatchewan, native grassland acreages were being offered for sale for approximately $1,875 per acre (Lane Realty Corp., 2013).

Another use of native prairie on acreages is the growing of market garden crops such as saskatoons, field grown fresh and drieflowers, or vegetables; this is especially so when the land is within commuting distance of a large community or city farmer's market (i.e. within 100 km). One other key thing to note about these crops is that irrigation is usually needed to optimize returns.

Sometimes land use conflicts arise as a part of ranch succession planning – the younger generation may have different ideas on what constitutes appropriate land use, and the conservation values of the older generation may be compromised in order for succession to take place. An example of this would be the cultivation of native prairie to grow corn for grazing on the cow-calf enterprise, or other such crop. Similar potential exists for these changes to occur when land changes ownership outside of a family.

Opportunity cost ventures may be more profitable for ranchers in terms of market valued goods in the short term, but the full cost of cultivation may be compromised in the decision making process since producers currently do not have a mechanism to be compensated for the non-market values of native prairie. This is called a market induced failure. Unless the financial gap between the different commodities can be closed, there will always be the potential for land conversion on privately held native grasslands.

Crop insurance is delivered jointly through provincial and federal governments. The spring crop insurance price is a forecast of what the price is expected to be over the course of the crop year (Alberta Crop Insurance, 2013; Saskatchewan Crop Insurance Corporation (SCIC), 2013). Governments pay 60% of the premium while the producer pays 40% of the premium. However, the producer pays less than 40% of the crop insurance premium if the costs of administering provincial crop insurance programs are included. This creates a very attractive form of insurance.

Being able to purchase crop insurance at reduced rates allows producers to further guarantee a forecasted income before the growing season starts each year on cultivated land. This is something of magnitude that is not available to owners and lessees of native grassland. At this point, only forage rainfall insurance is available for native prairie landowners (Saskatchewan Crop Insurance Corp., 2013), the insurance coverage varying by soil class, ranging between $6 and $10 per acre. This opportunity cost creates a situation where revenue options and ability to forecast income on native grasslands are much reduced.

Table 2 provides a basic approach to estimate the value of EG&S through the concept of "opportunity cost" through crop insurance coverage. These opportunity costs may provide guidance for Payment for Ecological Services (PES) so that EG&S could continue to be provided to society. As discussed earlier, these alternative uses may or may not be representative or economically viable alternatives for any given parcel of land.

Table 2 gives an idea of the range of crop insurance coverage per acre available in Saskatchewan – one site is a low productivity Brown soil and the other site is a very high productivity Black soil. The Brown soil is a "Class L" soil while the Black soil is a "Class B" soil. The information on crop coverage per acre was calculated using the "General "What if" Calculator" that can be downloaded from the SCIC website for the 2013 crop year (Saskatchewan Crop Insurance Corporation, 2013). Coverage was selected at the 80% coverage rate where possible, and on stubble. Coverage for tame forages was selected for forage stands in the 1-8 years of age category.

Table 2 Estimates of Insurance Coverage Per Acre for Two Sample Locations in Saskatchewan (SCIC, 2013)

Crop	RM #51 (Brown Soil Class L)	RM #429 (Black Soil Class B)
Chickpeas, Large Kabuli	$243.88	*Not insurable*
Lentils, red	$170.72	$172.13
Canola	$198.82	$358.83
Wheat, durum	$119.60	$219.40
Wheat, Hard Red Spring	$129.20	$243.40
Alfalfa	$82.17	$100.74
Alfalfa/grass	$54.25	$63.08
Grass, introduced	$21.58	$43.05
Potatoes, seed	$1,836.80	$1,836.80
Native grassland – rainfall insurance	$6.00	$10.00

*****

PART THREE

COST OF PROVIDING STEWARDSHIP FOR NATIVE PRAIRIE

The majority of native grasslands in the prairie provinces are managed by private landowners for livestock production. It is very difficult to determine what a landowner's stewardship costs are, however, a number of protected native grasslands exist in the northern Great Plains of Canada that are either managed for biodiversity, and/or have the resulting benefit of high biodiversity. The goal of this analysis is to determine the annual gross cost per acre for stewarding these lands. These numbers also give an idea of what private ranchers' gross costs might be in order to manage their rangelands for basic biodiversity – many aspects of which benefit the public more than they benefit the private landowner.

A number of Partners were contacted by the author and asked whether or not they would like to participate in this project by contributing basic stewardship cost data for their programs. These Partners manage publicly and/or privately owned lands for the purposes of conservation. The biodiversity-related stewardship budgets for each of these organizations were obtained for one recent year. Confidentiality was maintained as a condition of obtaining this data.

Table 3 provides the Partner's total stewardship budget and the total number of acres managed under that budget. Program revenues were not included, but varied widely amongst partners. Gross stewardship cost per acre per year was then calculated. Costs were adjusted for inflation to 2012. An average annual gross cost per acre for all programs was then calculated.

While the numbers cannot be statistically aggregated because they come from different organizations, and each organization typically measures and reports different financial items, these numbers still provide a range of the market-valued costs for managing native prairie. They clearly illustrate that each acre of land costs a certain amount in order to maintain land stewardship.

Table 3 Estimate of Average Gross Cost Per Acre to Provide Stewardship

Partner (Year for which data was provided)	Total Annual Stewardship Expenditure	Number of Acres in Program	Gross Stewardship Cost per Acre	Gross Costs Adjusted to $Cdn 2012
Partner #1 (2004)	$10,370,000	2,295,512	$4.52	$5.20
Partner #2 (2010)	$551,500	40,969	$13.46	$13.88
Partner #3 (2012)	$742,600	132,600	$5.60	$5.60
Partner #4 (2012)	$1,160,000	161,920	$7.16	$7.16
Average Stewardship Cost/acre				**$7.96**

NOTES:

- Gross annual stewardship costs ranged between $5.20 and $13.88 per acre.
- The above costs do not include land costs.
- Partner #1: Gross costs included staff costs, infrastructure maintenance, weed control, contracts, policy and administration, finance, GIS support etc..
- Partner #2: Gross costs include both professional and operational staff costs, facility maintenance, operating costs, re-seeding of properties.
- Partner #3: Gross costs include staff costs, restoration costs, infrastructure and other property maintenance costs.
- Partner #4: Gross costs were very comprehensive and include both professional and operational staff costs, infrastructure maintenance and programming costs.
- Gross and net stewardship costs per acre are partially dependent on how much management the Partner puts into the land. Theoretically, if no management is undertaken, then there may be very minimal stewardship costs. However, this should not be viewed as “good stewardship”.

*****

PART FOUR

Public Funds Invested in Converting Native Prairie to Other Agricultural Crops (Including annual and perennial crops)

Canada has aggressively subsidized the grain production and export industry for over 100 years, both federally and provincially. However, these policies encouraged land use decisions that resulted in very significant loss of natural capital on the Prairies, and at significant cost to taxpayers.

The Canadian policy history shows that the federal government tended to favour grain production over livestock production. The Macdonald government was concerned that the southern border of Canada needed to be settled rapidly to protect it (Evans 2004; McEwan 1962). This is not to say that early ranchers didn't have considerable influence in Ottawa. In fact, many early prairie ranchers were wealthy investors from Eastern Canada; for example, Mathew Cochrane (the first owner of the historic Cochrane Ranch in Alberta) was a Canadian Senator (Evans, 2004).

The federal government viewed these wealthy investors as critical for "paving the way" for the advancing settlers (Evans, 2004). In the early years, cowboys were also seen as agents who could assist the Mounties, capable men who could help safeguard the Canadian border frontier against thieves and other unscrupulous people bent on cheating the settlers (Evans, 2004). After the demise of the buffalo in the mid 1880's, many of the first government contracts with ranchers for beef were to supply the needs of the North West Mounted Police, and to feed the First Nations on reservations who, by the mid 1880's, were starving (Evans, 2004). The advancing railway gangs also were a key market for early range beef.

Early ranchers and farmers soon easily exceeded production for both beef and wheat beyond local demand during the good weather years. Thus, in order for western Canada to grow (and pay for the new railway), its products would need to be moved great distances beyond the prairies, and even Canada. Building the railway across the southern Canadian boundary was viewed as critical as a means for shipping both beef and grain out of the prairies, and into Eastern Canada and Britain (Evans, 2004). However, at the turn of the century, growing wheat was a much more labour intensive endeavour than was ranching, and this resulted in a higher density of taxpayers along the railways.

In the early years beef was difficult to ship to Britain without the cattle losing a lot of condition; the grass that cattle ate also competed with the grass required by the homesteader's plow horses. Manufactured implements from Eastern Canada sold to the early settlers were shipped west at cheaper freight rates than producers were charged to ship their beef and grain eastward (Bailey at al, 2010). Some influential government

authorities also felt that farm finished beef was a much better product than the range finished beef – especially if the range beef was genetically close to its Texas Longhorn ancestors (Gruending, 1996). Many of these factors must have played a role in influencing early agriculture policy originating in Ottawa.

Ultimately, the Canadian government and the railway's future success and survival were intertwined. The railways were continually financially stretched, and along with this, the development of Canada placed considerable strain on the financiers of London (Gruending, 1996). Concerns about biodiversity and nature were likely not a consideration of these early policy makers!

The following excerpt from Bailey et al (2010) provides an excellent historical overview of the impacts of settlement policies on the native grasslands of Canada and is therefore cited in its entirety.

******

"From 1870 to 1930, a period of 60 years, the primary purpose of the Department of the Interior was to establish an orderly manner of settlement and 'development' for the Canadian prairies. To do this, the Department of the Interior "assisted in the removal of native peoples from the open plains. The Department settled Metis land grievances, surveyed and subdivided the region and then proceeded to promote and settle these holdings through a massive immigration campaign.

In 1930, after settlement and cultivation of 80% of the native grasslands, the Dominion of Canada transferred ownership of the natural resources to Manitoba and the fledgling Prairie Provinces of Alberta and Saskatchewan. Coincidentally, this occurred right at the beginning of the worst drought of the 20th century.

"The millions of acres of western real estate were expected to serve the interests of 'Old Canada'. After all, the 3.5 million citizens of the four eastern provinces (in 1871) had paid for the land.---Their hopes lay with the pioneer farmer who would initiate an economic takeoff, by buying lumber, groceries, and agricultural implements on the one hand and shipping grain, on the other. To encourage western settlement, a railway must be constructed."

Once the railway was operational, federal policy allowed tariffs to be lower to ship manufactured goods from eastern Canada westwards to the prairies, whereas the tariff costs were higher for prairie farmers to ship grain and cattle eastwards. The decision regarding unequal rail tariffs contributed significantly towards the growing feeling of alienation in Canada's western provinces regarding the government of central Canada and its citizens.

The Department of the Interior gifted prairie grasslands to settlers for crop farming with strings attached. Federal department policy required residency on the homestead and a large portion be cultivated before the settler would receive title to a free quarter section of land (Martin 1973). Other land could be purchased nearby… In fact, much of the grazing use of natural grasslands in settlement areas was to feed the draft horses that were required for pulling the eastern tillage and harvesting agricultural implements. Department of the Interior policy provided for a settler to be entitled to up to 4 square miles (4 sections) of natural

prairie located adjacent to his homestead (Martin 1938, 1973).

Grazing leases for settlers were authorized in the First Dominion Land Act of 1872, and revised in 1876, 1881, 1887, and 1905. Grazing leases were granted to ranchers subject to cancellation with two years notice if the lands were required for agricultural settlement (Martin 1938, 1973). It was not until 1905, 35 years after settlement began in Manitoba, that closed leases were introduced for certain areas deemed unfit for "normal" crop agriculture settlement. The areas were often in the Dry Mixed Grass ecoregion (Palliser Triangle) of southeastern Alberta and adjacent Saskatchewan, or in the southern Alberta foothills. Leases were to be granted only subject to an official report by the Inspector of Ranches that the land was unfit for "normal" agricultural purposes. Here again 'normal' agriculture referred to annual crop agriculture and not to ranching which should have been the norm for the Dry Mixed Grass ecoregion of southern Saskatchewan and Alberta.

The policies of the federal government and the administration of a vast prairie landscape by distant bureaucrats unfamiliar with the climate and the region caused enormous suffering amongst farm families in the dry southern regions. The drought of the 1930's created a social and ecological disaster for crop farmers and the soils they cultivated. Whole municipal districts were disrupted by settlers abandoning their homesteads in the driest regions of the prairies.

