



Smart Prosperity Institute

Improving On-Farm Agri-Environmental Outcomes in Canada's Next Agricultural Policy Framework Policies and practices to incentivize change

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Policy and Programs Report for



**FARMERS
FOR CLIMATE
SOLUTIONS**

REPORT

Table of Contents

1. HISTORY OF AGRICULTURAL POLICY FRAMEWORKS IN CANADA	5
1.1. INTRODUCTION	5
1.2. PAST FRAMEWORKS	5
2. OVERVIEW OF CAP FUNDING	6
2.1 FEDERALLY FUNDED PROGRAMS	6
2.2. FEDERAL-PROVINCIAL-TERRITORIAL PROGRAMS	7
2.2.1. SPENDING OVER TIME	7
2.2.2. BMP COST-SHARE PROGRAMMING BY PROVINCE	7
2.3. POLICY RECOMMENDATIONS FOR PROVINCIAL-LEVEL COST-SHARE BMP FUNDING	8
2.3.1. MODIFY FUNDING CAPS FOR FARMERS	9
2.3.2. CLEAR METHOD TO ADDRESS LEASE-HOLDERS	9
2.3.3. NO MINIMUM INCOME	10
2.4. ENVIRONMENTAL FARM PLANS BY PROVINCE	10
2.4.1. OVERVIEW	10
2.4.2. EFP UPTAKE	12
2.5. POLICY RECOMMENDATIONS FOR EFP DESIGN AND DELIVERY	14
2.5.1. MAXIMUM TIME TO EXPIRY FOR EFPs	14
2.5.2. INCLUDE ON-FARM VISIT ASPECT FOR ALL EFPs	14
2.5.3. INCREASE ONGOING ADVISORY SUPPORT	15
2.5.4. UP-TO-DATE EFP REQUIRED FOR BMP FUNDING ACCESS	15
2.5.5. INCLUSION OF CLIMATE CHANGE MODULE	15
2.6. BUSINESS RISK MANAGEMENT PROGRAMS	15
3. OVERVIEW OF RELEVANT PROGRAMS	16
3.1. UNITED KINGDOM NEW AGRICULTURE BILL	16
3.2. SET ASIDE PROGRAMS	17
3.2.1. UNITED STATES – CONSERVATION RESERVE PROGRAM	17
3.2.2. CANADA – GREENCOVER PROGRAM	18
3.2.3. CANADA – GRASSLAND SET-ASIDE PROGRAM	18
3.3. UNITED STATES – ENVIRONMENTAL QUALITY INCENTIVES PROGRAM	18
3.4. UNITED STATES – CONSERVATION STEWARDSHIP PROGRAM	18
4. FEDERAL POLICY SUGGESTIONS FOR THE NEXT APF	20
4.1. ENVIRONMENTAL OUTCOMES A KEY INDICATOR OF PROGRAM SUCCESS	20
4.2. IMPROVED DATA COLLECTION	21
4.3. EXPANDING ON AGRI DIVERSITY	22
4.3.1. OVERVIEW	22
4.3.2. EXPAND THE DEFINITION OF UNDER-REPRESENTED GROUPS IN AGRICULTURE	23
4.3.3. MODIFY NATIONAL SCOPE REQUIREMENT	23
4.3.4. INCLUDE GROUP ESTABLISHMENT OR EXPANSION IN ELIGIBLE ACTIVITIES	24
4.3.5. INCREASE TOTAL FUNDING	24
4.4. GRASSLAND CONSERVATION SET-ASIDES	25
4.4.1. PROGRAM OVERVIEW	25

4.4.2. PAYMENTS	26
4.4.3. EQUITY CONCERNS	26
5. SPECIFIC POLICY SUGGESTIONS TO ENCOURAGE BMP ADOPTION	27
5.1 OVERVIEW	27
5.1.1 FRAMEWORK FOR POLICY CONSIDERATIONS	27
5.2 FINANCIAL INCENTIVES	28
5.2.1. GENERAL FINANCIAL INCENTIVES	28
5.2.2. PAYMENT FOR ECO-SYSTEM SERVICE APPROACHES (REVERSE AUCTION)	29
5.2.3 EQUITY CONSIDERATIONS	29
5.3 POLICY SUGGESTIONS FOR SPECIFIC BMP ADOPTION	30
5.3.1. BUNDLING NITROGEN MANAGEMENT PRACTICES	33
5.3.2. QUANTITATIVE RIGHT RATE	35
5.3.3. PRECISION NITROGEN MANAGEMENT	36
5.3.4. ENHANCED EFFICIENCY FERTILIZERS	37
5.3.5. ELIMINATING FALL APPLICATION	38
5.3.6. 4R MANAGEMENT OF MANURE	39
5.3.7. IMPROVED CREDITING OF ORGANIC N SOURCES	40
5.3.8. SYNTHETIC MANURE COVERS	41
5.3.9. ACIDIFYING MANURE	42
5.3.10. LEGUMES IN PASTURE	43
5.3.11. ROTATIONAL GRAZING	44
5.3.12. EXTENDED GRAZING	45
5.3.13. 50% LEGUME COVER CROPS	46
5.3.14. INTERCROPPING	47
5.3.15. ALLEY CROPPING	48
5.3.16. SILVOPASTURE	49
5.3.17. NEW RIPARIAN TREES	50
5.3.18. AVOIDED CONVERSION OF SHELTERBELTS	51
5.3.19. AVOIDED CONVERSION OF WETLANDS	52
5.3.20. WETLAND RESTORATION	53
6. BROADER PROVINCIAL POLICY SUGGESTIONS TO ENCOURAGE BMP ADOPTION	54
6.1. INCREASING GOVERNMENT EXTENSIONS SERVICES	54
6.1.1. WHY USE PREFERRED OR TRUSTED MESSENGERS?	54
6.1.2. WHO ARE THE PREFERRED OR TRUSTED SOURCES OF INFORMATION?	54
6.1.3. CONSIDERATIONS TO IMPROVE EXTENSION SERVICES	55
6.2 LANDSCAPE-LEVEL TARGETING VIA COLLECTIVE ADOPTION BONUSES	56
6.2.1. OVERVIEW	56
6.2.2. COLLECTIVE ADOPTION BONUS PAYMENT RESEARCH	56
6.2.3. APPLICATIONS TO CANADA'S AGRICULTURE SECTOR	57
6.3. EFP AND TIERED INCENTIVE PAYMENTS & SYSTEMS-BASED BMP ADOPTION	58
6.3.1. OVERVIEW	58
6.3.2. ESTABLISHING A NATIONAL PROGRAM	59
6.3.3. PAYMENT STRUCTURE	59
6.3.4. MONITORING	59

7. REFERENCES	61
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APPENDIX 1 – BMP COST-SHARE INFORMATION BY PROVINCE	70
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APPENDIX 2 – ENVIRONMENTAL FARM PLAN (EFP) BY PROVINCE	73
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1. History of Agricultural Policy Frameworks in Canada

1.1. Introduction

The current agricultural policy framework (APF) that covers 2018 to 2023 is called the Canadian Agricultural Partnership (CAP). It is the latest in a series of 5-year agreements between the federal, provincial, and territorial (FPT) governments to fund a suite of programs for the agriculture and agri-food sectors. The general structure of these policy frameworks was created in the early 2000s, when commodity prices were low and pressure from provinces and farmers mounted to provide better support for farmers (Skogstad, 2011). A brief outline for previous APFs is provided below.

1.2. Past Frameworks

In 2003, the first APF, called the Agricultural Policy Framework, was signed. This was a new type of policy framework; in that it provided a 5-year funding agreement for the first time, rather than a 3-year funding agreement. The 2003 framework also introduced the concept of prioritizing funding to a set of key focus areas. In the original 2003 APF, there were five areas of focus, which were called “pillars”: business risk management, food safety, environmental performance, farming skills, and science and innovation. The first APF earmarked over \$600 million in funding for farmers to reduce their environmental impact (Skogstad, 2011).

The next APF was called Growing Forward (GF) and replaced the original APF with FPT cost-share funding covering the 2008 to 2013 period. GF identified three strategic outcomes: a competitive and innovative sector, a sector that contributes to food safety and improved environmental performance, and a sector that is proactive in managing risks (including biosecurity, traceability and business risk management). The GF program’s environmental initiative, “An Environmentally Sustainable Agriculture”, committed \$199.5 million to developing and improving sustainable on-farm practices (AAFC, 2013a).

The subsequent APF provided funding from 2013 – 2018 and was named Growing Forward 2 (GF2). This agreement committed \$3 billion dollars between FPT governments to the suite of programming. Notably, GF2 increased cost-share FPT investments by 50% compared to GF, with the goal of allowing provinces more flexibility to adjust programming to their local needs (AAFC, 2013b). Three new federal programs were created to focus on: (1) innovation, competitiveness, and market development; (2) business risk management; and (3) sectoral engagement and growth (AAFC, 2012). Environmental funding was primarily delivered through the FPT cost-share programs in GF2; however, the ‘Innovation and Market Development’ priority at the federal level also mention a focus on environmental sustainability as a key component for funding (AAFC, 2013c). This was the last APF before the adoption of the current framework, the CAP.

2. Overview of CAP Funding

The current APF, known as the Canadian Agricultural Partnership (CAP) is a \$3 billion, five-year agreement meant to strengthen and grow Canada’s agriculture and agri-food sectors from 2018 to 2023. The CAP is broken into three main areas of funding – federally funded activities and programs that support sector innovation and growth, FPT cost-shared business risk management programs, and FPT cost-shared programs and services tailored to meet each region’s specific needs. The CAP, similar to previous APFs, has identified key areas of focus, including: (1) growing trade and expanding markets; (2) innovative and sustainable growth; and (3) supporting diversity and a dynamic, evolving sector (AAFC, 2021a). About \$2 billion dollars in cost-shared FPT programs are provided through the CAP, with the federal government covering 60% of the costs and the provincial or territorial governments covering the other 40%.

2.1 Federally Funded Programs

The federal government focuses on offering funding for programs and activities and support key priorities set out under the agreements. This federal-only funding under the CAP amounted to \$686.5 million over five years in federal programs and \$467 million of federally-funded activities that directly benefits farmers and processors (AAFC, 2021a). The breakdown of spending on federally funded programs can be found in Table 1 below.

Table 1. Federal-specific programs and funding levels¹

Focus Area	Program Name	Program Goals	Funding Allocation
Growing trade and expanding markets	AgriMarketing	Aid industry increase and diversify exports to international markets by supporting industry-led promotional activities	Up to \$121 million
	AgriCompetitiveness	Assisting industry-led efforts to disseminate knowledge on best practices for farm business management	Up to \$20.5 million
Innovative and Sustainable Growth	AgriScience	Support discovery and innovation through research and accelerate pace of innovation	Up to \$338 million
	AgriInnovate	Accelerate adoption or commercialization of products, tech, processes or services that increase	Up to \$128 million

¹ Funding numbers and program information from AAFC, 2021a

		competitiveness and sustainability	
Supporting Diversity and a Dynamic Sector	AgriDiversity	Help under-represented groups fully participate in the sector	Up to \$5 million
	AgriAssurance	Develop and adopt systems that can make verifiable health and safety claims for products	Up to \$74 million

2.2. Federal-Provincial-Territorial Programs

The programs most significant to increasing the uptake of BMPs are the cost-share programs and environmental farm plans tailored to each province. By the nature of this programming, this means that there are essentially 13 different programs, one run by each province or territory. Generally, environment and climate change related programs run by the programs include a suite of cost-shared BMPs (either administered directly by the province or through a different entity), the creation and administration of environmental farm plans (EFPs), and often a program line that works to develop new BMPs or new ways to support BMP adoption over time.