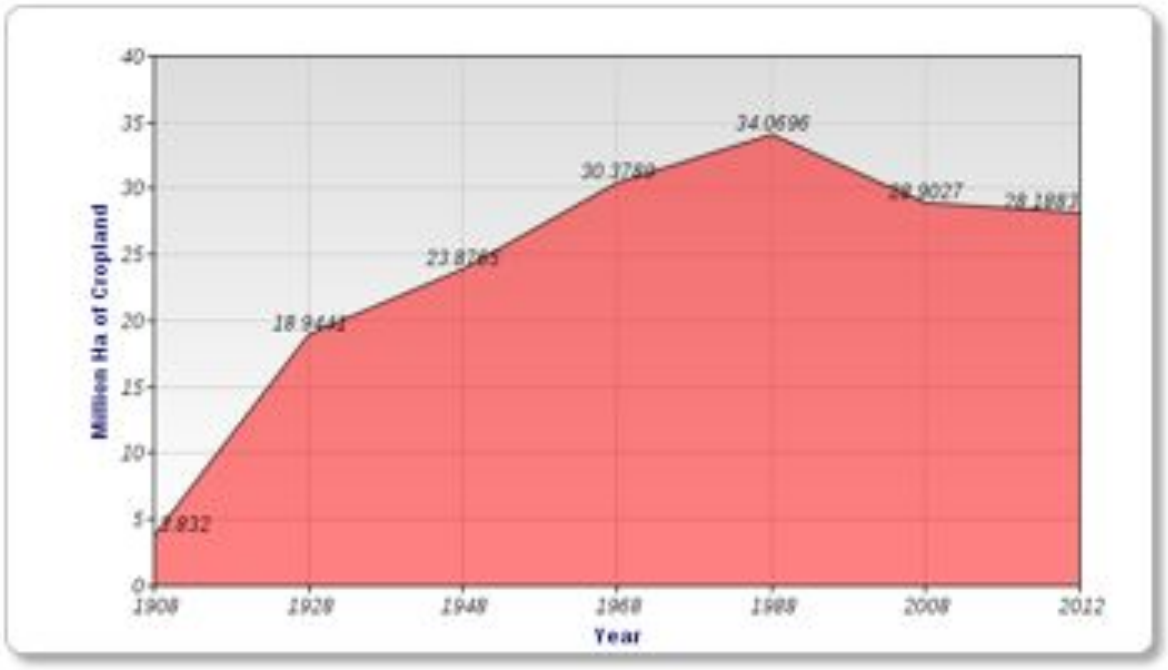
A century later, few question the merits of growing large acreages of grains, oilseeds, and other annual crops on arable prairie lands. However, the implementation of policies by the Department of the Interior to require settlement and cultivation of native grassland soils, as if they were in the humid climate of southern Ontario and Quebec, created enormous ecological and social disruption, frequent settler abandonment, and family failure. It also contributed to global warming on the Canadian prairies. Wind-blown soil erosion became rampant in the drought of the 1930's and the lives of countless families were disrupted or destroyed (Jones 1987)".

******

The two most important government transportation programs affecting Canadian agriculture were the Western Grain Transportation Act (WGTA) and the Feed Freight Assistance Act (FFA) (Klein et al, 1994). The grain industry has historically been heavily subsidized, the government saw this as critical; the Crow rate subsidy paid a large portion of the freight bill on exported grain for almost 100 years , whereas during this same time period the livestock industry was essentially unsubsidized (Riemer, 1998; Klein et al, 1994). The number of farms peaked in 1936; farm size grew steadily after the depression likely due to the change towards mechanization (Riemer, 1998). Cultivation increased steadily after WWII until the 1980's; By the early 1970's, 70% of Saskatchewan's original native grasslands were cultivated (Riemer, 1998).

The following graph shows the amount of cropland, summer fallow, and tame hay (in hectares) in the three Prairie Provinces. The data is presented in 20 year increments since 1908, and including 2012 (CANSIM data, Statistics Canada, 2012).

Figure 1. Cropland Area for Prairie Provinces, 1908-2012. Source CANSIM Data – Prairie Provinces Snapshot



Even up until the mid 1990's, income support dominated expenditures by the Canadian Department of Agriculture and Agri-Food (Hill and Vaisey, 1995). During the 1990's, fiscal restraint, the World Trade Organization (WTO) and the General Agreement on Tariffs and Trade (GATT) and the realization that subsidized transport for the grain industry was artificially increasing land values, directly increasing the production of traded goods (primarily grains and oilseeds), and discouraging prairie economic diversification. This resulted in demise of these types of subsidies by 1995 to the extent that now agriculture is essentially a deregulated industry (Riemer, 2005).

We do not have annual data on the cultivation of native grasslands and so the cultivated crop area data serves as a reasonable indication of the impact of agriculture subsidy programs on cultivation of native grasslands. Cultivated area as shown on the above graph is generally in synch with the government subsidy programs that were available to farmers since 1908. One can also observe the impact that the demise of GRIP and the WGTA had on cropland area on the three Prairie Provinces during the 1990's.

Governments have demonstrated that they are more likely to make real change when that change is forced upon them by international pressures as opposed to internal pressures (Riemer, 1998). The GATT had an unprecedented effect on Canadian agriculture policy (Riemer, 1998): that is, a significant reduction in trade distorting subsidies and the removal of the transportation subsidy provided by the Western Grain Transportation Act.

Another federal policy that has had a significant impact on agricultural land use patterns is the Gross Revenue Insurance Plan (GRIP) which guaranteed an average price for grains but did not include forage crops and so there was concern that the GRIP would result in "perverse incentives" and "moral hazards" encouraging cultivation of remaining native grasslands (Saskatchewan Advisory Committee on GRIP and NISA, 1992). After these subsidies were removed between 1991 and 1996, over 750,000 acres dropped out of the total amount of farmland in Saskatchewan alone. This was paralleled by a 500,000 acre drop in the amount of cultivated land in the province (Riemer, 1998).

Over the past century a number of other federal and provincial programs, such as those mentioned above, have been implemented to provide cash incentives to owners of agricultural lands that have resulted in conversion of native prairie to cropland or tame pasture. The following program descriptions apply to the northern Great Plains in Canada. Provincial programs include those undertaken in Alberta, Saskatchewan and Manitoba. Listing is in chronological order of occurrence and the program information is referenced for information on its impacts on land use.

Appendix One shows a full description of direct payment programs paid out by federal and provincial governments to all Prairie Provinces during the years 1981 to 2011 (Statistics Canada, 2012). Appendix Two shows specific amounts of payouts for each Prairie Province and year. Of special interest is the increase in direct payments between 2003 and 2006, primarily due to the occurrence of BSE and its impacts on the prairie beef industry. For more detailed information on payouts by province and specific program, please see the Statistics Canada website link which is given in the reference section.

The programs that historically provided the largest amount of incentives to grain producers (and therefore incentives to cultivate native grasslands) include the following.

Dominion Land Act (1882 and later)

Prairie settlers were granted one quarter section of land for $10. However, settlers needed to cultivate at least 20 acres of the land, along with improvements, within three years, before legal title would be granted. Otherwise the land would be confiscated by the Land Improvement District authorities (Gruending, 1996). The height of agricultural settlement on the prairies was in 1912. The railways later became involved in settlement programs and a significant wave with Eastern Europeans occurred in the 1920's (Evans, 2004).

The Dominion Government granted ranch leases of up to 100,000 acres for 21 year leases, lease rates were one cent per acre per year. However, the Minister of the Interior retained the right to cancel any lease with two years notice, if and when the land became needed for settlement by farmers (Evans, 2004). The original leases were for ten acres per one head livestock; they were subsequently changed to one head per 20 acres in 1888 after it was deemed that ten acres per head was unsustainable.

Crow Benefit /Western Grain Transportation Act (1897 to 1995)

The Canadian government passed this legislation in 1897; under terms of this Act, the Canadian Pacific Railway committed itself to transporting prairie grains at reduced rates in perpetuity. In 1925 the Canadian National Railway was added to this Act. Grains were included in the subsidy but livestock transport was not. Initially designed to stimulate the growth of Western Canadian agriculture, this Act has more recently been identified as a factor inhibiting diversification and growth due to the increase in real costs of moving grains. This subsidy also increased the value of feed grains to the detriment of the local livestock sector. This distortion led to lower livestock and livestock related value added production in the Prairie Provinces and increased land prices. In 1989-1990, producers paid approximately 30% of the total cost of moving their grain to export locations (Klein et al, 1994). The program ended with a $1.6 billion payout to owners of prairie farmland, plus a $300 million adjustment assistance fund and $1 billion in new export credit guarantees to help sales of agricultural products in world markets. The resultant lower farm prices have been shown to stimulate growth of the livestock sector in Western Canada (Klein and Storey, 2012).

Canadian Wheat Board – Quota Acres Policy (1935)

This was the largest and most important marketing board in Canada. The acreage based wheat quota system which distributed marketing opportunities based on the amount of cultivated land that a farmer owned and thereby introduced a direct incentive to increase cultivated land area. The acreage based quota was discontinued in 1993-94 in favor of a system that divides access to markets based on the farmer's ability to supply grain on contract (Riemer, 2005). This change removed the incentive to cultivate marginal land to obtain delivery quota (Rosaassen and Lokken, 1996).

Feed Freight Assistance Programs (1941 to 1995)

This program was created to enable livestock producers outside the prairie region to purchase prairie feed grains at prices comparable to those on the prairies and to provide an additional market for grain from the Canadian prairies (Klein et al, 1994). However, Feed Freight Assistance Programs reduced the competitiveness of livestock producers in the areas where feed grains and forages were grown. This in turn reduced the value of rangelands and tame pasture. Prairie-based livestock organizations were opposed to the program since it removed the natural location advantage of cheaper feed grains for prairie livestock production; an absolute maximum subsidy of $50/tonne was placed on feed grain shipments to any region. British Columbia was the largest beneficiary of this program; at program dissolution the cost of the program was about $15 million per year (Klein et al, 1994).

Income Taxes (1946 to present)

Both the federal and provincial governments have treated the breaking and clearing of land as an eligible cost for calculating income tax (Rosaassen and Lokken, 1996). A type of "perverse incentive" can occur where farmers using poorer farming practices often pay less taxes. In the 1970's and 1980's there was a subsidy income tax credit for farm machinery which would have favoured more machinery intensive production such as annual cultivation (Klein and Storey, 2012).

Crop Insurance (1957 to present)

Crop insurance is shared between producers (40%), and both the federal and provincial government (60%). It helps farmers reduce income volatility due to natural disaster. Large amounts of marginal land classes are eligible for crop insurance. Native prairie, forest and wetlands also receive support only if broken and converted to crop production (Rosaassen and Lokken, 1996). Forage and pasture rainfall insurance was added in the mid 1990's, thus removing some of the biases that favoured grain production specifically. It is likely that crop insurance has resulted in some increase in cultivation for crops (Klein and Storey, 2012). In 2010 the number of insured acres in Saskatchewan was 21,443,174 acres while the total indemnity paid for that year was $695,076,265 (Saskatchewan Crop Insurance Corporation, 2012). This equates to an overall average payout of $32.41 per acre. Additional taxpayer costs above this would include the government share of the premium, plus the cost of administering the program.

Temporary Wheat Reserves Act (1950's -70's)

This Program paid the storage costs for a fixed volume of commercial wheat inventory. This supported wheat production for export relative to other crop diversification and livestock production (Rosaassen and Lokken, 1996).

Western Grain Stabilization Plan (1976 to 1990)

The Western Grain Stabilization Plan (WGSP) was established to stabilize producers' net proceeds from the production and sale of wheat, oats, barley, rye, flaxseed, canola and mustard seed produced in the Prairie Provinces and the Peace River region of British Columbia. Amendments to the Act in 1988 provided for the addition of nine crops to the seven currently covered (Statistics Canada, 2012). Huge payouts of over $3 billion in the four-year period 1983-87 left the WGSP fund with a staggering deficit, most of which was eventually paid by the federal government; the program increased the area of eligible crops by over four percent (Klein and Storey, 2012). The program ended in 1990.

Crop Disaster Assistance Program (1986)

Over the years a number of ad hoc programs were made available to alleviate localized problems. For example, crop producers in Saskatchewan, Alberta and British Columbia who suffered crop damage due to drought conditions received payments. Floods, winter-kill and low international prices for grains have also triggered payments (Klein and Storey, 2012).