2.2.1. Spending Over Time

One aspect of CAP spending that is of interest to Canadian farmers is the amount dedicated to the FPT cost-shared programs. These programs support the adoption of various environmentally focused BMPs and provide support for business planning activities. Between GF2 and the CAP, the total funding for the cost-shared portion of the APF remained the same, except for a small increase in British Columbia. However, most GF2 announcements in 2013 noted that cost-shared funding had increased by 50% between GF1 and GF2. This means that FPT cost-share program funding levels have remained stagnant since 2013; however, other support programs, like the On-Farm Climate Action Fund and Agricultural Clean Technology Program, have been created in recent years to offer additional support to farmers for BMP adoption.

2.2.2. BMP Cost-share Programming by Province

The programs jointly funded by FPT governments vary greatly by province. This has been a design feature of the APFs since GF2, where FPT cost-share dollars increased by 50% to allow provinces more flexibility in their programming. Every province offers a suite of farmer-government cost-share options for BMP adoption, with the funding requirements and amounts also varying by province. Table 2 below provides a quick overview of BMP cost-share funding by province, while Appendix 1 lays out more detail characteristics of each province's cost-share offerings, as well as other agri-environmental programming offered with FPT CAP funding.

Table 2. Agri-environmental cost-share programming by province

Delivery Agent	Notes
BC: Investment Agriculture Foundation (IAF)	Requires EFP completed in past 5 years \$70,000 per farm cap across all APFs
AB: Agriculture Environmental Stewardship Program	Requires EFP completed in past 10 years Offers funding at both individual and group levels
SK: Farm Stewardship Program	Not all BMPs require EFP Minimum \$50,000 gross farm income in SK to apply
MB: Ag Action Manitoba Plan	Requires EFP from past 5 years and BMP must be in EFP Maximum funding of \$60,000 per farm operation over the CAP Required to own or control land, or receive permission to implement
ON: Ontario Soil and Crop Improvement Association (OSCIA)	Requires 4 th edition EFP to apply Maximum of 2 BMP applications per year, per category Additional targeting to priority areas
QC: Programme Prime-Vert	Requires a current EFP to apply and BMP must be part of EFP Funding caps set per BMP Option for regional EFP and group funding Additional targeting to priority areas
NB: Environmentally Sustainable Agriculture programs	Requires 2004 edition EFP Maximum of \$50,000 per individual farm operation over the CAP
NL: Environmental Sustainability and Climate Change Program	No EFP requirement Maximum of \$400,000 over the CAP (across <i>all</i> cost-share programs)
NS: Soil and Water Sustainability Program	Requires EFP completed in past 5 years A copy of the long-term lease (10 years) or rental agreement must accompany the Application for all physical projects applicable to leased/rented land
PE: Agriculture Stewardship Program	Requires EFP for BMP funding A maximum of \$100,000 per farming operation over the CAP; maximum of \$20,000 per fiscal year

2.3. Policy Recommendations for Provincial-Level Cost-share BMP Funding

There are three key variations for eligibility and program payouts between the provinces. The first is how a funding cap is allocated. In some provinces, funding caps are set per BMP (e.g. in

Ontario, a farmer is limited by the funding cap for a specific BMP, and can apply to a maximum of 3 BMPs in that category), while in other provinces, a funding cap is set across all projects in the whole APF (Ontario Program Guide, n.d.-a). Next, some provinces place restrictions on farmers who lease their land, such as requiring proof of a 10-year lease. Finally, some provinces also require farmers to have a minimum gross income to be able to apply for cost-share funding, which of course restricts all farmers under that income level from participating at all.

There are 3 policy suggestions that FCS recommends to improve the equity and success of this key component of agri-environmental funding under the next APF. These suggestions are primarily directed at the provincial governments, who design and implement these programs. Depending on the province, some of these recommendations may already be in place in their current programming, so not all suggestions will be applicable to each province.

2.3.1. Modify Funding Caps for Farmers

The first way to modify BMP cost-share programs to increase adoption of key BMPs is to modify, and perhaps standardize somewhat, the way that provinces set overall funding caps for BMP cost share programming. For example, British Columbia current sets its cost-share cap at \$70,000 per farmer across all APFs; by contrast, Ontario sets limits by BMP category and by how many applications a farmer can have at a time (IAF, 2022a; Ontario Program Guide, n.d.-b). There are some studies that can be used to evaluate barriers to BMP adoption; however, these rarely evaluate the FPT cost-share program or compare delivery tactics across provinces. While there are few studies looking at the rate of adoption of BMPs, especially in comparison between provinces, there are still some studies that can be used to evaluate barriers to BMP adoption. Firstly, in one study in Nova Scotia, 67% of EFP farmers who participated in the EFP program (likely to access cost-share funding) reported an income in excess of \$100,000, compared to only 33% of non-EFP participant farmers (Atari et al, 2009). In this same study, 53% of farmers reported that cost was important, very important, or extremely important in their decision to adopt the EFP/BMP program (Atari et al, 2009).

The cost-share programs are very successful at promoting BMPs that provide private benefits for landowners, but they are considerably less effective at promoting actions that provide positive public benefits that also impose private net costs to landowners. Boxall (2017) identified that even when funding levels for individual BMPs were adjusted in Alberta's cost-share program to account for the value of public benefits, farmers still preferred to adopt BMPs that offered significant private benefits instead. Marr and Howley (2019) found in a survey of farmers from England and Ontario that the agri-environmental actions undertaken at the highest rates were actions that offered dual benefits for both agricultural yields and the environment. The authors noted that this tendency to adopt BMPs offering cost-savings and improved profit margins could be occurring because of the type of funding supports offered within BMP programs (Marr & Howley, 2019). Funding to promote BMPs under on-farm stewardship programs is generally structured as one-time support payments to partially offset the capital cost of projects or BMPs (e.g. installing livestock exclusion fencing in riparian areas), which may

render it less attractive for investments into actions with high levels of environmental benefits but which may negatively impact production capacity over the long-term (e.g. wetland conservation or restoration on land that could potentially be used for crop production).

Provinces should be encouraged to offer more flexible caps, such as those offered in Ontario and Quebec, where there are potentially more funds to be offered for each farmer, allowing farmers to implement numerous BMPs that are outlined in their EFPs with less financial burden. FCS recommends setting funding caps either by each individual BMP or similar BMP groups, or raising the overall cap under the next APF (e.g. raising from \$100k over the five program years to \$200k per farmer). Raising the overall cost cap may encourage farmers to adopt more BMPs overall and may move some farmers towards adopting BMPs with fewer private benefits and towards BMPs that also offer public benefits. In some cases, it may be advantageous to couple an initial cost-share with a small ongoing payment. Considerations should also be taken to account for setting aside a portion of funding for equity-seeking farmers to ensure that larger farmers with more ready access to capital do not disproportionately deplete overall program funds.

2.3.2. Clear Method to Address Lease-holders

Provinces vary in which BMPs farmers who lease land can access and some provinces are stricter on limitations for leaseholders. This is an important consideration, as trends show that the number of farmers leasing land has been increasing – 43% of all farmland in Canada was leased in 2016 compared to 39% in 2011 (FCC, 2021a). This leaves a significant portion of farmland potentially subject to less BMP funding. This is also impacting younger farmers (35 or under) more than the average farmer, as 50.6% of farmland operated by young farmers was leased in 2016 (FCC, 2021a).

Farmers leasing land should have similar access to BMP funding. FCS recommends that provinces ensure that farmers leasing land are still able to access BMP funding on an equitable level. Annual practices should not be restricted by land tenure, such as extended grazing for cattle, using enhanced efficiency fertilizer, or using no-till methods. Equipment cost-shares where the farmer could use the equipment on a new site if they begin to rent elsewhere should also be accessible for lease holders. Cost-share for permanent infrastructure that could not follow the farmer to a new location could still be eligible for cost-share, if the leasing owner also accepts the construction of a permanent structure.

2.3.3. No Minimum Income

Some provinces require farmers to have a minimum gross income before they are able to access cost-share funding; this is perhaps most notable in Saskatchewan, where the minimum gross income requirement is set to \$50,000 (Government of Saskatchewan, n.d). Nova Scotia also limits the total amount a farmer can access for payments based partially on their gross commodity income (Government of Nova Scotia, 2021). These minimum requirements for income place a fairly obvious barrier to access funding for farmers who do not meet the

threshold. FCS recommends that this minimum gross income requirement is removed to allow smaller farmers to participate in BMP cost-share funding.

2.4. Environmental Farm Plans by Province

2.4.1. Overview

Designed to give farmers a better understanding of the environmental risks posed by different parts of their farming operation, Environmental Farm Plans (EFPs) have been a part of APFs for almost two decades (OMARFA, 2016). EFPs began as a pilot project in Ontario in 1993 and expanded across Canada under the 2003 Agricultural Policy Framework (AAFC, 2009). As with other FPT cost-share programming, most elements of EFP design and delivery are given to the provinces.

The goal of the EFP is to allow farmers to work through an assessment of their whole farm and the environmental risks associated with certain farm operations. The objective of the EFP is to help farmers identify actions to improve sustainability on their farm (Laforge, Corkal & Cosby, 2021). Generally, risks are identified as arising from landscape features (e.g., a sloping field is more prone to runoff due to its slope), or from management practices (e.g. poor fertilizer storage that would result in excess runoff). The outcome of the EFP process is a list of actions the farmer can decide when and how to implement to address the identified risks. Most provinces order actions by their urgency in some way. For example, BC created ‘red box’ answers that identify where a farmer is out of compliance with regulations; Ontario assigns a rating from 1 through 4 to each action, and the number indicates how urgent that action is (IAF, n.d.; Ontario Program Guides, n.d.-b). Farmers are then able to decide how, when, and if they will implement each action item.

Generally, EFP programming is designed and administered at the provincial level, and with significant feedback from the farmers and other stakeholders who would be developing the EFPs. Provinces will either deliver the programming themselves (usually through their provincial agriculture ministry), or through a third party delivery agency (i.e., general farm organization or environmentally-focussed association). Completion of an EFP is often required to access cost-share funding for BMPs. Table 3 below shows a summary of some of the variation in subject matter and method of delivery by province; a more detailed breakdown can be found in Appendix 2. The key areas that differ across provinces include: (1) how the EFP is administered; (2) how often the province has updated the EFP; and (3) length of time it takes to develop an EFP.

Table 3. Variations in EFP administration to individual farmers by province

Delivery Agent	Administration
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**BC: (previously ARDCorp), now
Investment Agriculture Foundation
(IAF)**

1. On-Farm Assessment w/ advisor
2. EFP workbook with advisor
3. Apply for funding (if applicable)
4. Implement EFP and remedy all red-box answers
5. Display EFP sign

AB: Alberta EFP

6. **Renew every 5 years**
1. Register online
2. Complete EFP workbook (with or without assigned technician)
3. Submit action plan from workbook to technician
4. Approval of EFP
5. Implementation as desired

SK: Ministry of Agriculture

6. **Renew every 10 years**
1. Complete workbook online
2. Submit to Agriculture Knowledge Centre for review
3. Implement as desired
4. **Renew every 10 years**

**MB: Keystone Agricultural Producers
of Manitoba (KAP)**

1. Attend virtual workshop
2. Complete the EFP workbook
3. Review EFP with a KAP reviewer
4. KAP reviewer certifies completion
5. **Renew every 5 years**

**ON: Ontario Soil and Crop
Improvement Association (OSCIA)**

1. EITHER 2-day, in-person workshop OR electronically
2. Submit completed workbook action plan to EFP Workshop Leader
3. Implement EFP
4. **Renew to newest edition (but encouraged to do every 5 years)**

QC: MAPAQ

1. Farmer works with third-party agent to create an Agri-Environmental Support Plan (QC version of EFP)
2. Third party authorizes completion (must be approved by Ministry to qualify farmer for BMP funding)
3. Implementation begins, guided by an action plan
4. **Renew as needed or every 7 years**

NB: Agricultural Alliance of NB

1. Facilitator provides EFP workbook
2. Farm self-assessment (coordinator can offer assistance)

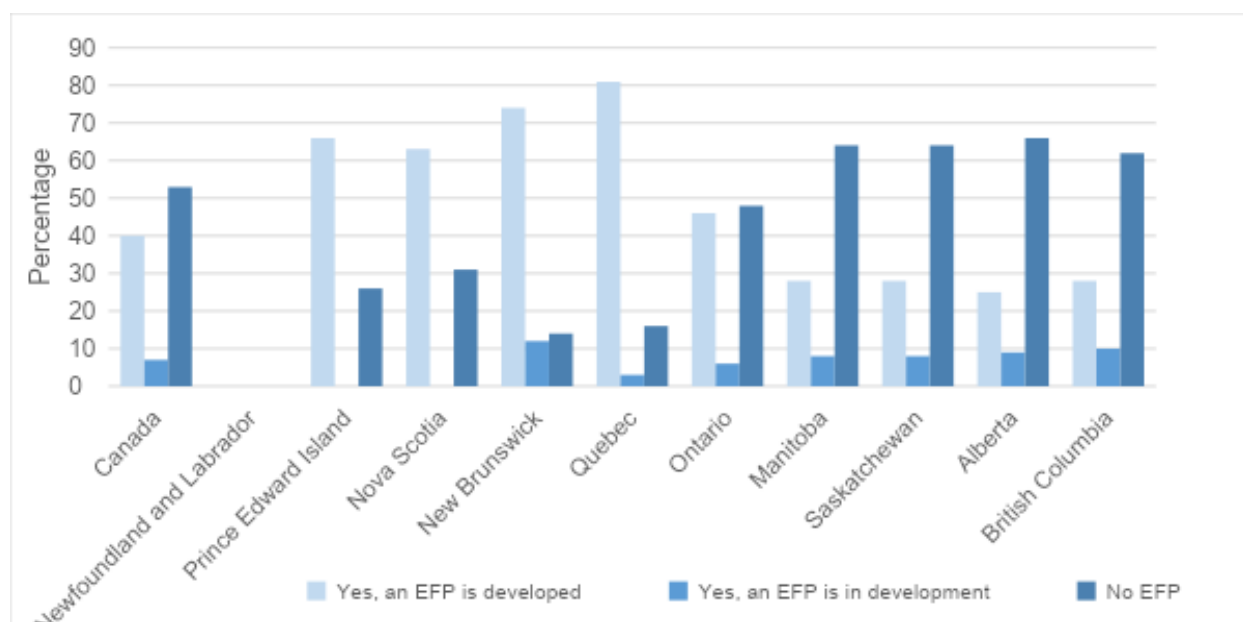
NL: Ministry of Fisheries, Forestry and Agriculture	<ol style="list-style-type: none"> 3. Submit EFP for review by 3rd party 4. Implement 5. Renew every 5 years
NS: Nova Scotia Environmental Farm Plan (NSEFP)	<ol style="list-style-type: none"> 1. Workshops are arranged as needed 2. Complete Farm Review EFP worksheets 3. Advisor and possibly 3rd party certifies Action Plan and EFP 4. Implementation of Work Plan 5. Renew every 5 years <ol style="list-style-type: none"> 1. Initial review with an on-farm visit from coordinator 2. Farmer is sent an EFP Report from coordinator 3. Implementation of Action Plan 4. Renew every 5 years with on-farm visit
PE: Prince Edward Island Federation of Agriculture	<ol style="list-style-type: none"> 1. Collection of data of farm and creation of GIS map of farm 2. In-person meeting with EFP environmental planning officer 3. Completion of EFP 4. Renew every 5 years

2.4.2. EFP Uptake

Across Canada, about 40% of farmers have adopted an EFP, and a further 7% had an EFP in development as of 2017 (Statistics Canada, 2019). However, the rate of adoption is extremely different across the country, as shown in Figure 1. Adoption is high (63% or higher) in the maritime provinces and reach their peak in Quebec with over 80% of farmers having an EFP. Moving further west, adoption drops off in Ontario and into the Prairies. Ontario was the first province to offer a type of EFP, yet adoption in the province remained at under half (46%) of farmers in 2017². The other factor to consider when looking at EFP adoption is the age of an EFP. As indicated in Table 3, EFPs must be updated within a certain timeframe for the farmer to remain eligible for provincial cost-share programming. Most provinces have also updated their EFPs multiple times to better reflect agri-environmental priorities in the province, so older EFPs run the risk of not addressing current issues. Figure 2 shows the age of EFPs by province in 2017.

² The Farm Management Survey represents about 81% of the Canadian agricultural production in seven specific production subsectors: dairy, beef, poultry, pigs, field crops, forage crops, and fruit, vegetables, berries and nut production – so some sectors are not captured in the following data

Figure 1. Adoption level of EFP by province, 2017³

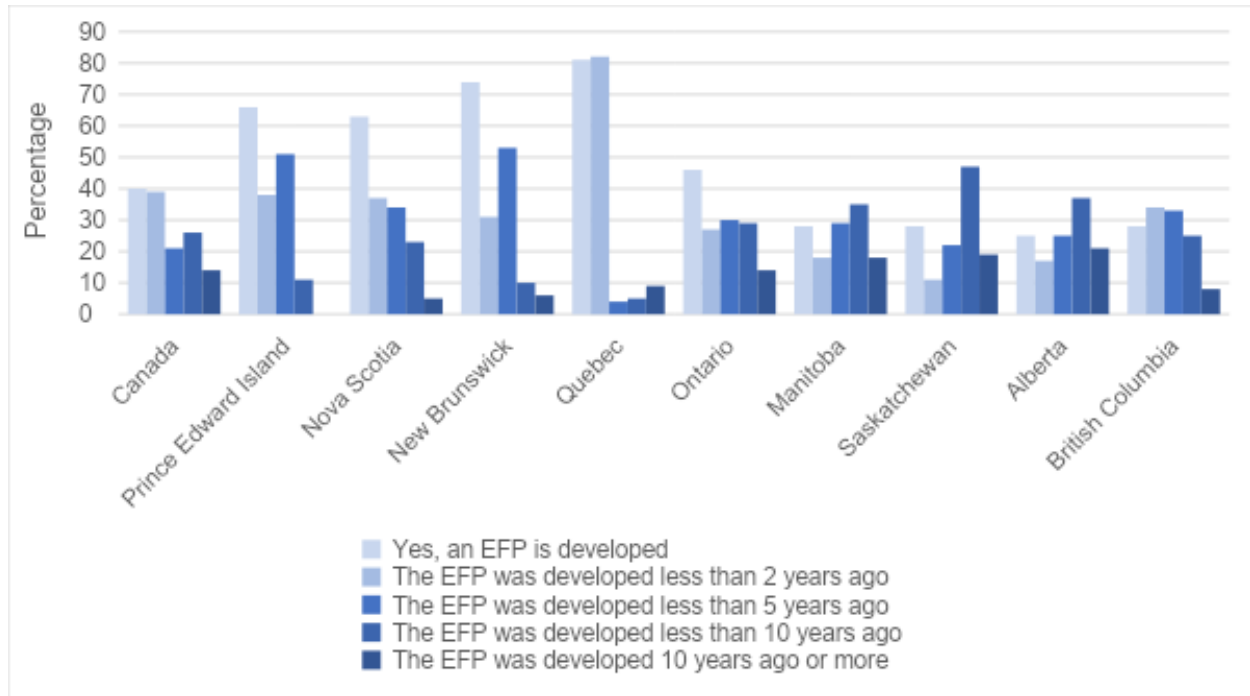


Again, as of 2017, Quebec has the highest percentage of EFPs developed in the past 2 years (82%), far ahead of any other province (Statistics Canada, 2019). The age of EFPs by province can be found in Figure 2 below. The Maritime provinces also have newer EFPs than the rest of Canada, with Ontario and the Prairies performing the worst in terms of EFP age.

Unfortunately, there has not been an overall evaluation of EFP programs between provinces (Laforge et al, 2021) which makes it difficult to determine the reasons for the large variations in adoption. However, some program differences may explain some variation. One caveat is that this data was collected in 2017 during GF2, meaning that it represents adoption levels before the CAP was put in place. This being said, a few general notes can be made. Firstly, Quebec may have such high levels of recently developed EFPs because farmers are encouraged to update the action plan portion of their EFP-equivalent (the Agri-Environmental Support Plan) yearly, while the assessment need only be updated every 7 years. This may account for part of the high adoption in Quebec. Conversely, Alberta only requires its farmers to update their EFP once every 10 years to remain valid, and under earlier programming EFPs had no expiration date. Farmers in the maritime provinces tend to work more one-on-one with an advisor (or have an on-farm visit), while western farmers are mainly offered programming online, which may cause less engagement with the program. In 2010, one survey of Ontario farmers indicated that on-farm assistance (64%), and more in-person one-one-one assistance (63%) would have helped them to complete their EFP and action plans (Smith et al, 2020). This provides some indication that farmers who receive some one-on-one assistance may be more likely to complete their EFP.

³ not enough / no data available for Newfoundland and Labrador (Statistics Canada, 2019)

Figure 2. Age of EFP by province, 2017⁴



2.5. Policy Recommendations for EFP Design and Delivery

2.5.1. Maximum Time to Expiry for EFPs

EFPs should be harmonized across Canada to require updating 5 years after creation; this ensures new problems that may have arisen on-farm since the previous update are addressed, and progress towards original action plans can be measured. In fact, a review of environmental farm planning in Canada in 2006, conducted by AAFC (2009), stated that it was important for EFPs to be updated every five years to remain an effective management tool for farm risks, and to ensure the EFP reflected changes in farm management and regulatory requirements.

Ideally, all farmers' EFPs would be renewed on the same schedule across Canada to allow for the best comparison of data; however, this is fairly impractical to implement due to administrative constraints and the voluntary nature of the program. Simultaneous renewal would require EFP providers to significantly scale-up staff around renewal time and then subsequently reduce their staff once the EFPs have been renewed. Maintaining a more static number of staff

⁴ not enough / no data available for Newfoundland and Labrador (Statistics Canada, 2019)

and advisory support is easier, and allows staff to become more familiar with local practices, problems, and other knowledge that takes time to learn.

2.5.2. Include On-Farm Visit Aspect for all EFPs

Some provinces have an on-farm visit as part of the EFP process. Having an on-farm visit as part of the program would likely help to standardize EFP completion within a province, as on-farm EFP visits would likely be done by a professional trained to look for key areas for intervention. Furthermore, this assistance may help farmers complete the EFP process if the visit was done near the end of the EFP workbook, so the provider can answer a farmer's questions and encourage the farmer to finish the work.