Gross Revenue Insurance Plan (1991 to 1996)

This was a federal-provincial program that resulted in cultivation of additional grasslands. Farmers were paid based on: their seeded acres of eligible crops; the risk area per acre payment; and an index for land quality, summer fallow-stubble crop mix and management. Concerns of the farmer based Advisory Committee on GRIP and NISA (1992) included "moral hazard" (i.e. maximizing program benefits by using poor farming practices), "adverse selection" (i.e. making cropping decisions based on the program and not on market prices and conditions) and the concern that any program needs to be "resource neutral" (i.e. that programs do not encourage cultivation of pasture and wetlands). Forages and pastures remained excluded for coverage under this program. Large payouts occurred in the first few years of the program because some very high prices from the late 1970's were included in the moving average price. As lower average prices were included in the running average, the program fell out of favor and was discontinued in 1996 (Klein and Storey, 2012).

Net Income Stabilization Account (NISA): (1991 to 2009)

The Net Income Stabilization Account (NISA) was established in 1991 under the Farm Income Protection Act. The purpose of NISA was to encourage producers to save a portion of their income for use during periods of reduced income. Producers can deposit up to 3% of their "Eligible Net Sales" (ENS) annually in their NISA account and receive matching government contributions. The federal government and several provinces offer enhanced matching contributions over and above the base 3% on specified commodities. All these deposits earn a 3% interest bonus in addition to the regular rates offered by the financial institution where the account is held. Most primary agricultural products are included in the calculation of "Eligible Net Sales" (sales of qualifying commodities minus purchases of qualifying commodities), the main exception being those covered by supply management (dairy, poultry and eggs). The NISA account is comprised of two funds. Fund No. 1 holds producer deposits while Fund No. 2 contains the matching government contributions and all accumulated interest earned on both Fund 1 and Fund 2.

Special Canadian Grains Program (SCGP): 1986 to 1987

This program provided $1 Billion in cash to Canadian grain and oilseed producers (1986-1987 crop year) in response to the world grain trade war. The program also paid out $1.1 Billion for the 1987-1988 crop year (Rosaassen and Lokken, 1996).

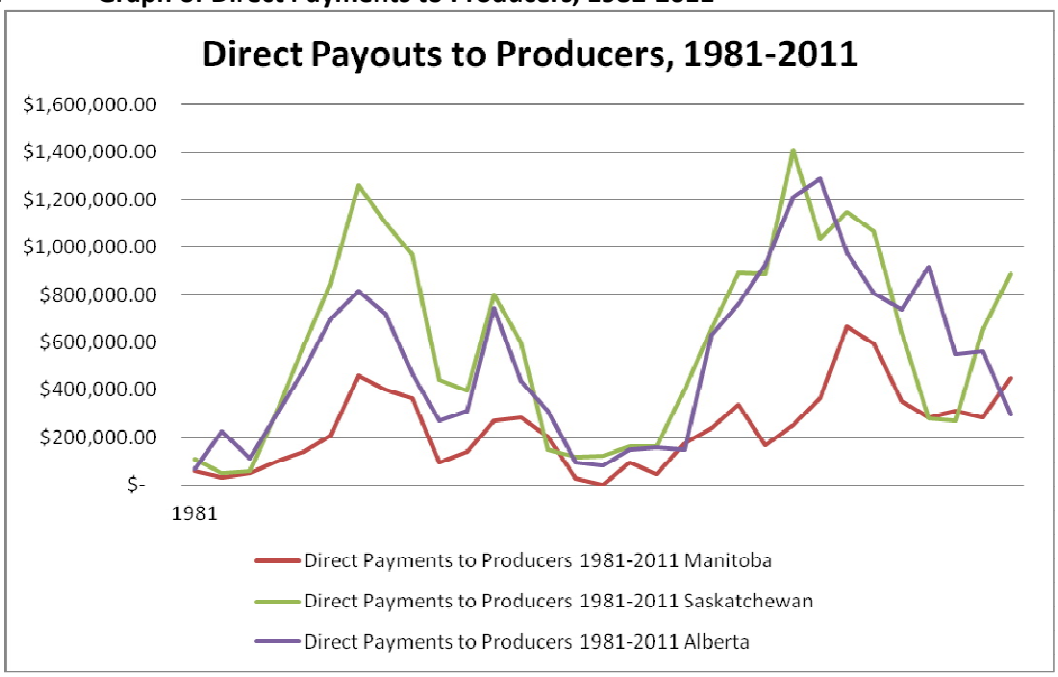
Summary of Programs

For the period 1990-1999 subsidies as a percentage of net farm income were 64% (Mussell and Ross, 2001). For a nine year period in the 80's and 90's the grains sector would have operated at a net loss if subsidies had not been paid; the prolonged low levels of profitability observed in recent history indicate that the grain industry has often not been economically viable without subsidy support (Riemer, 2001); land prices were artificially maintained at higher levels than unsubsidized prices would have supported. Taxpayers spent more money on grain support programs than the agriculture industry itself earned in 1990 by a ratio of almost three to one (Riemer, 1994).The total value of transfers in 1992 was $7.1 Billion (Barichello, 1995). When calculated in 1995 as a percent of farm cash receipts, government transfers to the red meat sector constituted only 5% while transfers to the grains and oilseeds sector and the supply management sector constituted 40-45% (Barichello, 1995). The livestock industry remained essentially unsubsidized until the BSE crisis occurred in Canada in 2003.

Girt (1990) outlined the main groups of subsidies which contribute to the expansion of cropland at the expense of livestock production. Girt also estimated the value of the subsidies to the grains sector in Western Canada would approach $50/acre/year. The key subsidies included: Drought Assistance Programs (like the Western Canada Special Grains), Crop Insurance, Gross Revenue Insurance Plan (GRIP) and Net Income Stabilization Act (NISA). None of these programs operated on a cost recovery basis and all were subject to countervail.

Figure 2 shows direct payments made to producers during the years 1981-2011 (Statistics Canada, 2011). Of special note is that indirect payments to producers (i.e. those made through a third party) are not included in this data set. More specific information (i.e. specific payments by province and year) can be found in Appendix Two of this report and by going to the Statistics Canada website database.

Figure 2 Graph of Direct Payments to Producers, 1982-2011



It has been shown that program payments in Canada (unlike other countries, especially the European Union) have not included requirements that reward farmers for increasing productivity or innovation, or for enhancing environmental stewardship or management skills (Martin and Stiefelmeyer, 2011; Rosaassen and Lokken, 1996). Riemer (2005) argued that programs have not historically rewarded the early adopters but have typically rewarded the late adopters – often those who cultivated native grasslands for short term gain. Programs that provide subsidies for the conversion of cropland to forages have even been called a subsidy for late adopters – an attempt to "right" past inappropriate agriculture policy.

The historical approach favoring grain subsidies has, as stated by Riemer (1994), steadily reduced prairie Canada's natural capital over the last 100 years. Conversion of native grasslands have resulted in misuse of land (i.e. we now cultivate some Class 5 and 6 lands) and degradation due to salinization, erosion, and organic matter loss, along with loss in biodiversity and other forms of natural capital.

Other subsidized farm inputs include: irrigation development supported by provincial and federal governments, fuel and fertilizer rebates, subsidization of the cost of land improvement (i.e. clearing and draining), and income tax incentives for land purchases (Riemer, 1994).

Crop, economic, and environmental failures have been as much a part of agriculture on the prairies as have been the acclaimed production successes (Rosaassen and Lokken 1996). Further, prairie agriculture, as it exists today, has not proven itself to be an environmentally, economically or socially sustainable use of the land. Rosaassen and Lokken (1996) continue that the depopulation of the inner core of the

Palliser Triangle, which began prior to 1920 - after only a decade of settlement - was a major indication of the flaws in the blueprint for prairie settlement; the great drought and depression of the 1930's came the closest to focussing permanent attention on the environmentally precarious nature of prairie agriculture. Finally, Rosaassen and Lokken (1996) ask "Why have prairie residents, especially in Saskatchewan, strongly supported policies which include unsustainable elements"? Thompson (1976) described the process as "permanently wasteful but immediately profitable".

Subsidies are hidden within the values of cash cropped lands. But the hidden subsidies create an expectation that income from grasslands should be higher, especially with bankers. Only 25% of the privately held land in Saskatchewan now remains uncultivated at most (Riemer, 2005). Any native grasslands that were cultivated for short term gain are gone forever. Returns to high crop prices, low beef prices, urban and industrial expansion, along with other alternative land uses, still threaten the conservation of native prairie in future.

In the last number of years, livestock production increased across the prairies as a result of the demise of programs such as the Western Grains Transportation Act in the 1990's; in fact Canada's share of the international trade in beef quintupled during the 1990's (Martin and Stiefelmeyer, 2011). Today there is much greater recognition that subsidies have undermined the profitability of prairie agriculture and that they have caused great loss of our natural capital. Today agriculture is a more deregulated industry, largely as a result of international pressures on policy (Riemer, 2005).

*****

PART FIVE

Public Funds Invested in Converting Cultivated Land to Perennial Cover

In the past few decades a major focus of agri-environmental programming in prairie Canada has been on putting in place programs that encourage private landowners to seed cultivated land to perennial forages. These measures represent, to an extent, an effort to compensate for earlier inappropriate agriculture policy and landowner response to that policy. These cultivated lands were subject to two taxpayer subsidies – first, a subsidy to cultivate the land, then a second subsidy to reseed the land to perennial cover. The problem is that neither of these two efforts ever acted as an incentive for landowners to conserve native grasslands. Early adopters were never rewarded under this approach. The habitat quality and the amount of EG&S provided to society by lands converted back to simple seeded species' mixes will always be less than that found on native prairie. An alternative approach that could introduce different land allocation patterns would be to provide an incentive for landowners to conserve native prairie based on its own merits – "make it easy to do the right thing, and hard to do the wrong thing".

Forage conversion programs on the prairies are identified and briefly described below. Programs include those funded by both federal and provincial governments in the northern Great Plains of Canada, as well as Ducks Unlimited Canada Inc., and other non-government organizations.

The analysis describes for each program, the incentive paid for the conversion to forages, the number of acres converted, and the total cost of the program. Then a total cost per acre by program is estimated and cost per acre averaged for all programs is shown in Table 4. In addition, the description of each program will include any restrictions placed on species that could be seeded and on the length of time the land must remain in perennial cover. The acres seeded to native species are presented where known.

Permanent Cover Program I and II (1989 to 1992)

The first major prairie initiative was the federal government's Permanent Cover Program (PCP), which sought to remove unsuitable, primarily highly erodible, lands from crop production and recurring drought. The PCP provided funding to assist farmers with seeding costs in exchange for a commitment to maintain the lands in forage cover. For more details see a paper posted on the Agriculture and Agri-Food Canada website.

Incentive paid for seeding: $20 per acre for introduced forage species.

Land Use Agreements: These were offered to producers to keep converted marginal lands in perennial cover: PCP had both 10 and 21 year land agreements.

Number of Acres Converted: 1.3 million acres in Manitoba, Saskatchewan, Alberta and British Columbia.

Total Cost of Program: $74 million

Total Cost per Acre of Program: $56.92 *(or $77.35 in 2012 dollars)*

Restrictions on Species Seeded: None.

Relevant Research Findings:

- Initially 50.7 million acres of land were identified and targeted a class 4-5-6- lands (Brand, 1996). *(Author's note: this means that there are still a lot of cropland acres in existence where subsidies resulted in excess cultivation beyond the level of "good stewardship").*
- Total savings to the Federal government of all programs was estimated to be $23.1 M annually (or $17.77 per acre, *or $24.14 in 2012 dollars).* This does not include provincial contributions to these programs. A PFRA study evaluated impacts on NISA, GRIP, Crop Insurance, FSAMII and WGTA (Brand, 1996).
- It was estimated that between $2-5 Million of soil productivity was recovered by PCP.

Saskatchewan Conversion Cover Program (2001 to 2003)

This provincially funded Conservation Cover Program provided funding to assist with forage seeding costs and was oversubscribed in each year of the program. More than 400,000 hectares (i.e. 988,000 acres) were seeded to forage cover under this program. There was a program limit of 50 acres per farmer. For details see a Saskatchewan press release and associated program brochure

Incentive paid for seeding: $15 per acre.

Land Use Agreement to Keep in Perennial Cover: None

Number of Acres Converted: 988,000 acres

Total Cost of Program: $55 million

Total Cost per Acre of Program: $55.67 *(or $65.82 in 2012 dollars)*

Restrictions on Species Seeded: None

Greencover Canada (2003 to 2008)

This was a federal initiative to help producers improve their grassland management practices, protect water quality, reduce greenhouse-gas emissions, and enhance wildlife habitat. The Greencover land conversion component of this program encouraged the conversion of environmentally sensitive land to perennial forage cover, that is, CLI 4, 5, 6, and 7 land classes. Program participants committed to maintain the perennial cover for at least ten years. New to conversion programs was the requirement that the farmer provide proof of a registered seed certificate analysis. This was to guarantee a minimum standard for seed selection and quality so as to help the producer attain success with the seeding. Also new was the opportunity for farmers to seed native forage species. Species for both types of seedings needed to be long lived species. For more details see program information posted by Agriculture and Agri-Food Canada on its website.

Incentive paid for seeding: $20/acre for long lived introduced forage species and $75/acre for long lived native forage species.

Land Use Agreement to Keep in Perennial Cover: An additional $25/per acre was paid to keep the land in perennial cover for a period of ten years.

Number of Acres Converted:

Tame = 512,244
Native = 27,698
Total = 539,942 acres

Province	Tame Acres	Native Acres	Tree Acres	Total Acres
AB	166,508	9,750	4	176,262
MB	54,661	324	0	54,985
SK	291,075	17,624	91	308,790

Total Cost of Program: $52.8 Million (2006)

Total Cost per Acre of Program: $98.79 *(or $109.16 in 2012 dollars)*

Restrictions on Species Seeded: No short lived tame or native forage species were to be seeded and new controls were implemented to minimize problematic invasive species through requirement of seed certificates of analysis, as a condition of payment. Seed mixes also needed to be pre-approved by a federal or provincial range/pasture specialist.

Ducks Unlimited Canada Forage Seeding Program – Saskatchewan (1998-2012)

Incentive paid for seeding: ranges between $15 and $30 per acre depending on specific program and year.

Land Use Agreement to Keep in Perennial Cover: 10 and 21-year programs (differential payments for different lengths of agreement)

Number of Acres Converted: 307,597 acres
Total Cost of Program: $7,329,276

Total Cost per Acre of Program: $23.83 per acre

Restrictions on Species Seeded: no smooth brome or crested wheatgrass allowed

Nature Saskatchewan Forage Seeding Program (2000-2011)

Incentive paid for seeding: $25/acre for introduced forage species; approximately $100/acre for native seedings

Land Use Agreement to Keep in Perennial Cover: Yes, 2000-2008 (10 year agreement), 2009-2011 (12 year agreement)

Number of Acres Converted: 15,337 acres (50% cost share)

Total Cost of Program: Nature Saskatchewan's costs were $194,864; the program was 50% shared with landowner

Total Cost per Acre of Program: $12.70 per acre

Restrictions on Species Seeded: Yes, as of 2009 only native species were permitted.

Saskatchewan Water Security Agency (1996-2012)

Incentive paid for seeding: varies

Land Use Agreement to Keep in Perennial Cover: n/a

Number of Acres Converted: 137,001 acres (1996-2012)

Total Cost of Program: $3,149,911

Total Cost per Acre of Program: $22.99 per acre

Restrictions on Species Seeded: unknown

Alberta - Agriculture Policy Framework #2 BMPs (Alberta Agriculture & Rural Development (AARD))

Incentive paid for seeding: $31.41 per acre for native seedings

Land Use Agreement to Keep in Perennial Cover: unknown

Number of Acres Converted: 1,500 acres

Total Cost of Program: $47,121, the producers paid an equivalent amount

Total Cost per Acre of Program: $31.41 per acre

Restrictions on Species Seeded: only native species were seeded

Manitoba – Agriculture Policy Framework #2 (Manitoba Agriculture, Food and Rural Initiatives (MAFRI)

Incentive paid for seeding: unknown
Land Use Agreement to Keep in Perennial Cover: unknown
Number of Acres Converted: 1,069 acres

Total Cost of Program: $50,740
Cost per Acre: $47.47 per acre
Restrictions on Species Seeded: unknown

Table 4 Cropland to Forages Conversion Costs per Acre (in 2012 dollars)*

Program	#Acres Converted	Cost of Program	Average Conversion Payment Per Acre
PCP I and II	1,300,000	$100,564,103	$77.35
Conversion Cover Program (SK)	988,000	$66,054,187	$65.82
Greencover Canada	539,942	$58,940,659	$109.16
Ducks Unlimited Canada – Saskatchewan	307,597	$7,329,276	$23.83
Saskatchewan Water Security Agency	137,001	$3,149,911	$22.99
Nature Saskatchewan (50% cost shared with producer)	15,337	$194,864	$12.70
Alberta APF #2 (AARD) (50% cost shared with producer)	1,500	$47,121	$31.41
Manitoba APF #2 (MAFRI)	1,069	$50,740	$47.47
Totals	**3,290,446**	**$236,330,861**	
Average cost per acre			**$71.82**

*Note: this table is not exhaustive – not all Partners were able to provide data.

*****

Ecosystem Goods & Services From Native Prairie: Research Needed

The purpose of this report was to inform decision-making and policy development related to the conservation of native prairie ecosystems. In particular, the data collected was intended to increase understanding of the ecological and economic costs of converting native prairie ecosystems to other land uses, primarily annual crop production. However, the research revealed that there are significant knowledge gaps and that there are a number of categories of information that will be needed to enable the development of policy and programs that encourage more socially efficient patterns of land allocation across the prairie agricultural landscape. The following research is needed in order to provide greater knowledge about the ecosystem goods and services that native grasslands provide to society:

- Research on how much native grassland remains in each of the three prairie provinces and what condition it is in. Significant amounts of land are being incrementally lost to land development in each province. Concurrently, there is an ongoing need for summary work on the amount of grassland habitat that is being protected, especially in view of the divestiture of 2.2 million acres of AAFC Community Pasture lands back to the provinces of Saskatchewan and Manitoba.
- Moving from a market based to a Total Economic Value model requires significant social and agriculture policy change. Research may be needed about how to best approach this.
- Quantitative data specific to natural temperate grasslands that would allow a total comprehensive economic valuation of this biome; this is currently not available (Heindenreich, 2009). Also survey data on the types of good or service provided, the quantity provided, or the change in quantity provided. Research is needed that would enable estimates of TEV data using specific grassland data by geographic area. These gaps are significant. Mapping, quantifying and valuing of both market and non-market ecosystem services.
- Research on how to most effectively communicate the above values to the general public – specifically outlining “what is in it for them – i.e. the people who may be far away from any native prairie?”
- Research needs to be multi-disciplinary as the work of experts from separate disciplines is too one-dimensional to be useful in solving today’s issues.

- Research on functioning and sensitivities of grassland ecosystems, in order to ensure that environmental markets that are established or modified rely on appropriate data and habitats; enabling the protection of larger blocks of land and thus making a market possible (McClay, 2012).
- Evaluation of the appropriateness of different policy mechanisms in terms of native grassland conservation. It is important to evaluate a full suite of policy instruments including economic incentives, regulation as well as on the effectiveness of information and extension approaches. In most cases, a single approach employing one instrument will not be effective.
- Further research and monitoring on habitat losses, gains and productivity would enable habitat and biodiversity markets to increase in liquidity and transparency, by providing confidence about appropriate compensation ratios for habitat. Many opportunities remain to mitigate transaction costs through improved market information (McClay, 2012).

*****

Project Investigation Summary

The overarching goals of this project was to investigate and provide guidance for the valuation of EG&S programming on native prairie that is used for livestock production in the Prairie Provinces, and to inform the public and policy makers of the existing market signals that drive the loss of ecosystem services on native prairie in Canada. As native prairie continues to be lost, this information is critical for determining a starting point for programming such as Payment for Ecosystem Services (PES) to land managers of native prairie.

Part One: the literature review aimed to scan relevant recent studies pertaining to the Great Plains, providing an estimate of the value of EG&S to society. We found extreme variability in values, and so little confidence can be ascribed to the numbers that we found. Thus, the research does not yet provide a good basis for PES type programming. This should improve as data and methodology improve. However, the information available in the literature could certainly be used to educate the public regarding the relative non-market values that they receive from native prairie.

Part Two: The Opportunity Cost approach that we used was effective for providing an assessment of why native prairie is still at risk of land use conversion in the Canadian Prairie Provinces. It was also effective to illustrate the income livestock producers forego when they choose to retain native

prairie. However, the opportunity cost values are likely too high to form the basis of a PES at this point in time. There is not yet enough demand by society for EG&S of native prairie. In addition, there are presently some existing tools available to some landowners that act to incentivize retention of privately held native prairie (i.e. conservation easements and tradable development credits).

Part Three: The Cost of Providing Stewardship section clearly illustrates that there is a cost to stewarding native prairie. The data that we obtained from Partners perhaps represents the true cost of stewarding native prairie - this is likely the best option for a starting point for determining an appropriate PES. It represents a "real cost" to livestock producers who operate in a "working landscape". It applies equally to private and publicly owned (but privately managed) land. We need to consider that a "two tiered system" may be necessary - where PES for privately owned lands also includes both a stewardship payment and an incentive to offset the opportunity cost of land conversion. It is expected that intense land use pressures on native prairie in the Prairie Provinces will most likely continue in the future.

Part Four and Five: these sections on Canadian agriculture subsidies and cropland conversion programs show the amount that the public is willing to pay to subsidize conversion of native prairie through perverse incentives, and then how much they are willing to pay to convert land back to a form of grassland that is less ecologically valuable than intact native prairie. Therefore, it seems logical that it would be cost-effective to use public funds to financially incentivize the retention and stewardship of native prairie. This would reward land managers for undertaking positive environmental initiatives for all Canadians.

It seems that there is less support for private and public management of native prairie at both the federal and provincial government level than there was even twenty years ago. Native prairie is still being lost incrementally, but steadily. It is critical that efforts are made immediately to recognize, both notionally and monetarily, the "priceless" EG&S that native prairie provides to all Canadians, both now and into the future.

*****

REFERENCES

Action for Agriculture. 2013. Food for Thought – New Solutions for New Challenges. Online video, 36 minutes. Downloaded February 2013 from: http://www.actionforagriculture.com/home/food-for-thought-video

Advisory Committee on GRIP and NISA. 1992. Report of the Advisory Committee on GRIP and NISA. Saskatchewan Agriculture and Food publication. Regina, Saskatchewan.

Agriculture and Agri-Food Canada. 2008. Audit Report – Greencover Canada Program. Downloaded January 2013 from: http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1234817744362&lang=eng

Agriculture and Agri-Food Canada. 1996. The Permanent Cover Program, is Twice Enough? – Soil and Water Conservation Policies: Successes and Failures. Downloaded January 2013 from: http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1187267959357

Alberta Agriculture and Rural Development. 2011. AgProfit$ Alternatives. Downloaded January 2013 from: http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/econ10238

Alberta Agriculture and Rural Development. 2011. Production Costs and Returns, Irrigated Soils. Downloaded January 2013 from: http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/econ10238/$FILE/11%20Irrigated.pdf

Alberta Agriculture and Rural Development. 2013. Unpublished data, Cow-calf Cost of Production Benchmarking Study. D. Kaliel. Edmonton, Alberta.

Bailey, A., D. McCartney, and M. Schellenberg. 2010. Management of Canadian Prairie Rangeland. Agriculture & Agri-Food Canada publication No. 10144. Ottawa, Canada.

Balmford A., Bruner A., Cooper C., Costanza R., Farber S. 2002. "Economic reasons for conserving wild nature." *Science* 297(5583):950-953.

Barichello, R, R. 1995. Overview of Canadian Agriculture Policy Systems. In: Agriculture and Food Policy Systems Information Workshop: Understanding Canada/United States Grain Disputes. Farm Foundation. Rio Rico, Arizona, USA. Downloaded December 2012 from: http://www.farmfoundation.info/webcontent/Agriculture-and-Food-Policy-Systems-Information-Workshop-Understanding-Canada-United-States-Grain-Disputes-886.aspx

Belcher, K. 2013. Personal communication. Professor, School of Environment and Sustainability. University of Saskatchewan. Saskatoon, Saskatchewan.

Brand, P. 1996. Conservation Through the Permanent Cover Program. In: Proceedings of the Fourth Prairie Conservation and Endangered Species Workshop. Eds. W. D. Willms and J. F. Dormaar. Natural History Occasional Paper No. 23. The Provincial Museum of Alberta, Edmonton, Alberta.

Costanza, R., D'Arge R., De Groot R., Farber S., Grasso M.. 1997. "The value of the world's ecosystem services and natural capital." *Nature*. 387:253-260.