2.5.3. Increase Ongoing Advisory Support

Some provinces currently offer cost-share funding towards one-on-one farm business planning, and a few also offer cost-shared planning for EFP implementation or design (e.g., for help creating a NMP if this is an action suggested in their EFP). One study in Ontario of farmers implementing EFPs investigated what additional services may help farmers implement EFPs (Smith et al, 2020). They found that about 67% of farmers would like additional technical information, 64% wanted on-farm assistance to complete the action plan, and 61% wanted one-on-one in-person assistance (Smith et al, 2020). There is the potential to offer expanded, discounted advice in the forms listed above to help farmers implement their BMPs. Section 6.1 discusses the need and use for extension services in more detail.

2.5.4. Up-to-date EFP Required for BMP Funding Access

As previously mentioned, almost all provinces require an EFP to be completed to access BMP cost-share funding through the APF. This should be a requirement for all provinces. Some provinces, such as Quebec and Ontario, also require that the BMP being requested for cost-share be an action identified in the EFP. Implementing this Canada-wide would help to target funding to areas where it is most needed.

2.5.5. Inclusion of Climate Change Module

In the FCS task force examining BRM programming, one suggestion was to include a climate change module in the contents of EFP workbooks. Further information on this suggestion can be found [in this report](#).

2.6. Business Risk Management Programs

Business risk management (BRM) programs are a key area of expenditure under each APF. They involve a suite of programs that are funded jointly between federal and provincial governments; administration of the programs varies but all insurance products are run by each province. Due to the complex nature of these programs and the large funding outlay they represent, FCS convened a BRM task force to identify areas in the suite of programs that could lead to improved environmental outcomes. The results of that task force can be found on the

Farmers for Climate Solutions website. As this aspect of the CAP is already covered, no further policy suggestions will center around this suite of policies in this paper.

3. Overview of Relevant Programs

To gain insight into novel policy options available to AAFC and the provinces for the next APF, FCS' Task Force conducted research into past successful policies in Canada and more novel policies from other countries. The United Kingdom's New Agriculture Bill, set-aside programs, and a selection of USDA programs are described in detail in this section. Some aspects of these programs are drawn into the discussion throughout sections 4, 5 and 6, and so this section provides the necessary exposition to contextualize the recommendations.

3.1. United Kingdom New Agriculture Bill

After leaving the EU, the UK had the opportunity to decide how to spend its agricultural funds, and if they wanted to transition away from the EU method of agricultural funding allocations. A new Agriculture Bill was passed in November of 2020, which outlined how the UK would transition payments based mainly of size of land farmed in the EU CAP to funding based on the provision of public goods under its Environmental Land Management (ELM) Scheme (Government of the UK, 2020).

The new bill lays out a 7-year transition period where slowly, agriculture support payments will transition from payments based on land area to environmental benefits. The aim of the program is to maintain the same levels of funding but providing more benefits with these funds (UK Parliament, 2020). A 7-year transition was chosen to aid in the change management by providing farmers with a long-term funding period, so they are able to plan and adapt to funding changes (UK Parliament, 2020). Pilot programs are beginning in 2021 and will run for multiple years, to work with farmers to determine the best program options for funding after the 7-year transition period; the first pilot has over 900 farmers participating (Defra, 2021; Government of the UK, 2021).

While subject to future changes, currently the ELM is structured as a three-tier program. Tier 1 would encourage agri-environmental practices that the majority of farmers could implement. Tier 2 would focus on the delivery of locally targeted environmental outcomes, and Tier 3 would look at delivering land use changes at a landscape scale (UK Parliament, 2020). At the moment, a pilot is being run for Tier 1 programming.

In the Tier 1 pilot, farmers are able to select from a menu of eight Sustainable Farming Incentive 'standards' to apply to their eligible land types, which includes agricultural lands but also farm woodland, hedgerows, and water bodies. Each of the eight standards has three ambition levels – introductory, intermediate, and advanced. A higher level of ambition means there is more work for the farmer to comply with the standard, but also provides higher payments per acre that it is implemented on.

The standard for arable and horticultural land pays farmers £28/hectare at the introductory level, but pays £74/hectare if farmers comply with the advanced level, almost 3 times the payment per hectare. One design of this program is that it also rewards farmers who are already undertaking

action, as they will receive payments if they are already meeting the standard for each payment level. Another benefit to farmers is that some actions in the standards only apply to a percentage of their land (e.g. providing pollinator resources on 5% of their land) but will still be paid for all eligible acres enrolled in the program (Defra, 2022). This means that farmers may not be required to reduce cropped acres, as non-agricultural areas on cultivated land, such as water features.

To receive funding at the advanced level for the arable and horticultural land standard, farmers must complete all introductory and intermediate actions, as well as additional actions, or extend actions onto a larger portion of their land. For example, introductory-level farmers must provide resources for birds and pollinators on 5% of their eligible land; this rises to 10% for farmers at the advanced level. This may provide an incentive to farmers who are already implementing some of these practices on their farm to increase their efforts to receive the increased funding.

3.2. Set Aside Programs

3.2.1. United States – Conservation Reserve Program

The United States has run its Conservation Reserve Program (CRP) since 1985. In its original conception, it was designed to reduce soil erosion, but in later Farm Bills has been updated to include wildlife habitat, water and air quality, and other conservation goals (Hellerstein, 2017). It is a program that pays farmers to idle their cropland on mid-length contracts, between 10 to 15 years in length (USDA, n.d.-a). Farmers sign up voluntarily if they have land eligible for the program, and are paid a set amount for the land they enroll. These payments are a rental rate that is based on the average rental rate of similar fields in their county (American Farm Bureau Federation, 2021).

The CRP was introduced in 1985; by 1991 over 12.9 million hectares of cropland were enrolled in the program (Hellerstein, 2017). Enrolment in the program reached its peak in 2007 with 14.9 million hectares enrolled. In 2000, many of the original contracts from the program expired, however the program saw re-enrolment in addition to new enrolments. Over time, the program expanded to include not just highly erodible lands, but also Conservation Priority Areas and an expansion of qualification criteria. In more recent years, the program has been shrinking, in part due to a cap on maximum acres of enrollment, and in part possibly because bid caps on payments per acre have not kept pace with rising commodity prices that would provide a higher value per acre. The 2018 Farm Bill and further updates have moved to address these issues, mainly by offering farmers higher rental rates closer to market value, and higher cost-share percentages for adoption of BMPs on CRP land (USDA, 2021). They have also expanded the program to add a focus on lands that will be able to increase carbon sequestration.

Between 1985 – 2020, the CRP program prevented over 9 billion tons of soil erosion, sequestered an average of 49 million tons of greenhouse gasses annually, and restored more than 3 million acres of wetlands. Lands under the CRP program have also been found to have a reduction of nitrogen runoff of 95% compared to annually tilled land, and an 85% reduction in

phosphorus runoff compared to annually tilled land (USDA, 2020a). A recent study found that of land that was not re-enrolled in the program, 79% was returned to crop production, indicating that the program is providing additionality in land retirements (USDA, 2020b).

In Canada, Ontario under the CAP offers a cropland retirement BMP for farmers (OSCIA, 2021a). The BMP focuses on the retirement of fragile land; however, the program only covers 50% of the cost of seeding the land into long-term vegetative cover only if the farmer can show a long-term commitment of 15 years or more to retire the land. The Ontario program also does not pay the farmer for any other losses, including opportunity costs.

This is far less than offered to US farmers. It should be noted that this is a very expensive program, with 2020 rental payments totalling \$1.795 billion USD across 21.9 million acres (American Farm Bureau Federation, 2020). To manage these costs, in some iterations of the CRP program the USDA has partnered with other funding organizations to jointly fund projects (USDA, n.d.-b). To keep program costs down in Canada, very specific ecological services or threatened landscapes could be targeted (for example, wetlands or watersheds). The program could also be designed to target small, less productive marginal lands instead of large tracts of land, which might be better covered for retirement in other programs, such as reverse auctions.

3.2.2. Canada - Greencover Program

A Canadian version of the CRP has existed under a previous APF – the Greencover Canada program, which ran from 2004 – 2009 (AAFC, 2003). This program included a component called “Land Conversion”, where farmers were able to receive payment to convert and maintain their land to perennial forage. Once the forage was deemed established, farmers had to keep that land in cover for 10 years. Farmers were paid \$20 an acre for seeding establishment, and \$25 per acre once the forage was determined to be established. Eligible lands were targeted by soil type, crop productivity or degradation risk, and a minimum of 40 acres per quarter section were required to be eligible. In the program year 2006-07, a total of 624,704 acres had been enrolled in the Land Conversion portion of the program, and was estimated to cover about 95% of the estimated target for the program (Treasury Board Secretariat, n.d.).

3.2.3. Canada – Grassland Set-Aside Program

There is also a current grassland set-aside program being run in British Columbia by the Delta Farmland and Wildlife Trust called the Grassland Set-aside Stewardship Program. The not-for-profit operates the Grassland Set-aside Stewardship Program in the lower Fraser River delta in British Columbia (DF&WT, n.d.). This program offers farmers \$400 per acre of grassland set-aside for every year an acre is enrolled (DFWT, n.d.). Farmers can enroll their land for one to four years and must seed their acreage into grasses while enrolled in the program. One of the main goals of this program is soil regeneration or supporting farmers who wish to transition to organic agricultural practices, as well as providing habitat for wildlife. As of the time of writing, the program has about 540 acres enrolled annually, and set-asides have been established on just over 14,000 acres (DFWT, n.d.).

3.3. United States – Environmental Quality Incentives Program

The USDA Environmental Quality Incentives Program (EQIP) is a voluntary program that helps farmers and foresters address environmental concerns and deliver environmental benefits on their land. The EQIP program provides farmers with co-funding (between the farmer and the government) and one-on-one support to implement conservation practices on their land (NRCS, n.d.-a). Since 2020, individual states are also able to select up to 10 high-priority practices for their area to receive additional funds to encourage adoption.

A portion of the program also targets conservation practices at the landscape scale (NRCS, n.d.-b). Landscape-based approaches have focused on watersheds, species at risk conservation, and pollinator efforts. The landscape scale program has been successful – for example, the National Water Quality Initiative, in place since 2012, has worked with over 4,000 farmers across 1 million acres, and resulted in at least 11 impaired water bodies covered in the program have since been scheduled for delisting (NRCS, n.d.-c). EQIP also highlights a series of practices that are critical to climate-change mitigation. These practices include cover cropping, reduced tillage, and conservation crop rotations (NRCS, 2022a).

3.4. United States – Conservation Stewardship Program

The United States also has a program that promotes farmers taking conservation stewardship measures on working lands called the Conservation Stewardship Program (CSP) (NRCS, n.d.-d). Farmers who are already undertaking some conservation stewardship actions (similar to BMPs) on their land can enroll in the CSP to receive funds for improving their conservation actions. A conservation planner meets with an interested farmer one-on-one to determine what ways the farmer can continue to improve their conservation activities (NRCS, n.d.-d). The CSP offers farmers who meet program requirements five-year contracts that can be renewed if the initial contract is fulfilled. These contracts pay farmers for two components: 1. payments to maintain the existing level of conservation on their land at the time of enrollment, and 2. payments to implement new conservation measures, called ‘enhancements’.

The CSP maintains a list of over 200 eligible enhancements CSP farmers can undertake, related to soil, water, animal, plant, and air improvements. Perhaps more interestingly, CSP applicants can also look to undertake enhancement ‘bundles’ – enhancements that work together to provide increased conservation benefits when implemented as a group (NRCS, 2022b). Generally these bundles have a few required measures, as well as a list of additional components from which farmers can choose one to adopt to complete their bundle. Bundles focus either on geographical areas (e.g. Mississippi River Basin Initiative bundles) or industry type (e.g. grazing bundles, crop bundles).

Once awarded a CSP contract, a farmer will be paid for the financial costs of maintaining the level of stewardship they are undertaking at the start of their contract; a farmer will not receive

less than \$1,500 a year. A farmer will also be paid for additional enhancements they agree to undertake and this rate varies by year, state, and type of enhancement (NRCS, n.d.-e).

This program could encourage long-term BMP adoption in Canada. This type of program would reward early adopters who are already undertaking BMPs, as well as provide an incentive for new farmers to begin adopting BMPs, knowing future support is available. This program would also ensure a continuity of practice and encourages early adopters to improve on their conservation efforts. The 'bundle' options also promote a systems-based approach to BMP adoption and enhances the environmental benefits compared to adopting BMPs one at a time. Bundling BMPs based on location would also allow provinces some ability to target issues specific to their region and increase program efficiency. The bundling by watershed could also support the development of a collective adoption bonus structure, which is explored in more detail in section 6.

4. Federal Policy Suggestions for the Next APF

The upcoming APF (2023-2028) will be the final full policy framework to be instituted before a suite of environmental targets need to be met in 2030. There are also only seven more growing seasons (2023 – 2029) before the 2030 growing season. Farmers will need time to implement changes to their production practices, meaning governments need to provide the best supports available to help them adapt to climate change while making progress towards 2030 targets.

In recent years, Canada has committed to numerous targets that impact the agriculture and agri-food sector. In 2021, Canada confirmed its support for the Global Methane Pledge, which calls on countries to reduce methane emissions by 30% below 2020 levels by 2030 (Government of Canada, 2021b). Specific to agriculture, Canada has released a fertilizer emissions reduction target to reduce emissions from nitrogen fertilizers by 30% below 2020 levels by 2030 (Government of Canada, 2020b). Finally, across Canada as a whole, the federal government is looking to reduce emissions by 40% below 2005 levels by 2030 (Government of Canada, 2022a).

Taking all these factors into account, this APF should be considered vital to setting the sector up for success in meeting its environmental targets, while still allowing the sector to grow. The following section will recommend some overarching concepts that the federal government should consider including in the next APF. Programs for specific-BMP adoption that will require more cooperation with the provinces and territories are explored in section 5.

4.1. Environmental Outcomes a Key Indicator of Program Success

Past APFs have set key areas of intervention to guide the creation of programming and the spending of funds. These strategic outcomes are also used to evaluate the outcomes of APF programming (AAFC, 2017a). As these key priorities, or strategic areas of intervention, are used by the federal government to set spending priorities and to evaluate outcomes, **FCS recommends that one of these areas in the next APF focus solely on sustainable farming practices, as well as climate change adaptation and mitigation.** It is clear that this is an area of interest for the provinces and territories as well, as the Guelph Statement named climate change and environmental protection as a main priority (AAFC, 2021b).

This key area should also be supported by a specific funding target. For instance, the EU has consistently set spending targets for the environment based on the amount of agricultural support available. This target is generally consistent across member states and has recently increased from 30% to 40% in their new 2023 to 2027 Common Agricultural Policy (European Commission, 2022).

A similar target would work well in Canada. Setting a spending target would ensure that sufficient funds are being allocated towards the required programming and BMP adoption, while still allowing for the autonomy the provinces desire to create programming in their provincial

context. AAFC's Departmental Sustainable Development Strategy reports that of the \$2 billion in FPT cost-shared funding, about \$436 million is available to support environment and climate change (AAFC, 2022a). This represents about 22% of the total funding envelope. If Canada were to adopt the EU's spending target, in the context of CAP's \$2 billion, Canada would have to dedicate an additional \$364 million to environmental priorities.⁵

This concept is not unheard of in previous policy frameworks. All three previous APFs (GF, GF2, CAP) have had 'key priorities' or 'strategic outcomes'; GF had a priority of "A Sector That Contributes to Society's Priorities" which included "Promote Environmentally Responsible Agriculture". Under the GF agreement, proportionate spending priorities were set for key strategic priorities. At least 25% of each province's proportionate spending (territories were exempt from these targets) had to be dedicated to creating a "competitive and innovative sector" and a further 25% minimum in spending had to be dedicated to managing risks and society's priorities together. Similarly, in the CAP, 50% of annual spending had to be dedicated to three of the six priority intervention areas: markets and commerce, science, research and innovation, and environmental sustainability and climate change.

4.2. Improved Data Collection

One of the most critical changes that should be made in this APF is the creation of a framework for collecting program outcome data. A standardized framework that all provinces can use to report outcomes of cost-share programming would aid in program evaluation, both by the government itself, as well as third-party organizations if some data is able to be shared. For example, an interim evaluation of the performance of GF2 by the federal government found that data limitations made it difficult to evaluate the impact of the program; one of their recommendations was to include in each bilateral agreement a requirement "for standardized data against common indicators that will enable AAFC to assess the effectiveness of the Cost-shared Program" (AAFC, 2017a). As the cost-share agreement funding is 60% funded by AAFC, they have leverage to insist this standard data collection occur.

The data is even less clear when looking to evaluate agri-environmental outcomes in particular. Statistics Canada only collects some self-assessment of indicators every five years during Censuses of Agriculture. EFPs are delivered by each province, and by separate organizations; data is considered confidential and thus is rarely used for evaluations (MacRae, n.d.). AAFC does collect environmental management data via survey, but again these are infrequent and not directly related to evaluation of APF programming (Statistics Canada, 2011).

Improved data collection as a part of the next APF is critical for multiple reasons. Firstly, it is important for the delivery agencies at both the provincial and federal levels to determine if their program interventions are providing the desired outcomes, as well as which programs are cost-effective. Perhaps more importantly, data on adoption levels of different BMPs via farmers accessing cost-share funding, would be extremely important to gauge the sector's progress

⁵ Author calculation based on: \$2 billion x 40% = \$800 million - \$436 million = \$364 million.

towards meeting Canada's 2030 targets. Furthermore, data on maintenance of BMPs would be extremely useful to look at potential dis-adoption rates, as well as how effectively farmers are able to adopt and maintain BMPs (as often emissions reduction levels and other environmental benefits are contingent not only on correct implementation of a BMP).

Smart Prosperity Institute's past convening in Ottawa reinforced the need for better data collection and program evaluations, as data gaps relating to environmental and program performance were identified as major problems in Canada's agriculture sector (McFatrige et al, 2021). In particular, the concerns regarded the fact that data is provided only in a highly aggregated form that makes it difficult to assess regional trends or progress. There is also very little data on input use or farm management trends, with this type of data either not being publicly reported from the Farm Management Survey or not being collected at all. Canada's series of Agri-Environmental Indicator Reports is incredibly useful for assessing some of these trends; however, the reports have quite significantly lag times, with the most recent report addressing trends up to 2011 (Clearwater et al., 2016).

In addition, agri-environmental programming plays an important role in promoting BMP adoption, but there are very few rigorous evaluations of the current suite of programs (SPI, 2021). There is also very little reporting on how program dollars are spent year-over-year. AAFC should consider aligning their reporting with the USDA's, which publishes annual statistics on program enrollment in several of the major conservation programs administered through the Farm Bill (i.e., see USDA, 2022). Rigorous program evaluations would provide a better understanding of what is working, what aspects of program design need to be refined, and how to increase the program's cost-effectiveness and environmental impact. There are also opportunities to assess new policies in a more refined manner by considering how quasi-experimental designs or creating a counterfactual scenario to determine what the impact would have been in the absence of the program.

Next, BMP adoption data linked to a farmer's EFP would be an excellent tool for evaluating which BMPs farmers prioritize adopting, and which BMPs farmers may need additional incentives to adopt. While this data would likely need to be protected for privacy, it would still allow delivery agencies or government agencies to conduct these analyses and adjust their programming accordingly.

Finally, improved data collection will be required to improve the accuracy of Canada's National Inventory Report (NIR). An important piece of understanding how the adoption of BMPs is progressing will be to have a baseline of adoption levels of each practice and how emissions levels will change. This will be critical to ensuring that the agricultural sector is meeting its share of reduction targets, and relatedly, critical to ensuring that farmers are recognized for the changes and adaptations they have made to their farming practices. Without correct data collection, farmers' efforts will not be correctly credited.

There are two critical data gaps that should be addressed for NIR reports: (1) the data on the number of farmers currently implementing specific BMPs and (2) the change in emissions that will result from a farmer moving from one practice to an improved practice (emissions coefficients). Many of the BMPs in this paper are not currently represented in the NIR; this type of data collection on the prevalence of various practices, and emissions coefficients, should begin as soon as possible. Farmers are acting now, but because action will need to ramp up, initial reduction tonnages may be modest. It is critical, however, that even these small initial reductions are quantified and reported so that early progress can be documented, lauded, and duplicated.

4.3. Expanding on AgriDiversity

4.3.1. Overview

AgriDiversity is a \$5-million program under the CAP that is federally funded, and set to run the length of the CAP. The AgriDiversity program’s intention is to strengthen the agriculture sector by funding equity-deserving groups in Canadian agriculture, which AAFC defined for the purposes of this program as youth, women, Indigenous peoples, and persons with disabilities (AAFC, 2018a). The program provides non-repayable contributions to projects that support equity-deserving groups to participate more in the industry. Eligible parties could receive up to \$200,000 a year at up to 50% cost-share, for a maximum of \$1 million of funding over the 5 years of the CAP⁶. This seems to indicate that if 10 participants were able to secure the maximum funding each year of the program, these 10 participants could have, in theory, claimed all the available funding for the entire program. Table 4 provides an overview of how the funds have been spent so far.

Table 4. Spending on AgriDiversity by year under the CAP by fiscal year (reported so far)⁷

Year	Spending	Number of recipients
2018-2019	\$429,777	2 over \$100,000; 4 under \$100,000
2019-2020	\$621,070	3 over \$100,000; 4 under \$100,000
2020-2021	\$661,841	2 over \$100,000; 5 under \$100,000

⁶ E.g. An organization is eligible for the maximum \$200,000 a year at 50% cost-share; if done for five years this gives a maximum of \$2 million spent, and \$1 million in total cost-share dollars at the 50% cost-share rate.

⁷ Government of Canada, 2021a; Government of Canada, 2020a; Government of Canada, 2019a

Total to date

\$1,712,688

7 over \$100,000; 13 under \$100,000

The premise of this program is strong and should be continued under the next APF. However, what is notable from Table 4 is that so far, under half of all program funds have been disbursed. This could represent a lack of interest, but it may also indicate that eligibility and program objectives may need to be modified to increase the use of these funds.

4.3.2. Expand the Definition of Under-Represented Groups in Agriculture

Currently, AgriDiversity provides support to youth, women, Indigenous Peoples, and persons with disabilities (AAFC, 2020a). While this does support many equity-deserving groups, FCS recommends that the definition be expanded to also include small-scale farmers, Black farmers and other farmers of colour, and 2SLGBTQ+ communities.