Costanza, R., Wilson, M. Troy, A., Voinov, A. Liu, S., and D'Agostino, J. 2006. The Value of New Jersey's Ecosystem Services and Natural Capital. Gund Institute for Ecological Economics and New Jersey Department of Environmental Protection. University of Vermont. Burlington, Vermont.

Dodds, W.K., Wilson, K.C., Rehmeier, R.L., Knight, G.L., Wiggam, S., Falke, J.A., Dalgleish, H.J., and Bertrand, K.N. 2008. "Comparing ecosystem goods and services provided by restored and native lands." *BioScience*. 58:837-845.

Evans, S.M. 2004. Bar U and Canadian Ranching History. University of Calgary Press. Calgary, Alberta. 385pp.

Girt, J., 1990. Common Ground, Recommendations for Policy Reform to Integrate Wildlife Habitat, Environmental and Agricultural Objectives on the Farm. Wildlife Habitat Canada, Ottawa.

Gruending, D. 1996. The Middle of Nowhere – Rediscovering Saskatchewan. Fifth House Printers. Saskatoon, Saskatchewan. 228 pp.

Heindenreich, B. 2009. *What are Global Temperate Grasslands Worth? A Case For Their Protection - A Review of Current Research On their Total Economic Value.* Temperate Grasslands Conservation Initiative. Vancouver, Canada. 51pp.

Hill, H. and J. Vaisey. 1995. Policies for Sustainable Development. In: Proceedings of the Symposium Planning for A Sustainable Future: The Case of the North American Great Plains. May 8-10th, 1995. Lincoln, Nebraska.

Holderness, K. 2008. "The need for competitive policy". In: Homes on the Range: Conservation in Working Prairie Landscapes. Proceedings of the 8th Prairie Conservation and Endangered Species Conference and Workshop. March 1-3rd, 2007. Canadian Plains Research Centre, University of Regina, Regina, Saskatchewan.

Homes & Land – Calgary. 2013. Listings in February 8th – March 8th issue. Land parcels were in the Bar U/Longview and Nanton area, respectively.

Jones, D.C. 1987. Empire of Dust. University of Alberta Press. Edmonton, Alberta. 316 pp.

Kaliel, D. 2013. Unpublished data, AgriProfit$ Study, 1995-2010. Alberta Agriculture and Rural Development. Edmonton, Alberta.

Klein, K. K., B. Stennes, W. A. Kerr, S. N. Kulshreshtha, G. Fox, and J. Corman. 1994. Transportation Issues in Canadian Agriculture II: Analysis of the Western Grain Transportation and Feed Freight Assistance Acts. Canadian Journal of Regional Science XVII:1(1994), pg 45-70.

Klein, K.and G. Storey. 1998. Structual Developments in the Canadian Grains and Oilseeds Sector. Downloaded December 2012 from: http://www.farmfoundation.info/webcontent/Agriculture-and-Food-Policy-Systems-Information-Workshop-Economic-Harmonization-in-the-Canadian-U-S-Mexican-Grain-Livestock-Subsector-903.aspx

Kulshreshtha, S. and G. Pearson. 2006. An Update on Determination of a Cost Recovery Framework and Fee Schedule Formula for the Agriculture & Agri-Food Canada – P.F.R.A. Community Pasture Program. Centre for Sustainability and Law and Environment, University of Saskatchewan, Saskatoon, Saskatchewan.

Lane Realty. 2013. Parcel 159 acres, native grassland and bush, Located west of Lumsden, near Buffalo Pound Lake; Downloaded February 18th from: http://www.lanerealtycorp.com/2020applications/propertylistings.asp?page_size=1&current_page=1&city=Lumsden

Larson, K. 2013. Unpublished data, Cow-calf Cost of Production Benchmarking Study, various years. Western Beef Development Centre. Humboldt, Saskatchewan.

Ma, S. and M. Swinton. 2011. Valuation of ecosystem services from rural landscapes using agricultural land prices. Ecological Economics: 70 (2011) 1649-1659.

MacEwan, G. 1962. Blazing The Old Cattle Trails. Western Producer Prairie Books. Saskatoon, Saskatchewan. 248 pp.

Manitoba Agriculture Food and Rural Initiatives. 2012. Guidelines for Estimating Saskatoon Berry Production Crops. Downloaded January 2013 from: http://www.gov.mb.ca/agriculture/financial/farm/pdf/copsaskatooncosts2012.pdf

Manitoba Agriculture Food and Rural Initiatives. 2013. Guidelines for Estimating Crop Production Costs – 2013 – Western Manitoba. Downloaded January 2013 from: http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/econ10238/$FILE/11%20Irrigated.pdf

Martin, C. 1938, 1973. "Dominion Lands" policy. 1973 version edited by L.H. Thomas, Carlton Library No. 69, McClelland and Stewart, Toronto. 259p.

Martin, L. and K. Stiefelmeyer. 2011. Canadian Agriculture and Food: A Growing Hunger for Change. George Morris Centre. Downloaded December 2012 from: http://www.georgemorris.org/publications/file.aspx?id=459f6ab8-56fb-4646-a9a8-541a494c158c

McClay, J. 2012. *Environmental Markets 2012: a survey and assessment of environmental markets in Canada.* Sustainable Prosperity, University of Ottawa, Ottawa, Canada. 34 pp.

Mussell, A. and B. Ross. 2001. Tell the truth on farm subsidies. George Morris Centre. Downloaded December 2012 from: http://www.georgemorris.org/publications/file.aspx?id=9fbb5d30-5bf3-41cf-8c6a-78db2cfa0bec

Olewiler, N. 2004. *The Value of Natural Capital in Settled Areas of Canada*. Published by Ducks Unlimited Canada and the Nature Conservancy of Canada. 36 pp.

Prairie Conservation Action Plan. 2008. Presentation by Kerry Holderness: "The need for competitive policy". In: Homes on the Range: Conservation in Working Prairie Landscapes. Proceedings of the 8th Prairie Conservation and Endangered Species Conference and Workshop. March 1-3rd, 2007. Canadian Plains Research Centre, University of Regina, Regina, Saskatchewan.

Prairie Conservation Action Plan. 2008. Presentation by Peter Joyce: "Integrating EG&S concepts into agri-environmental programs and policy". In: Homes on the Range: Conservation in Working Prairie Landscapes. Proceedings of the 8th Prairie Conservation and Endangered Species Conference and Workshop. March 1-3rd, 2007. Canadian Plains Research Centre, University of Regina, Regina, Saskatchewan.

Rass, N. 2008. "Pastoralists, the best custodians of drylands." Extract from: *The nature of drylands. Diverse ecosystems, diverse solutions.* IUCN Barcelona 2008.

Rees, W.1998. Economic Growth, Conservation, and Sustainability: Footprints to An Ethical Dilemma. In: Proceedings of the Fifth Workshop Prairie Conservation and Endangered Spaces. February 1998. Saskatoon, Saskatchewan. Provincial Museum of Alberta Natural History Occasion Paper No. 24.

Riemer, G. 1994. Agricultural Policy Impacts on Rangeland and Options for Reform: An Overview and Evaluation. In: Proceedings of the First Interprovincial Range Conference in Western Canada. Managing Canadian Rangelands for Sustainability and Profitability. Grazing and Pasture Technology Program. Regina, Saskatchewan. Pp. 321-327.

Riemer, G. 1998. Land Use and Settlement on the Canadian Great Plains – Effect of Laws and International Agreements on Land Use and Conservation. In: Proceedings of the Fifth

Workshop Prairie Conservation and Endangered Spaces. February 1998. Saskatoon, Saskatchewan. Provincial Museum of Alberta Natural History Occasion Paper No. 24.

Riemer, G. 2001. Economic Viability of the Grains Industry and Its Relevance to Prairie Conservation. In: Proceedings of the Sixth Prairie Conservation and Endangered Species Conference – Sharing Common Ground. February 2000. Winnipeg, Manitoba.

Riemer, G. 2005. Land use policy change and the ramifications for stewardship and waterfowl conservation in Saskatchewan. Prairie Forum – the journal of the Canadian Plains Research Centre, University of Regina. Regina, Saskatchewan. Volume 30, no.1 (Spring 2005) ; pp. 11-24.

Rosaassen, K.A. and J. S. Lokken. 1996. Canadian Agricultural Policies and Other "Land Mining" Initiatives for Prairie Agriculture? In: Proceedings of the Fourth Prairie Conservation and Endangered Species Workshop. Natural History Occasional Paper No. 23. The Provincial Museum of Alberta, Edmonton, Alberta.

Sala, O.E., and Paruelo, J.M. 1997. "Ecosystem Services in Grasslands." In: Daily, G.C. (ed.) *Nature's Services: Societal Dependence on Natural Ecosystems*. Island Press. Washington, D.C.

Saskatchewan Crop Insurance Corporation. 2012. Insured Acres and Crop Insurance Claims, 2010. Downloaded February 2013 from: http://www.saskcropinsurance.com/Default.aspx?DN=58839ffe-56d0-45f8-ae9f-7b54da9e9cc7

Saskatchewan Crop Insurance Corporation. 2012. General "What If" Calculator. Downloaded February 2013 from: http://www.saskcropinsurance.com

Saskatchewan Forage Council. 2010. The Value of Saskatchewan's Forage Industry – A multi-level analysis. Downloaded November, 2012 from: http://www.saskforage.ca/publications/Forage%20Industry%20Analysis%20Final%20Report%20high%20res.pdf

Saskatchewan Ministry of Agriculture. 2004. Returns for a Saskatoon Berry Farm. Downloaded January 2013 from: http://www.agriculture.gov.sk.ca/Default.aspx?DN=6b8ffe92-0a86-45b1-95d9-302c42c726f0

Saskatchewan Ministry of Agriculture. 2007. Forages, Dryland Production Costs. Downloaded January 2013 from: From: http://www.agriculture.gov.sk.ca/Default.aspx?DN=8349c542-42e4-402b-9aed-0f48ea316789

Saskatchewan Ministry of Agriculture. 2012. Crop Planner. Downloaded January 2013 from: http://www.agriculture.gov.sk.ca/crop-planning-guides

Smith V. K. 1996. "Pricing What is Priceless: A Status Report on Non-Market Valuation of Environmental Resources." *Journal of Economic Literature*. 1996.

Statistics Canada. 2006. 2006 Census for Agriculture.

Statistics Canada. 2012. Direct Payments to Producers 1981-2011. Agriculture Economic Statistics. Agriculture Division, Farm Income and Prices Section. Ottawa, Canada. Downloaded December, 2012 from: http://www.statcan.gc.ca/pub/21-015-x/21-015-x2012002-eng.htm

Statistics Canada. 2012. CANSIM crop data 1908 to 2012. Estimated areas, yield, production and average farm price of principal field crops, in metric units. Downloaded February 2013 from: http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=0010010&tabMode=dataTable&srchLan=-1&p1=-1&p2=9

Thompson, J. H. 1976. Permanently wasteful but immediately profitable: Prairie agriculture and the Great War. Pp. 193-206 In: Canadian Historical Papers. The Canadian Historical Association, Toronto, Ontario.

Wilson, S. J. 2009. *The Value of BC's Grasslands: Exploring Ecosystem Values and Incentives for Conservation*. Grasslands Conservation Council of British Columbia. 45 pp.

Appendices

APPENDIX ONE: LIST OF DIRECT PAYMENTS TO PRODUCERS

Statistics Canada produces a number of documents on agriculture economics each year. The following is an alphabetical description of direct payments made to Canadian agriculture producers in the Prairie provinces during the years 1981 to 2011. This list does not contain indirect payments that have been made to producers - an indirect payment is one that has been paid through a third party agreement.

The specific amount of each direct payment by program and by province can be viewed at: http://www.statcan.gc.ca/pub/21-015-x/21-015-x2012002-eng.htm

Agricultural Income Disaster Assistance (AIDA) Program (1999 to 2004)
The Agricultural Income Disaster Assistance (AIDA) program was designed to provide assistance to producers facing dramatic income declines in 1998 and 1999 as a result of factors beyond their control and for which existing programs could not provide assurance of continuing the farm business. Funded 60% by the federal government and 40% by provincial governments, AIDA is available to anyone in Canada who files income tax returns as a farmer, and whose gross margin has dropped below 70% of their average gross margin over the previous three years. For beginning farmers, a special calculation is used to determine eligibility. The AIDA program provides individual payments to eligible producers and credits to the provincial governments for programs already established to assist producers. The provincial programs (this list is not exhaustive) that are partly funded by the AIDA program are:
• Farm Income Disaster Program (FIDP), Alberta
• B.C. Whole Farm Insurance Program (BCWFIP), British Columbia.