4.3.3. Modify National Scope Requirement

Currently, AgriDiversity requires that associations that apply be able to deliver projects that are national in scope, or that are agriculture and agri-food sector wide in scope. This is a limiting requirement, as Canada's agriculture and agri-food sector is extremely diverse both in the products produced, as well as geographically. Currently, regional associations can apply to the program, but only if there is no representation at the national level, and again, that the project be national in scope (AAFC, 2020a).

Other federally funded CAP programs, such as AgriCommunication, have a similar requirement that projects must be national in scope (AAFC, 2021c). However, equity issues are likely to be experienced differently based on the group represented, their location, and their main agricultural commodities being produced. This may be a further barrier to these equity-deserving groups to be able to access resources for the communities they serve. AAFC could change the program in two ways to remove this burden. The first is to modify the program to allow for groups that operate on a provincial or regional level. However, if this is not possible due to the program being federal-only funding, a second option is for AAFC to create a stream of funding for the same program for provincial or regional associations. This second stream could be administered either by AAFC, or by the provinces.

Equity-deserving farmers tend to be smaller in scale and sometimes produce specialty crops or livestock that may not be eligible for support from other national programs (i.e., AgriInsurance) (FCS, 2021). By modifying the national scope requirement, AgriDiversity would be able to address some of the regional specialty production systems and cater to small-scale farmers. Discussions with members of the Farmers for Climate Solutions Task Force revealed that some provinces may not even have a provincial hub or organization offering equity-deserving farmers networking or support services. For example, it was raised that some farmers have opted to join extra-provincial organizations because they could not identify a similar group in their home province. Before focusing on the creation of national-level initiatives, AgriDiversity should focus

on establishing organizations and networks in each province that could be connected together in the future.

4.3.4. Include Group Establishment or Expansion in Eligible Activities

Currently, eligible activities for funding under the AgriDiversity program are the following:

- Building entrepreneurial capacity and business skills, mainly through knowledge sharing
- Developing skills to enable increased leadership and entrepreneurship in the sector
- Strengthening individual's abilities to be leaders in the sector, through networking, training, and mentorship
- Enhance involvement in the agriculture sector, including the awareness of career opportunities, mainly through raising awareness and information dissemination

While these are important goals, the program can be expanded to improve supports to equity-deserving groups. Firstly, many groups likely need support to be able to expand the basic services they are already providing to their communities. Discussions with members of Farmers for Climate Solutions Task Force revealed that some of the existing equity-serving organizations are experiencing severe financial constraints – namely severe limitations on the ability to purchase new equipment and an inability to pay staff members an appropriate salary. Allowing for funding to help these organisations to expand their operation will allow them to offer consistent support to their communities. Appropriate core funding for equity-deserving organizations will likely help to achieve many of the other program targets listed above.

Next, FCS also recommends that funding be provided to groups to allow for activities that include allowing these groups to facilitate BMP adoption, aid in applications for additional equity funding/cost-share payment advances mentioned in section 4.3.1, and work with their communities to provide feedback to AAFC. Feedback should be solicited on which programs are and are not working for their communities, as well as what needs are not being met. This would allow for collaboration between equity-deserving groups and government agencies, and a necessary final step would be taking this feedback and incorporating it into future program design.

The Agricultural Climate Solutions: Living Labs program could be a great framework for addressing these issues. For instance, the program would focus on establishing a hub for equity-deserving farmer groups in each province that directly liaises with equity-deserving farmers to co-develop climate solutions for their production system and provide feedback on the best approaches to engaging their communities. Having a recognized equity-serving organization leading the lab and using equity-deserving farmers as participants and mentors could also help increase buy-in from these underserved communities.

4.3.5. Increase Total Funding

While currently it seems that this version of the program may not spend all of its potential \$5 million, this may in part be because of the restrictions on which types of equity-deserving groups

and organisations are able to apply. Due to the expanded nature of the program eligibility and potential for expanded responsibility placed on these organisations as suggested in this document, the next APF should similarly increase funding for this program. **FCS recommends that the next AgriDiversity program funding be increased significantly to support equity-deserving groups.** This will be critical to expanding the program to include all equity-deserving farmers and increasing the supports provided.

As was mentioned by Farmers for Climate Solutions Task Force members, some existing equity-serving organizations are really struggling to raise enough capital to fund their operations. With a cost-share of 50%, an equity-serving organization would need to raise \$100,000 to access the full funding available through AgriDiversity annually. AgriDiversity does allow for 25% of the funds to be contributed from in-kind sources and salaries or benefits are included under eligible expenses, meaning that some of the \$100,000 would not need to be raised in cash contributions. To reduce financial barriers for equity-serving organizations and promote participation in AgriDiversity, AAFC may want to pilot either a higher cost-sharing ratio or increasing the 25% cap on in-kind.

4.4. Grassland Conservation Set-asides

4.4.1. Program Overview

Many of the BMPs recommended by this task force related to livestock include BMPs that not only offer climate solutions, but also increase the productivity of pasture. Increasing the productivity of pasture means farmers are able to increase the overall head of livestock grazing the landscape or convert land no longer needed for grazing into other agricultural purposes. These land use changes counteract the potential emissions reductions being targeted by the task force.

For this reason, FCS also believes that a national grassland set-aside program needs to be created under the next APF to work in concert with other BMPs. While this program may not have direct climate impacts, it is vital to ensuring pasture productivity increases do not subsequently result in an increase in acres under crop production or an increase in the cattle herd. This program could also expand to include marginal cropland nationally in future.

In its essence, this program would allow farmers to voluntarily set aside grassland acres on their land. In return for the opportunity costs, and potential minor maintenance requirements, farmers would receive a set annual payment, which would be determined in their contract. The contract would also outline what activities are and are not allowed on the land while it is managed as a set-aside. To access this program and the associated funding, farmers will have to be current or new adopters of one of the livestock practices that increase on-farm production efficiency (i.e., rotational grazing).

This program would be different from programs that place permanent conservation easements on marginal agricultural land, and instead would be targeting medium-term set-asides, about 10

to 30 years in length. Shorter-term contracts may be more attractive to farmers who may not be ready to commit their land to conservation practices indefinitely. In fact, just this May, a term easement program for Saskatchewan farmers was announced, citing feedback from farmers that they had little to no interest in permanent easements (Canadian Cattlemen, 2022, SSGA, n.d.). While this new program and similar programs are providing some of this function already, a national strategy would ensure targeting, coordination between provinces, and a single place where farmers can apply for funding (e.g. Birds Canada, 2020).

For grassland set-asides specifically, these grasslands could be used as a strategic reserve of hay. If severe weather events impact local farmers (e.g. drought, flooding), those lands under contract could be hayed, and the hay distributed across local farms. This provides some additional risk mitigation for these farming communities, while also helping to maintain the grasslands with minimal disturbance.

This conservation program should target grasslands most at risk for conversion to annual cropping. Targeting could include consideration of soil classes on the farm, as well as whether the portion of land is significantly more prone to flooding or drought. For example, a program for grassland conservation could target soils in classes 1 and 2 from the Land Capability for Agriculture system, as they are lands that have the best potential use for cropping if converted from pasture (AAFC, 2013d). Crop and forage insurance records could also be used for this purpose. However, significant consideration should be given to how targeted lands are defined; it is likely best that there be a stream to target marginal cropland and another that targets hayland or grasslands that are at highest risk for conversion to cropland. Working in concert with each province to define conservation areas would allow the program to address more local concerns.

4.4.2. Payments

There are various methods to determine payment amounts for individual farmers. Options used by other organizations that work well are reverse auctions, where farmers place a 'bid' on the amount of money they need to viably set aside land – further details on reverse auctions can be found in a previous FCS paper here. Another option used by conservation organizations is offering farmers a per-acre payment based on the cash rents for agricultural land locally (ALUS, n.d.; USDA, n.d.-a).

4.4.3. Equity Concerns

There is the potential for any type of easement or term set-aside program to impact smaller, newer, and equity-deserving farmers. The main potential impact is removing farmland from the rental market. This could either raise overall farmland rental prices, and/or could also make it more difficult for those looking to expand or enter farming due to less access to rental land overall. There is no easy solution to these potential problems but they should be held in consideration during all aspects of program design. One option, as mentioned in the program description, is targeting this program to farmers who have already adopted

productivity-increasing BMPs, such as rotational grazing. Data collection surrounding the program could also aid in determining impacts on these equity-deserving groups.

5. Specific Policy Suggestions to Encourage BMP Adoption

This section will examine policy options to increase the adoption of specific BMPs that have been identified as having significant GHG reduction or mitigation potential and may also provide other agri-environmental benefits.

5.1 Overview

Many of these BMPs will likely be addressed through the FPT cost-share programs. This means that the provinces will maintain some control of which policies and BMPs they wish to support in their jurisdiction, and the federal government is likely less able to be prescriptive here. Recall that the programming under the CAP varies greatly between provinces, but this variation in programming highlights the ability of the APF to address production system heterogeneity and different environmental priorities across provincial boundaries. Funding caps for specific BMPs also vary by province, as do overall funding caps for farmers. This section will make suggestions for funding levels based on the findings in the [FCS Emissions Report](#) and the [FCS Economics Report](#), but understands that provinces may choose to set their own funding targets and additional incentives as they see fit.

5.1.1 Framework for Policy Considerations

Pannell (2008) created the Public-Private Benefits Framework, which is used to determine the most appropriate policy option to promote environmentally beneficial land use changes on private agricultural land. The framework evaluates the level of public or social benefit and level of private benefit associated with changing practices to determine the most appropriate course of action for agri-environmental policymakers. In this report, all of the BMPs are considered to have significant public or social benefits, stemming from their ability to reduce emissions and provide other environmental co-benefits. To assess the private benefits of practice change for each BMP, this report used the net benefits estimates calculated in the economics report. In most cases the 'Middle' or average estimate was used to assess the scale of the private benefits.

In line with Pannell's (2008) framework, when a practice is expected to produce private benefits to the farmer and environmental benefits simultaneously, positive incentives are not recommended. This is because farmers would be expected to adopt practices that have positive net returns on their own, without additional incentives. Based on this, when a BMP in the economics report was estimated to have positive net returns, financial incentives were not the primary consideration. Extension practices and risk-reduction approaches were considered the best options for these BMPs, as the primary goal should be to address knowledge gaps or perceived production risks.

However, average net returns are not the only consideration farmers need to take into account when adopting a new practice. Kuehne et al.'s (2017) Adoption Diffusion and Outcome Prediction Tool (ADOPT) suggests that both upfront costs and time costs, termed ease and

convenience in their model, also have a significant impact on the adoptability of a practice. For this reason, financial incentives were considered for some practices with positive average net returns to the farmer when upfront costs (i.e., infrastructure or agronomic services) or time costs (i.e., significant new farm management responsibilities) were expected to have an impact on adoption.

Kuehne et al.'s (2017) ADOPT model also considers the long-term economic impact of practice adoption. The model discounts future benefits to farm profitability, but nonetheless suggests that a future economic benefit is a factor contributing to the adoptability of the practice. In this report, many of the practices primarily benefit the farmer within each production cycle (i.e., via reducing fertilizer input costs), rather than accumulating in size across various production cycles. Although for practices like cover cropping, the future economic benefits from building soil health, erosion control, and adaptability are estimated to be significant. When it is possible to estimate the amount of time between adoption and the expected future private benefit, it can help policymakers decide how many years a subsidy or cost-share should be offered before the financial support can be tapered off - in exchange for the growth in private benefits.

In contrast, Pannell's (2008) framework identifies practices that have negative private benefits to the farmer as prime candidates for positive incentives. In this report, practices like manure storage covers and wetland restoration were estimated to have negative net returns to the farmer, because these practices do not positively influence farm productivity in any meaningful way. Rather, they represent a capital expenditure that produces significant social benefits in the form of emissions reductions and environmental co-benefits. These BMPs are best addressed with cost-share programs, payment for ecosystem services approach, conservation auctions, or subsidies.

Aside from financial incentives, extension is another vital part of agri-environmental policy in Canada's agriculture sector. FCS recommends that AAFC and the provincial governments focus on increasing the availability of in-person advisory services and recommends recruiting farmers as extension agents or demonstration trial participants where possible. Pannell's (2008) framework suggests that extension should be reserved for practices that have both a benefit to the farmer and a benefit to the environment. This is because practices that are not beneficial for the farmer to adopt will likely not be influenced by the provision of extension services. For instance, even if farmers are provided extension services on how to use a manure cover or restore a wetland, these practices have very little benefit to the farm's bottom line and so it is unlikely they would choose to undertake them without a financial incentive (Pannell, 2008).

Needing an advisor or knowledge support to use the practice is also considered in Kuehne et al.'s (2017) ADOPT model. These authors suggest that the ability of farmers to learn about the practice and how to use it has an impact on whether or not they will choose to adopt it. Existing knowledge or skills and the use of advisory services are both expected to impact the learning process and subsequently impact BMP adoption. For this reason, we consider whether each

BMP in this report would likely require additional support from an off-farm advisor to use correctly. If advisory support was needed, this was also captured in the upfront costs section, as soil tests and crop advisors were expected to represent additional costs associated with BMP adoption.

The final consideration for each of the BMPs was to assess how Canada and other jurisdictions were currently supporting the adoption of each practice. This was done to establish precedent and to explore whether existing support programs could simply be expanded or if new policy approaches might need to be established. The scan of programs initially focussed on the Canadian context, but was expanded to include examples from other jurisdictions where relevant. Many BMPs were already part of existing support programs, and so in some cases modifications to the existing structure were suggested to better support BMP adoption. The analysis also considered where BMP adoption could be supported through the suite of Business Risk Management programs.

5.2 Financial Incentives

5.2.1. General Financial Incentives

In the 2011 Farm Environmental Management Survey, conducted by Statistics Canada, it was found that the primary barrier to not adopting a BMP was economic pressures (53%) (Statistics Canada, 2013). Other studies, looking at farmer implementation of practices listed in their EFPs, have also found that cost was a main concern. In Nova Scotia, 53% of survey respondents indicated cost was important to extremely important in their decision to adopt a BMP (Atari et al, 2009); in British Columbia, the largest barrier to adoption was found to be cost, but it was less for BMPs that provided private benefits (Kitchen, 2012); and an overview of the EFP program by AAFC (2009) found that more expensive BMPs resulted in longer lags between EFP completion and adoption, likely because farmers were spreading the cost over several years; in Ontario, found that very few farmers reached near-complete EFPs without significant expenditures. This final study also indicated that due to the current reimbursement structure, access to capital or credit may prevent some farmers from implementing BMPs (Smith et al, 2020).

While there are less expensive policy interventions, such as extension programs or behavioural nudges available to governments, it is clear the cost of implementing some BMPs will remain a significant barrier that needs to be addressed. This is particularly true for BMPs that either have little or no private benefit to the farmer and are costly, or result in lost opportunity costs (e.g., wetland restoration, exclusion fencing for livestock). Large financial programs would be inappropriate when the BMP does not need a significant financial outlay or would likely either not impact a farmer's finances or will provide economic benefits.

5.2.2. Payment for Eco-system Service Approaches (Reverse Auction)

A payment for eco-system service approach is one alternative to cost-share programs that reward farmers according to the environmental benefits they provide on their privately owned land. One payment for ecosystem services approach is the reverse auction, also sometimes

known as a conservation auction. Reverse auctions are markets featuring one centralized buyer of environmental services, with numerous private landowners acting as sellers. Landowners submit competitive bids to implement BMPs, and bids are assessed and chosen based on the best value for money (i.e., environmental improvement per dollar spent) – usually by using an environmental benefits index, like the one used in the Conservation Reserve Program.

These auctions are a useful tool for incentivizing the adoption of conservation practices that have little or no private benefits. The effectiveness of the reverse auction lies in its ability to assess projects according to an environmental benefits index and for allowing farmers to specify the compensation they would need to undertake the conservation practice. The reverse auction structure essentially takes the guess work out of setting a subsidy level but is able to manage costs to the government by setting a price ceiling on the contracts – typically the cap is based on prorated land rental rates in other jurisdictions. The Government of Canada in Budget 2021 committed \$60 million to a reverse auction pilot program to help conserve treed and wetland areas on farms. This pilot should be expanded in the next iteration of the APF to support farmers in protecting Canada’s natural resources.

Properly designed reverse auctions can increase the cost-effectiveness of BMP adoption and improve the allocation of government funding. A growing literature suggests that conservation auctions usually outperform fixed-payment schemes, such as non-targeted cost-shares, with cost savings ranging from 16% to 315%, depending upon the context and design of the program (Latacz-Lohmann & Schilizzi, 2005). While this tool can be used to address heterogeneity amongst private landowners and increase the impact of distributed funding, there are concerns about the transaction costs associated with participating in this type of program.

5.2.3 Equity Considerations

Cost-share Programs

From previous explanations in section 5.1.1, farmers looking to implement their EFPs often end up spending significant amounts of money to do so. One study found that in 2010, Ontario farmers working towards completing their EFPs spent upwards of \$69,000 on agri-environmental activities, with 73% being paid for from the farmers’ own funds (Smith et al, 2020). This study also found that, for uncompleted EFP activities, 23% of farmers indicated that they either lacked the finances to complete a project, or that the cost was too high (Smith et al, 2020). Other studies have found that 67% of EFP participants in Nova Scotia made over \$100,000 in income a year, compared to only 33% of non-EFP participants (Atari et al, 2009). This may be because farmers with larger incomes are able to afford large cost-shares out of pocket, compared to farmers with smaller incomes.

While some Canadian farmers may be struggling to access enough capital to adopt agri-environmental BMPs, financial barriers are even more prominent for equity-deserving farmers. Conversations with FCS Task Force members suggest that equity-deserving farmers tend to be smaller in scale and recent consultations with equity-deserving groups have revealed

that access to financing, particularly surrounding cash flow, is a significant barrier (Brynne et al, 2021).

Farmers with higher debts, or those with limited access to either capital funds or credit, may not have the means to pay for the total cost of the BMP upfront, functionally excluding these farmers from the program. To increase the equity of these programs, farmers from equity-deserving groups should be able to access a portion of the cost-share funding in advance. For example, a program that offers 50% cost-share funds up to \$10,000 (for a project maximum of \$20,000) would offer 50% of the \$10,000 of cost-share funds upfront (so \$5,000 initially, and \$5,000 paid upon project completion). This would improve access to upfront capital for these equity-deserving farmers.

A final consideration in cost-share programming should be the rapidity of final program payments. Final cost-share payments should be sent to the farmer as expediently as possible once the farmer offers the requisite proof of completion. A lag in final payments means that for farmers who accessed credit to finance the project will be paying interest on their loan for a longer period of time. This is of course not ideal for any farmer, but equity-deserving farmers, who tend to have less access to financing, may be disproportionately impacted by excess delays. This may require funding agencies to increase their staffing capacity to be able to process BMP claims and disburse funds more quickly.

Per-Acre Payments

This policy document proposes policy solutions that pay farmers a per-acre subsidy for adopting BMPs on their farmland. However, this means that farmers with small overall acreages are disadvantaged, as a small per-acre payment would not result in a significant incentive (e.g. \$5/acre on a 3 acre farm would net the farmer \$15/year; this would be \$500/year on a 500 acre farm). FCS's previous task force on equity in Canada's agriculture sector found that current financing tends to be more beneficial to larger farmers. Furthermore, many equity-deserving farmers tend to work on small parcels of land and face challenges with access to land (Brynne et al, 2021). This also indicates that consideration should also be given to minimum acreage or parcel size requirements. Minimum parcel size, if set at all, should take into account this consideration and be set at size that allows the majority of farm businesses to participate.

For these reasons, when per-acre payments are considered as a policy option, a minimum or baseline payment should be applied to the per-acre incentive. This means that all farmers can expect a minimum payment for the adoption of this practice on all their acres even if they are farming at a small scale, while still allowing the program the flexibility to pay large farms for the additional costs they might incur. For example, a program could offer the greater of a payment of \$500/farm/year or \$5/acre/year for the adoption of a specific BMP.

5.3 Policy Suggestions for Specific BMP Adoption

In this section we will outline specific policies that can be adopted to encourage climate-friendly BMPs. A summary of the recommendations can be found in Tables 5 to 9 below. The analysis for each practice includes the consideration of the overall economic benefits to the farmer, and uses the information from the [FCS Economics Report](#) to provide a payment guideline for governments to consider. Other initial factors considered for policy design were if the farmer would experience high upfront time or financial costs, whether economic benefits would accrue for the farmer over time, and if advisory services would be required. The existence of similar policies either in Canada or other jurisdictions was also used to inform final policy suggestions. Finally, each practice receives policy suggestions, as well as possible delivery agents for each policy.

Table 5. Summary of Nitrogen Management BMP Considerations & Policy Suggestions

BMP	Avg. Net Returns	Incentive Cost by Unit	Policies Considered
Nitrogen Management			
Quantitative Right Rate	Positive	<u>Prairie Canola:</u> \$30/ha	Extension
		<u>Prairie Wheat:</u> \$35/ha	Nitrogen Management Plan
		<u>ROC Corn:</u> \$35/ha	Agronomic Services Cost-share BMP Insurance
Precision Nitrogen Management	Positive	<u>Prairie Canola:</u> \$13/ha	Extension
		<u>Prairie Wheat:</u> \$13/ha	Nitrogen Management Plan
		<u>ROC Corn:</u> \$16/ha	Agronomic Services Cost-share
Enhanced Efficiency Fertilizers	Negative	<u>Prairie Canola:</u> \$47/ha	Nitrogen Management Plan
		<u>Prairie Wheat:</u> \$32/ha	Collective Adoption Bonus
		<u>ROC Corn:</u> \$49/ha	Rebate
Elimination of Fall Application	Negative	<u>Prairie Canola:</u> \$3/ha	Regulation Additional Fall Storage Cost-share
4R Management of Manure	Positive	<u>Liquid Manure:</u> \$11/tonne	Extension Nitrogen Management Plan Manure Test Cost-share Transport Cost-share Custom Applicator Cost-Share
		<u>Liquid Manure:</u> \$44/tonne	Extension
			Nitrogen Management Plan

Organic Sources of Nitrogen	<u>Solid Manure:</u> \$18/tonne	Soil/Manure Test Cost-share
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Table 6. Summary of Manure Management BMP Considerations & Policy Suggestions