Agricultural Revenue Stabilization Account (2002 to present)
The Agricultural Revenue Stabilization Account program is an individual farm income protection program. It was designed to manage the fluctuations in farming income according to individual producers needs.

AgriInvest (2008 to present)
This program, as part of the 2008 Agriculture Policy Framework, replaces the coverage under the Canadian Agricultural Income Stabilization (CAIS) program for margin losses of 15 per cent or less. Through government and farmer contributions to producer accounts, it will provide producers with flexible coverage for small income declines as well as support for investments to mitigate risks or improve market income.

AgriRecovery (2008 to present)
AgriRecovery was designed to provide quick targeted assistance to producers in case of natural disasters. Federal and provincial governments jointly determine whether further assistance beyond existing programs already in place is necessary and what form of assistance should be provided. Funded 60% by the federal government and 40% by provincial governments, AgriRecovery is available to producers once provincial and federal governments agree that assistance is warranted. The assistance provided will be unique to the specific disaster situation and most of the time, unique to a province or even a region. Examples of programs included in Agri-Recovery are the 'Excess Moisture program' (available in Manitoba, Saskatchewan and Alberta) as well as the Pasture Recovery Program
(available in Saskatchewan and Alberta). A number of additional programs are also included.

AgriStability (2007 to present)
As part of the "Growing Forward" initiative, enacted in 2007, AgriStability is a margin-based program that provides income support when a producer experiences larger income losses. AgriStability has replaced the coverage currently provided under CAIS for income declines of more than 15%.

Alberta BSE Slaughter Market Adjustment Program (2004 to 2005)
The Alberta BSE Slaughter Market Adjustment Program for Other Ruminants is very similar to

the Canada-Alberta BSE Recovery Program. Producers who sold their animals for slaughter were entitled to compensation on a sliding scale equal to the difference between a base price and an average weekly market price.

Alberta Farm Income Assistance Program (AFIAP) (2000 to 2004)
The Alberta Farm Income Assistance Program (AFIAP) provides Alberta producers (who were farming as of December 31, 1999) with an agricultural assistance package designed to supplement declining farm income due to extreme weather conditions, continuous low commodity prices, and growing input costs. This payment provides qualifying farmers with $10.29 per acre for all cultivated acres, and $3.00 per acre on native pasture.

Alberta Farm Income Assistance Program 2002 (2002-2004 and 2006)
The Alberta Farm Income Assistance Program - 2002 provided an acreage based payment to producers suffering from adverse weather conditions, low income and pests.

Alberta Fed Cattle Competitive Bid program (2003 to 2006)
This program was designed to temporarily reduce the inventory of steers and heifers available for slaughter with the effect of increasing producers' cash flows and market price. This was achieved by setting aside animals from the slaughter queue for a minimum 8-week period and compensating producers for the market deficiencies.

Alberta Mature Animal Market Transition Program (2004 to 2006)
This program is designed to help producers deal with mature cows, bulls and other ruminants while the industry moves towards new market realities in response to the issue of BSE.

Alberta Steer and Heifer Market Transition Program (2004 to 2006)
The Alberta Steer and Heifer Market Transition Program, provided producers with compensation for slaughter weight steers and heifers on a market differential basis.

Alberta Winter Feed Program (2003 to 2005)
This program assisted producers to adequately care for their livestock over the winter months.

Assiniboine Valley Producers Flood Assistance Program (AVPFAP) (2007 to present)
This Province of Manitoba program provides financial assistance for Assiniboine Valley agricultural producers who experienced crop loss or the inability to seed a crop in 2005 and 2006 along the Assiniboine River from the Shellmouth Dam to Brandon, MB due to flooding.

Beef Cattle and Sheep Support Program (1982)
Under the Beef Cattle and Sheep Support Program, payments were made to Alberta producers in 1982 for bred cows and heifers on inventory as well as feeders, slaughter cattle and lambs sold.

Beef Enhancement Program (1982 to 1986)
Under the Beef Stabilization Plan, productivity enhancement grants were provided to Manitoba producers. These grants were paid on a per cow basis over the 1982 to 1986 period to encourage cattle production.

Big Game Damage Compensation Program (1997 to 1998)
Announced in the fall of 1996, this program enables producers in Saskatchewan to receive certain compensation for commercial crop losses and damage to haystacks caused by big game animals such as white-tailed deer, mule deer, antelope, elk, bear and moose.

Bovine Spongiform Encephalopathy (BSE) Recovery Program (2003 to 2006)
This program was designed to help offset the impact of border closures following the discovery of a single cow with BSE in Alberta. The Assistance Package was cost shared by the federal government and participating provinces on a 60:40 basis.

CAIS Inventory Transition Initiative (CITI) (2006 to 2007)
CITI is a one time federal government injection of $900 million into Canada's Agriculture and Agri-food industry. The funds will be delivered to producers by recalculating how the Canadian Agricultural Income Stabilization (CAIS) program values inventory change for the 2003, 2004, and 2005 CAIS program years.
.

Canada-Alberta Farm Income Assistance Program (CAFIAP) (2001 to 2005)
The Canada-Alberta Farm Income Assistance Program is designed to supplement farm income in Alberta for the year 2000.

Canada-Manitoba Adjustment Program (2000 to 2001)
The Canada-Manitoba Adjustment Program provides producers of grains, oilseed and special crops with a one-time payment to assist them as they complete the adjustment from the elimination of transportation subsidies during a period of low prices. Program payments are based on the greater of a producer's: 1998 qualifying sales or average qualifying sales from 1994 to 1998. Producers who started farming in 1999 had their payment based on their 1999 qualifying sales. Assistance under this program is cost shared by the Government of Canada and the Government of Manitoba.

Canada-Manitoba Adjustment Program 2 (2001 to 2002)
The Canada-Manitoba Adjustment Program 2 is designed to aid Manitoba farmers competing in the grains, oilseed and specialty crops sectors, as producers in these sectors are faced with making adjustments to compete in the global market with international competitors that receive significantly higher support.

Canada-Saskatchewan Adjustment Program (2000 to 2002)
The Canada-Saskatchewan Adjustment Program provides producers of grains, oilseed and special crops with a one-time payment to assist them as they complete the adjustment from the elimination of transportation subsidies during a period of low prices. Program payments are based on the greater of a producer's: 1998 qualifying sales or average qualifying sales from 1994 to 1998. Producers who started farming in 1999 had their payment based on their 1999 qualifying sales. Assistance under this program is cost shared by the Government of Canada and the Government of Saskatchewan.

Canada-Saskatchewan Assistance Program (C-SAP II) (2001 to 2002)
The Canada-Saskatchewan Assistance Program II focuses on grains, oilseeds and specialty crops producers to assist them in dealing with income problems. Payments are made to producers based on a percentage of their qualifying sales of grains, oilseeds and specialty crops.

Canada-Saskatchewan 1999 Unseeded Acreage Benefit (1999 to 2001)
This program compensates producers who did not participate in the 1999 Canada-Saskatchewan Crop Insurance Program for losses incurred due to excessive moisture conditions experienced in the spring of 1999. A compensation payment of $25 per acre was paid to eligible producers who were unable to seed on or before the 1999 seeding deadline established for crop insurance. Canada and Saskatchewan shared the cost of this program on a 60:40 basis. Note that an unseeded acreage benefit of up to $25 per unseeded acre was available to crop insurance customers under the basic crop insurance program. Details of the payment calculation were the same for insured and non-insured producers.

Canadian Agricultural Income Stabilization (CAIS) (2004 to 2008)
The CAIS program is available to producers across Canada and provides assistance to those producers who have experienced a loss of income as a result of bovine spongiform encephalopathy (BSE) or other factors. The program integrates stabilization and disaster protection into a single program, helping producers protect their farming operations from both small and large drops in income.

Canadian Farm Income Program (CFIP) (2001 to 2005)
The Canadian Farm Income Program is a three-year program covering the 2000, 2001, and 2002 claim years. CFIP provides funds to producers who have had a sudden and severe drop in income for reasons beyond their control such as flooding, disease, price collapse, or rapidly rising input costs. To be eligible for a CFIP payment, a producer must have completed a production cycle. A production cycle can be the growing and harvesting of a crop, the process of rearing livestock, or the sale of purchased inventory in the case of feeding or finishing businesses.

Compensation for animal losses (1981 to present)
Under the Animal Disease and Protection Act enacted in 1970, producers in all provinces are compensated when farm animals infected with certain contagious diseases are ordered to be slaughtered. Producers in certain provinces are also compensated for animals killed by wildlife, wild dogs, hunters, etc..

Conservation Cover Program (2001 to 2004)
The Conservation Cover Program (CCP) is a four-year initiative of the Government of Saskatchewan that will contribute to the cost of converting cropland to perennial cover. The program offers $15 per acre to a maximum of 50 acres (minimum five acres) per applicant.

Cost of Production Payment Program (COP) (2007 to 2010)
The Cost of Production Payment Program helps non-supply managed commodities producers with the rising cost of production. This federal program is based on producers' net sales for 2000-2004 (or in the case of new producers: payments will be based on average net sales for 2005-2006).

Cover Crop Protection Program (2006 to 2008)
The CCPP is a Government of Canada initiative designed to provide financial assistance to agricultural producers who were unable to seed commercial crops as a result of flooding in the spring of 2005 and/or 2006.

Crop Drought Program (1986 to 1987)
Under the Crop Disaster Assistance Program, payments were made to help maintain crop production in the drought-stricken southern Prairies and Peace River area. Payments based on yield deficiencies were made to Saskatchewan, Alberta and British Columbia farmers who suffered crop damage due to 1985 drought conditions.

Crop Drought Special Assistance (1986 to 1987)
Under a 1985 program, Saskatchewan producers were provided with payments such that crops yielding five bushels or less per acre were treated as a total loss.

Crop Insurance (1981 to present)
The Crop Insurance Act, enacted in 1959, makes available to farmers, in every province, all-risk crop insurance.

Crop Insurance Restoration (1985 to 1988)
Under the Crop Insurance Coverage Restoration Program, payments were provided to help restore Alberta producers' crop insurance coverage to the levels they had prior to the dry weather in 1985.

Crop Loss Compensation (1981 to present)
Under a special assistance program, payments were made to help Quebec, Manitoba and Saskatchewan farmers overcome the effects of adverse weather in 1983 (floods, winterkill and drought). Producers in certain provinces are also compensated for crops damaged by wildlife.

Crop Restoration Program (1997 to 1998)
This program, coordinated with the Manitoba Disaster Financial Assistance Program and is a component of the Jobs and Economic Restoration Initiative, is designed to immediately assist farm operators who have been affected by the 1997 flooding in the Red River Valley. It will enable farmers to resume normal operations and ensure that the maximum acreage of crops is seeded in 1997.

Cull Animal Program (2003 to 2006)
This program is intended to assist farmers with the additional cost of feeding surplus animals, thereby discouraging on-farm slaughter and encouraging movement of mature animals to domestic markets in an orderly fashion.

Disaster Assistance (Peace River) (1990)
Through the terms of the Public Safety Services Act, assistance was provided to producers who suffered severe crop loss because of heavy rainfall.

Disaster Assistance Program South-East Alberta (1991 to 1996)
This program was established in 1991 in Alberta, under the Public Safety Services Act, in response to a prolonged drought across Southern Alberta.

Farm Income Adjustment Program (2001 to 2002)
The Farm Income Adjustment Program provides producers of non-supply managed agricultural commodities with a one-time payment to assist them in adjusting to lower prices and higher input costs.

Farm Income Assistance (1990 to 1992)
In order to improve farm incomes in 1990, particularly those of grain and oilseed producers in Western Canada, payments were made to producers.

Farm Income Disaster Program (FIDP) (1999 to 2007)
This program was established in 1995, and is available to Alberta farmers. It provides a measure of stability against fluctuations in the farm's program margin which is the difference between allowable farm revenue and expenses. It is a whole farm program, which means all agricultural commodities are eligible.

Farm Income Payment (2005 to 2006)
The Farm Income Payment Program was put in place to ease immediate financial pressures on farmers and allow for a transformation of the industry that addresses the root causes of declining farm income.

Farm Support and Adjustment Measures I (1992 to 1993)
This program was announced in the spring of 1991 to help farmers in the grains, oilseeds and horticulture sectors make the transition to the new GRIP and NISA programs.

Farm Support and Adjustment Measures II (1991 to 1993)
In late fall 1991 the Farm Support and Adjustment Measures II program was announced in response to the continuation of the international grain trade war. The program was initiated to provide transitional support to producers until the longer term safety nets programs (GRIP and NISA) were fully implemented. Grain producers were the primary recipients of assistance with lesser amounts available to non-grain sectors including, horticulture, maple syrup, fur, honey and sugar beets.

Fed Cattle Competitive Market Adjustment Program (2003 to 2006)
The program encouraged producers to sell slaughter weight fed heifers or steers by compensating them on a sliding scale. Unlike the competitive bid program, this program did not include an option for producers to set aside a portion of their own herd. Rather, all cattle were required to enter the competitive marketplace.

Fed Cattle Set-Aside (2005 to 2006)
The program is part of a national strategy to assist Canada's cattle industry to reposition itself to help endure its long-term viability.

Feeder Calf Set-Aside Program (2004 to 2006)
The Feeder Calf Set-Aside program is part of a national strategy to assist Canada's cattle industry to reposition itself to help ensure its long-term viability.

Feed Freight Assistance Adjustment Fund (FFAAF) (1996 to 1999)
This program was established as transitional assistance to contribute to the ability of the affected livestock farming operations and industries to adapt to the new economic environment after the Feed Freight Assistance subsidy was terminated.

Feed Grain Adjustment Program (Feed GAP) (1990 to 1994)
This program provided assistance to producers for hogs, lambs, cattle and game animals as long as the animals were finished in the province of Saskatchewan.

Flood Compensation (1985 to 1986)
Under disaster financial assistance arrangements, payments were made to Alberta producers for crop losses in regions flooded in the summer of 1986.

Freight Cost Pooling Assistance Program (FCPAP) (1997)
Under the Western Grain Transportation Adjustment Fund (WGTAF) this program will assist producers in
Saskatchewan and Manitoba facing higher freight costs because of a change in the Canadian Wheat Board's (CWB) pooling system.
.

Grain Embargo (1981)
As a result of government actions in response to the Afghanistan situation in 1980, payments were made in compensation for losses resulting from the 1980 partial embargo on grain sales to the Soviet Union. Payments were made to producers in Ontario, Manitoba, Saskatchewan, Alberta and British Columbia.

Grains and Oilseeds Payment Program (GOPP) (2006)
The Grains and Oilseeds Payment Program is a one-time program for producers of grains, oilseeds, or special crops.

Greenfeed and Livestock Assistance (1988 to 1992)
Under the 1988 Greenfeed and Livestock Drought Assistance Programs, payments were made to livestock producers in Quebec and the Prairie provinces affected by the 1988 drought. Per head payments were made for breeding livestock in order to help producers maintain their herd, and payments were made on a per acre basis for greenfeed in order to increase feed supplies.

Gross Revenue Insurance Plan (GRIP) (1991 to 2002)
The Gross Revenue Insurance Plan (GRIP) was established in 1991 under the Farm Income Protection Act. GRIP builds on crop insurance by providing producers with revenue protection by offering price support in addition to yield protection. Payments are made when a producer's market revenue falls below predetermined target revenue. In 1991, grain and oilseed and specialty crop producers were eligible to participate in GRIP. Starting in 1999, payments under this program (mainly recoveries of overpayments) are included in the Other Payments category.

Herd Maintenance Assistance Program (1980 to 1982)
Under the Herd Maintenance Assistance Program, payments were made to Manitoba, Saskatchewan and
Alberta producers to ensure that basic breeding herds were not sold off because of feed shortages as a result of the 1980 drought.

Herd Retention Program (2002 to 2003)
The Herd Retention Program was designed to provide drought relief to livestock producers facing severe,
high and moderate drought conditions in Saskatchewan in 2001 and 2002. Producers received payments
of $25, $17 or $12 per animal unit (bred female) depending on the assessed severity of the drought for their region.

Interim Red Meat Production Equalization Program (1993 to 1995)
Under this program, eligible livestock owners were provided financial assistance. Payments were based on pounds of gain achieved on animals fed for slaughter in Saskatchewan.

Jobs and Economic Restoration Initiative (JERI) (1997 to 1999)
This federal-provincial cost-shared program is designed to help prevent permanent job loss in flood affected areas of Manitoba, and to restore economic activity.

1996 Lesser Slave Lake Area Disaster Recovery Program (1996 to 1998)
The 1996 Lesser Slave Lake Area Disaster Recovery Program covered losses on uninsurable items suffered in the flooded Lesser Lake Area in Alberta. Producers whose main income was from farming were eligible. Included as payments in the series "Direct Program Payments to Producers" is the compensation paid to farmers for the losses related to current agricultural production (for example, costs to replace product or input inventories damaged or lost). The amount paid for the replacement or the reconstruction of capital assets such as building, machinery and equipment was excluded, as it is not related to current agricultural production.

Livestock Compensation (1982)
Under the South-West Livestock Compensation Program, payments were provided to Saskatchewan producers for livestock lost due to storm conditions in 1982.

Livestock Development Program (1990 to 1993)
Under the Livestock Development Program, livestock producers received payments to assist them in retaining feeder cattle in the provinces of Manitoba (1992 only) and British Columbia.

Livestock Drought (1984 to 1987)
Under the Prairie Livestock Drought Assistance Program, payments were made to help producers in the four Western provinces maintain their breeding herds after the 1984 drought.

Livestock Fodder Procurement (1980 to 1981)
Payments to producers in the Prairie Provinces were made under a three part program: Straw Feed Procurement, Straw Ammonization, and Green-Feed - For Silage Procurement. The program, complementing the Herd Maintenance Assistance Program, was established to offset some adverse effects of drought conditions in 1980.

Livestock Insurance Programs (1991 to present)
The Livestock Insurance Programs regroups a number of provincially administered livestock insurance programs. These programs include: The **Cattle Price Insurance Program** (2009 to present), designed to provide Alberta cattle producers with an effective price risk management tool reflective of their risk.

Livestock Predation Compensation Program (1999 to present)
This program compensates livestock producers in Manitoba for losses from injury or death of eligible livestock that resulted from losses due to natural predators such as black bear, cougar, wolf or coyote. Compensation is available to 100% of the assessed value of the animal, for a confirmed loss due to predation and to 50% of the value for a probable loss. In respect for livestock injured, the payment will be the lesser of the veterinary treatment or the value of the livestock. The government of Manitoba pays 60% of program payments and the Government of Canada 40%. Administration costs are cost-shared 50/50 between the Government of Canada and the Government of Manitoba.

Livestock Special Assistance (1986)
Under the Supplemental Livestock Assistance Program, payments were provided to Alberta producers for breeding cows and other qualifying stock. The program was introduced in response to the damaging effects of various weather conditions in 1985.

Livestock Transportation (1984 to 1987)
Under a program instituted in 1984, payments were provided to Saskatchewan livestock producers affected by drought conditions. The assistance was for transportation of livestock from drought condition areas to emergency pastures.

Manitoba Bovine Spongiform Encephalopathy Feeder Assistance Program (2003 to 2004)
The purpose of this program was to provide feeding assistance payments on finished livestock that were on feed in Manitoba, and had been prevented from being marketed due to restricted slaughter capacity resulting from the United States of America closing its border to related Canadian live animals and meat products.

Manitoba Drought Assistance Program (2003 to 2004)
The purpose of this program is to provide assistance to Manitoba livestock producers who are short of hay and straw.

1999 Manitoba Farm Disaster Assistance Program (MFDAP) Custom Seeding (1999 to 2000)
The Custom Seeding payment is a component of the Manitoba Farm Disaster Assistance Program (MFDAP), introduced to help producers affected by the excess moisture conditions during the spring of 1999. Eligible farmers received a maximum of $10 per seeded acre for costs related to custom land preparation and seeding, retroactive to June 1, 1999.

1999 Manitoba Farm Disaster Assistance Program (MFDAP) Forage Restoration (1999 to 2000)
The Forage Restoration payment is a component of the Manitoba Farm Disaster Assistance Program (MFDAP), introduced to help producers affected by the excess moisture conditions during the spring of 1999. Eligible producers received $75 per acre in financial assistance to help cover the value of lost hay and the cost of restoring tame forage fields damaged by excess moisture.

1999 Manitoba Farm Disaster Assistance Program (MFDAP) Hay Shortfall (1999 to 2000)
The Hay Shortfall payment is a component of the Manitoba Farm Disaster Assistance Program (MFDAP), introduced to help producers affected by the excess moisture conditions during the spring of 1999. Eligible producers receive a $25 per acre payment for hay lands inaccessible because of heavy rain to compensate for feed supply shortages in the winter of 1999-2000. Both tame and native hay acres are eligible, to a maximum of the number of acres normally required to produce the farmers' over winter feed shortfall.

1999 Manitoba Farm Disaster Assistance Program (MFDAP) Unseeded Acreage (1999 to 2000)
The Unseeded Acreage payment is a component of the Manitoba Farm Disaster Assistance Program (MFDAP), introduced to help producers affected by the excess moisture conditions during the spring of 1999. Eligible producers received $50 per acre not seeded on or before June 25 due to excess moisture.

Manitoba Ruminant Assistance Program (2008)
This one-time payment for 2008, funded jointly by the province of Manitoba and the federal government, will allow cattle producers to receive a direct payment of up to 3% of historical net sales. The payment, administered by the Manitoba Agricultural Services Corporation (MASC), will be provided to all ruminant producers and will be in proportion to the size of the producer's livestock operations.

Manitoba Slaughter deficiency Program (2003 to 2005)
The purpose of this program was to provide assistance to Manitoba producers who have experienced depressed slaughter prices for marketed livestock due to BSE and the closure of the U.S. border.

2011 Manitoba Spring Blizzard Mortalities Assistance (2011 to present)
The 2011 Manitoba Spring Blizzard Mortalities Assistance program provides assistance to Manitoba producers who experienced livestock losses following the blizzard that hit April 29th and 30th, 2011. Compensation is provided for animal deaths that occurred, as a result of the storm, between April 29th and May 5th 2011. This program is funded and administered by Manitoba Agriculture, Food and Rural Initiatives (MAFRI).

Net Income Stabilization Account (NISA) (1991 to 2009)
The Net Income Stabilization Account (NISA) was established in 1991 under the Farm Income Protection Act. The purpose of NISA is to encourage producers to save portion of their income for use during periods of reduced income. Producers can deposit up to 3% of their "Eligible Net Sales" (ENS) annually in their NISA account and receive matching government contributions. The federal government and several provinces offer enhanced matching contributions over and above the base 3% on specified commodities. All these deposits earn a 3% interest bonus in addition to the regular rates offered by the financial institution where the account is held. Most primary agricultural products are included in the calculation of "Eligible Net Sales" (sales of qualifying commodities minus purchases of qualifying commodities), the main exception being those covered by supply management (dairy, poultry and eggs). The NISA account is comprised of two funds. Fund No. 1 holds producer deposits while Fund No. 2 contains the matching government contributions and all accumulated interest earned on both Fund 1 and Fund 2. Included as payments in the series «Direct Program Payments to Producers» are the producer withdrawals from Fund 2.

Permanent Cover Crop Program (1991 to 1992)
The primary objective of the Permanent Cover Program was to reduce soil degradation on marginal lands that had high erosion risk under annual cultivation. It provided assistance to farmers to convert eligible lands from annual crops to perennial forage or tree cover. An initial seeding payment—Permanent Cover Establishment Assistance— was paid to offset some of the cash costs related to plantings forages or trees. Farmers who chose to sign long-term contracts subsequently received a second payment—Land Use Contract Assistance—intended to offset some of the costs related to changing from growing annual crops to growing permanent cover crops. Included in the Direct Program Payments (DPP) series is the initial payment only. The Permanent Cover Program was entirely funded by the Government of Canada and delivered through PFRA (Prairie Farm Rehabilitation Administration), within four provinces—Manitoba, Saskatchewan, Alberta and British Columbia.

Price Stabilization Payments – Agricultural Stabilization Act (ASA) (1981 to 1995)
The A.S.A., enacted in 1958, provides payments to producers in every province during periods of low commodity prices. Payments are made whenever the average market prices of commodities covered under the Act fall below calculated support prices. Mandatory support is provided for cattle, hogs, lambs and wool; industrial milk and industrial cream; corn and soybeans; and spring wheat, winter wheat, oats and barley not produced in the designated area of the Canadian Wheat Board. Other commodities may be designated for support by the Governor in Council.

Private hail insurance (1981 to present)
Private Hail Insurance is purchased by agricultural producers to protect themselves against the loss of their crops due to hail. Hail insurance is privately funded through producer premiums and producers may have the option to extend coverage for damage to crops due to loss through fire, depending on the insurance provider.

Producer Assistance 2003 (2003)
Producer Assistance 2003 was a transition measure until the Canadian Agricultural Income Stabilization (CAIS) program came into effect.

Provincial Stabilization Programs (1981 to present)
Under provincial stabilization programs, payments are made in order to support producer incomes affected by small profit margins, or low prices, for selected commodities. Provincial stabilization programs are partly funded by provincial governments, either directly through the subsidization of producer premiums, or indirectly by absorbing a part, or the whole, of the cost of administering the program. These programs are optional, and producers are required to pay premiums in order to participate.

Saskatchewan Cattle and Hog Support Program (2009)
This program will help producers retain their breeding herds and address immediate cash flow needs.

Saskatchewan Fed Livestock Competitive Market Adjustment Program (2003 to 2004)
This program was designed to compensate producers who sell their eligible cattle in a competitive market. Producers are compensated for a portion of their market loss.

Saskatchewan Feed and Forage Program 2011 (2011 to present)
This program provides compensation to producers who must transport additional feed to their livestock, or transport their livestock to alternate locations for feeding and grazing, due to feed shortages caused by excess moisture. In addition, financial assistance is provided to producers who must reseed hay, forage or pasture land that has been damaged by excess moisture. This provincially-funded program replaces the initial Saskatchewan Feed and Forage Program (2010-2011), which was jointly offered by the provincial and federal governments, as part of AgriRecovery.

Saskatchewan Set-Aside Program (2003)
The program was designed to allow producers to access the same level of compensation that is available under the Slaughter Element of the BSE Recovery Program without having to market their livestock for slaughter. By allowing cattle feeders to set-aside 10% (or 45 head which ever is greater) of their eligible livestock, fewer cattle will be available for slaughter, possibly creating a positive impact on fat cattle prices.

South western Alberta Grass Fire Disaster Recovery Program (1998)
Funded by the Alberta Government, the South western Alberta Grass Fire Disaster Recovery Program assisted municipalities and individuals affected by the grass fire that swept through parts of south western Alberta on December 14, 1997. Included in the Direct Program Payments (DPP) series is only the one-time compensation payment to farmers for loss of non-insurable winter pasture.

Special Canadian Grains Program (1987 to 1990)
Under the Special Canadian Grains Program, payments were made to producers to help offset low grain and oilseed prices resulting from weak international markets and the United States - European Economic Community trade war.

Special Drought Assistance (1989 to 1992)
Due to losses suffered as a result of the drought in the summer of 1988, producers in every province from Quebec to British Columbia received assistance.

Temporary guidelines modifications (1985 to 1986)
Under the Crop Insurance Modifications to Retain Feed in Drought Areas Program, payments were provided on 1985 crops cut for feed purposes to encourage Alberta farmers to cut as much drought affected crop as possible for feed.

2003 Transition Funding (2003 to 2005)
Producers received direct payments for their share of a second installment of federal transition funding
(totaling $1.2 billion over two years) to help them move to new business risk management programs.

Transitional Industry Support Program (TISP) (2004 to 2006)
The Transitional Industry Support Program (TISP) was designed to support the integrity of the Canadian agricultural industry. The program included direct payments to producers of cattle and other ruminant animals, and general payments that represent bridging assistance to help the industry transition to new business risk management programming. The programs that are listed in this category are Alberta Industry Transitional Program, British Columbia Industry Transitional Program, Other Ruminant Industry Transitional Program and Manitoba Other Ruminant Industry Transitional Program.

Tripartite Payments - Agricultural Stabilization Act (ASA) (1986 to 1998)
Under an amendment to the A.S.A., in 1985, stabilization plans can be established on a commodity basis. Each commodity stabilization plan provides for price stabilization according to pre-set formula. Payments are made to producers whenever market prices fall below the stabilization price. By September 1987, plans had been established in various provinces for the following commodities: slaughter cattle, feeder cattle, feeder calves, hogs, lambs, white beans, coloured beans, sugar beets and apples. Starting in 1999, payments under this program (mainly recoveries of overpayments) are included in the Other Payments category.

Unseeded Acreage Payment (UAP) 2006 (2006 to present)
This program provides a payment to Saskatchewan farmers who experienced excess moisture conditions prior to June 20, 2006 and were unable to seed 95% of the acres they would normally intend to seed.

Waterfowl Damage (1981 to present)
Payments have been made to farmers every year since 1972 to minimize crop losses caused by migratory waterfowl.

Western Diversification Restart Program (1997)
This program is a component of the Jobs and Economic Restoration Initiative. It makes available accountable cash advances to business people and farm operators who have been affected by the 1997 flooding in the Red River Valley. The assistance is available for such things as building repair and livestock replacement.

Western Grain Stabilization Act (1981 to 1998)
The Western Grain Stabilization Act, enacted in 1976, was established to stabilize producers' net proceeds from the production and sale of wheat, oats, barley, rye, flaxseed, canola and mustard seed produced in the Prairie Provinces and the Peace River region of British Columbia. Amendments to the Act in 1988 provided for the addition of nine crops to the seven currently covered. These included: triticale; mixed grains; sunflower; safflower; buckwheat; peas; lentils; faba beans; canary seed. Starting in 1999, payments under this program (mainly recoveries of overpayments) are included in the Other Payments category.

White Fat Cows and Bulls Market Transition Program (2005)
This program was designed to help producers while the industry moves towards new market realities in response to the issue of BSE.

APPENDIX TWO: TABLE OF DIRECT PAYMENTS TO PRODUCERS (1981-2011)

Statistics Canada produces a number of documents on agriculture economics each year. The following is an itemization of total net direct payments made to Canadian agriculture producers in the Prairie provinces during the years 1981 to 2011. This list does not contain indirect payments that have been made to producers - an indirect payment is one that has been paid through a third party agreement.

More information about the specific payout programs and the amount of each direct payment by program and by province can be viewed at: http://www.statcan.gc.ca/pub/21-015-x/21-015-x2012002-eng.htm

Note the payments below are in 1,000's of dollars.

	Manitoba	Saskatchewan	Alberta	Totals
1981	$59,054.00	$109,964.00	$ 68,559.00	$237,577.00
1982	$29,819.00	$48,542.00	$ 227,434.00	$305,795.00
1983	$48,059.00	$58,456.00	$113,800.00	$220,315.00
1984	$99,885.00	$307,081.00	$ 299,104.00	$706,070.00
1985	$138,504.00	$ 585,580.00	$481,414.00	$ 1,205,498.00
1986	$207,963.00	$845,601.00	$697,106.00	$1,750,670.00
1987	$459,124.00	$ 1,259,042.00	$817,104.00	$2,535,270.00
1988	$398,917.00	$1,105,275.00	$720,369.00	$2,224,561.00
1989	$367,326.00	$967,201.00	$467,900.00	$1,802,427.00
1990	$93,737.00	$443,873.00	$271,287.00	$808,897.00
1991	$139,498.00	$397,373.00	$312,274.00	$849,145.00
1992	$272,707.00	$803,645.00	$743,768.00	$1,820,120.00
1993	$285,079.00	$598,801.00	$437,914.00	$1,321,794.00
1994	$202,286.00	$149,956.00	$311,215.00	$663,457.00
1995	$26,361.00	$118,576.00	$94,503.00	$239,440.00
1996	$ -	$120,161.00	$81,766.00	$ 201,927.00
1997	$ 96,733.00	$161,283.00	$149,669.00	$407,685.00
1998	$47,481.00	$161,018.00	$158,006.00	$366,505.00
1999	$178,186.00	$399,273.00	$148,855.00	$726,314.00
2000	$238,314.00	$658,675.00	$631,497.00	$1,528,486.00
2001	$336,897.00	$893,023.00	$760,420.00	$1,990,340.00
2002	$168,525.00	$886,096.00	$929,880.00	$1,984,501.00
2003	$253,935.00	$1,408,075.00	$1,210,505.00	$2,872,515.00
2004	$364,369.00	$1,034,001.00	$1,287,286.00	$2,685,656.00

2005	$666,024.00	$1,148,159.00	$979,411.00	$2,793,594.00
2006	$592,663.00	$1,067,465.00	$807,824.00	$2,467,952.00
2007	$350,244.00	$640,608.00	$739,751.00	$1,730,603.00
2008	$282,278.00	$279,905.00	$920,329.00	$1,482,512.00
2009	$311,745.00	$272,200.00	$550,269.00	$1,134,214.00
2010	$283,811.00	$653,791.00	$561,922.00	$1,499,524.00
2011	$449,009.00	$885,832.00	$298,286.00	$1,633,127.00
Total	**$7,448,533.00**	**$18,468,531.00**	**$16,279,427.00**	**$42,196,491.00**

APPENDIX THREE: GLOSSARY OF TERMS

The following definitions are primarily from Heindenreich (2009), Wilson (2009), Joyce (2007), Kulshreshtha and Pearson (2006) and the Saskatchewan Advisory Committee on GRIP and NISA (1992).

Adverse Selection – making cropping decisions based on the support provided by a program and not on the basis of market prices and conditions.

Direct Cost/Benefit - Direct costs/benefits are costs/benefits that can be easily traced to a particular object, such as a product, the raw materials used to manufacture a product, or the labor associated with the work to produce the product.

Direct Use Value – when a biome is turned into a commodity which receives compensation in the traditional market.

Ecological or Ecosystem Goods and Services – the benefits that humans and other species derive from healthy ecosystems. These include the products received from ecosystems (e.g. food, fiber, clean air and water), the benefits from ecosystem processes (e.g. carbon sequestration, climate regulation, filtering of wastes, etc.) and non material benefits (e.g. recreation and aesthetic benefits).

Fiscal Benefits – additional revenues (or reduced levels of expenditures) by various levels of governments. For example, when cropland is converted back to perennial cover, there is a fiscal benefit in that government program payments will likely be reduced.

Full Economic Value – takes into consideration both market and non-market valued benefits of grasslands; uses that do not destroy (but may degrade) the biome.

Indirect Cost/Benefit – the ongoing cost/benefits that can't be associated with just one product or service. These costs/benefits may not be priced in the traditional market economy, although we know that these costs/benefits indeed to exist (i.e. cultural values of grasslands are considered an indirect benefit; loss of biodiversity would be an indirect cost).

Indirect Use or Non Use Value – human benefits that neither convert nor consume the biome. Includes ecosystem services such as climate regulation, nutrient cycling, and biological control.

Market Failure – when the economic market fails to allocate resources in a way that is efficient or maximizes welfare to society. In the absence of policy and programs that encourage conservation and /or discourage environmentally damaging management, the agricultural landscape will tend to provide too few or too low quality ecological services from society's perspective.

Market Value – occurs when there is an established market to determine a price. An example would be grazing fees for use of grassland.

Moral Hazard – occurs when a producer maximizes program benefits through inappropriate farming practices including: reducing input use and not using appropriate farming practices in order increase claims. The decisions are made because of the payment program and not in response to market prices.

Natural Capital – refers to the earth's land, water, and atmosphere that provides resources and a flow of ecosystem services. Since we do not directly pay for a number of these services, they are undervalued in our market economy.

Non-Market Value – occurs when there is no market to establish price for the good in question. An example would be trying to determine a value for biodiversity of native grasslands.

Perverse Incentive or Side Effects – occurs when unintended consequences arise from well meaning policy (e.g. production subsidies encouraging cultivation of marginal lands while concurrent initiatives pay for the set-aside of those same lands).

Resource Neutrality – for example, recognizing the importance of cropping decisions on forage and pasture land and the impact on seeding intensity and wetlands. A program is said to be resource neutral if it does not unduly favor one land use (i.e. croplands) to the detriment of another (i.e. native grasslands).

Total Economic Value (TEV) – all values considered together, that is, both use and non-use/passive values. Also includes "option value" which is the value placed on a future ability to use the environment. TEV is the most widely used framework to identify and quantify the contribution of ecosystem services to human well-being.

Value/Benefits Transfer – the approach of transferring research results from one study area to another; adapting existing valuation information or data to new policy contexts; often undertaken when there is little or no local data available. The methodology is inexpensive and relatively valid under certain conditions.

Working Landscape – a landscape that provides direct use values without requiring the destruction of the biome. Examples of activities in working landscapes include grazing, harvesting of by-products and active recreation use.

Opportunity Cost – the income foregone by not using land in an alternative way. In terms of grasslands, an example might be the financial opportunity foregone by not converting sandy rangeland to potato production.

Payment for Ecosystem Services – the process of paying landowners of natural habitats for providing goods and services that are not valued in the traditional market economy.