BMP	Avg. Net Returns	Incentive Cost by Unit	Policies Considered
Manure Management			
Synthetic Impermeable Floating Covers	Negative	<u>Prairie Dairy:</u> \$20/head	Full Rebate for Equipment Purchase (i.e., cost of cover and gas capture)
		<u>ROC Dairy:</u> \$35/head	
		<u>Prairie Swine:</u> \$1.50/head	
		<u>ROC Swine:</u> \$2/head	
Acidification of Liquid Manure	Negative	<u>Prairie Dairy:</u> \$39/head	Full Rebate for Equipment Purchase (i.e., acidification infrastructure) Rebate for Inputs Staff Training Subsidy Manure Test Cost-share
		<u>ROC Dairy:</u> \$39/head	
		<u>Prairie Swine:</u> \$7.50/head	
		<u>ROC Swine:</u> \$7.50/head	

Table 7. Summary of Livestock Management BMP Considerations & Policy Suggestions

BMP	Avg. Net Returns	Incentive Cost by Unit	Policies Considered
Livestock Management			
Increased Legumes in Pasture	Positive	<u>Prairie Cow-Calf:</u> \$2/head	Extension Seed Cost-share
		<u>ROC Cow-Calf:</u> \$1.50/head	
		<u>Prairie Cow-Calf:</u> \$20/head	Extension
Rotational Grazing	Positive		Fencing & Watering Cost-share

		<u>ROC Cow-Calf:</u> \$17/head	
Extended Grazing Period	Positive	<u>Prairie Cow-Calf:</u> \$35/head <u>ROC Cow-Calf:</u> \$35/head	Extension Watering Cost-share

Table 8. Summary of Soil Management BMP Considerations & Policy Suggestions

BMP	Avg. Net Returns	Incentive Cost by Unit	Policies Considered
Soil Management			
50% Legume Cover Cropping	Positive	<u>Prairie:</u> \$175/ha <u>ROC:</u> \$190/ha	Extension Seed Cost-share Per-acre Payment
Intercropping	Negative	<u>Prairie:</u> \$125/ha <u>ROC:</u> \$53/ha	Per-acre Payment Expanded BRM Offerings

Table 9. Summary of Wetland & Tree Management BMP Considerations & Policy Suggestions

BMP	Avg. Net Returns	Incentive Cost by Unit	Policies Considered
Wetland and Tree Management			
Alley Cropping	Negative	<u>Canada:</u> \$170/ha	Tree Cost-share Equipment Upgrade Cost-share
Silvopasture	Negative	<u>Canada:</u> \$170/ha	Tree Cost-share Exclusion Fencing Cost-share
New Riparian Trees	Negative	<u>Canada:</u> \$2,980/ha	Tree Cost-share Per-acre Payment Exclusion Fencing Cost-share
Avoided Conversion of Shelterbelts	Negative	<u>Prairie:</u> \$3000/ha	Reverse Auction One-time Easement Payment Per-acre Payment

Avoided Conversion of Wetlands	Negative	<u>Prairie:</u> \$3,000/ha	Reverse Auction Easement One-time Payment Per-acre Payment
Wetland Restoration	Negative	<u>Prairie:</u> \$5,200/ha	Reverse Auction Easement One-time Payment Per-acre Payment

5.3.1. Bundling Nitrogen Management Practices

Overview

Most of the provinces offer funding for nutrient management planning, ranging from support for the creation of a plan to the consultation services required to create field maps. Although when it comes to equipment, the funding opportunities vary across provincial boundaries. For instance, both British Columbia and Ontario offer cost-shares for equipment modifications to improve land application of nitrogen; however, equipment does not appear to be included in Manitoban or Saskatchewan programming.

To help Canadian farmers address nitrogen fertilizer emissions and address the 2030 fertilizer emissions reduction target, FCS suggests that each province should offer a standardized set of nutrient management cost-shares in the next Agricultural Policy Framework, which farmers gain access to by completing a nutrient management plan. This set of nutrient management practices would aim to address the set of priority areas mentioned below (i.e., soil tests, agronomic services, enhanced fertilizer products, and biological sources) and should be delivered through the existing provincial cost-share program channels.

Nutrient Management Plans

To support the adoption of the suite of nitrogen management practices, provinces may want to make nitrogen management cost-share access conditional upon the completion of a nutrient management plan. The nutrient management plan would play a similar role to the environmental farm plan by outlining opportunities to improve nitrogen application through rate, placement, source, and timing recommendations. Some provinces offer a subsidy for nutrient management plans, while others offer cost-share funding for only the first plan each farm creates. FCS suggests that the first plan be offered on a subsidy basis, as is done in British Columbia, with additional cost-share support for subsequent updates to existing nutrient management plans.

Suite of Nitrogen Management Practices

After the nutrient management plan has been completed, the variety of cost-share opportunities for nitrogen management practices would then become available to the farmer. The economic analysis of the nitrogen management practices included in this report (i.e., quantitative right rate, variable rate application, manure application, etc.) show that many result in positive net returns, meaning they are beneficial to a farmer's bottom line. For this reason, we suggest that

cost-shares target the technical support required to successfully implement these BMPs, rather than a per-acre payment for BMP adoption. Extension and knowledge transfer should also be a key part of incentivizing nitrogen management BMP adoption, as farmers who are made aware of the potential benefits to their bottom line may decide to adopt the practice without additional financial incentives.

In terms of technical support, **FCS believes that cost-share funding should be targeted towards: (1) soil tests; (2) agronomic advisory services and mapping for variable rate application; (3) software or small equipment updates to enable seeders and tractors to perform variable rate application; (4) agronomic advisory services or testing to support the use of biological sources of nitrogen.** These cost-share supports would address some of the smaller upfront costs associated with improving the efficiency of nitrogen application and limiting fertilizer-based emissions. In contrast, enhanced efficiency fertilizer adoption was estimated to result in negative net returns to the farmer on average. Based on this, FCS suggests that a subsidy or rebate program should be established to offset some of the additional costs associated with enhanced fertilizer products. This program could offer compensation for the additional cost of enhanced products, with the reference for compensation being the cost of the non-enhanced counterparts.

Other Considerations

FCS also recognizes that farmers may also need support for larger capital cost items, such as new tractors or seeders that are compatible with variable rate application or fertilizer storage equipment to enable spring application. These larger capital cost items have not been included in the economic analysis. There might be opportunities to address equipment constraints with funding support for custom applicator services or incentives for equipment sharing.

5.3.2. Quantitative Right Rate

Average Net Returns

On average, farmers will experience a net benefit from adopting this practice. This is primarily due to reduced inputs costs and no expected change in yield levels.

Current Delivery/Policy

Some provinces offer funding for variable rate application; however, no program to our knowledge explicitly tries to reduce application rates. Past programs in the United States (i.e., Iowa's Nitrogen Best Management Practices program from 2001) have offered risk reduction initiatives and agronomic support to encourage farmers to reduce N application rates (Maulsby, 2001).

Upfront/Time Costs

There are no significant equipment costs associated with this BMP, and management practices do not change substantially, aside from the introduction of regular soil testing.

Advisory Services Required

Soil tests would be required to determine the correct rate. Agronomic advice may be needed to ensure the farmers feel comfortable with reducing their rates. Past programs have emphasized including agronomic support in programs focussed on adjusting nitrogen rates (Green, 2014).

Long Term Economic Benefit

The benefits of rate reduction or more efficient N use tend to occur within each production year. We do not identify any significant benefit that builds over time.

New Policy Suggestion

The primary policy suggestion is the inclusion of right rate as a core component of the creation of a nutrient management plan, with soil tests supported by cost-share funding. Agronomic support to determine the appropriate application rate from the soil test could also be eligible for cost-share funding.

We also suggest that this BMP be offered as an additional option for BMP insurance, where farmers would only receive an indemnity payment when rate reductions lead to income loss. This would avoid offering unconditional financial transfer for a BMP that is, on average, expected to improve net returns. BMP insurance is explored more in the [FCS BRM task force paper](#).

Delivery Agent

Provincial crop insurance agencies would be best placed to offer this type of policy, as they have current data on historical yield and are familiar with the provision, monitoring, and enforcement of crop insurance policies.

5.3.3. Precision Nitrogen Management

Average Net Returns

On average, farmers will experience a net benefit from adopting this practice. This is primarily due to increasing the efficiency of input use, as well as potentially improving yields with appropriately targeted management zones.

Current Delivery/Policy

Currently, provinces like Saskatchewan and Manitoba offer cost shares for the agronomic advisory services associated with variable rate application, while other provinces like Ontario and British Columbia offer cost shares for equipment that improves fertilizer application equipment. These programs are all part of provincial cost-share programming under the Canadian Agricultural Partnership.

Upfront/Time Costs

For the purposes of this report, the cost of new technology was not included in the economic assessment; however, initial field mapping may have high costs. In addition, creating management zones and adjusting rates accordingly may influence the ease and convenience of farm management leading to an increase in time costs.

Advisory Services Required

Advisory services are generally required to create prescription maps and conduct soil tests.

Long Term Economic Benefit

The benefits of rate reduction or more efficient N use tend to occur within each production year. We do not identify any significant benefit that builds over time.

New Policy Suggestion

All provinces should offer a cost-share for the agronomic services (i.e., soil testing, mapping, creating management zones) of adopting variable rate nitrogen application. Some provinces subsidize first time nutrient management plans, and this type of subsidy could be extended to also include the first-time costs of field mapping and any associated agronomic support required to implement variable rate application.

Delivery Agent

This program can be delivered through the existing provincial cost-share channels.

5.3.4. Enhanced Efficiency Fertilizers

Average Net Returns

On average, farmers will experience a net loss from adopting this practice. This is primarily due to the increased cost of the inputs and a variable impact on yield levels depending on crop type (i.e., no benefit for wheat, but potential benefit for corn).

Current Delivery/Policy

Some On-Farm Climate Action Fund (OFCAF) programs are providing financial support for the use of enhanced efficiency fertilizer products; however, subsidy levels do not yet appear to be publicly available. Alberta's carbon offset program might be one exception, as the Nitrous Oxide Emissions Reduction Protocols, modelled after Fertilizer Canada's 4R program, promote the use of enhanced fertilizer products in exchange for credits (Government of Alberta, 2015). Outside of Canada, the conservation reserve program offers funding for farms that use at least 50% enhanced efficiency fertilizer products (USDA, 2019).

Upfront/Time Costs

Enhanced efficiency fertilizer products do have a price premium compared to standard fertilizer products. There are no significant equipment costs or changes in management responsibilities associated with enhanced efficiency fertilizer application.

Advisory Services Required

Some farmers may want to use advisory services to maximize the benefit of adopting enhanced efficiency fertilizers. For instance, application rates can be reduced when using enhanced products, but the appropriate degree of reduction may require advisory services, particularly in initial years while farmers learn how the product works differently than the products they're used to.

Long Term Economic Benefit

The benefits of more efficient N use tend to occur within each production year. We do not identify any significant benefit that builds over time.

New Policy Suggestion

This program could be delivered as a rebate program, where farmers purchase enhanced fertilizer products and then apply for the additional costs over and above traditional fertilizers to be rebated. This would be the simplest approach from a monitoring and enforcement perspective. A rebate should be contingent on the creation of a nitrogen management plan.

AAFC's recent discussion document suggests that enhanced efficiency fertilizer adoption is very low right now. In light of this, AAFC may want to consider a collective bonus structure, where the rebate program would be used to incentivize individual farmers to participate and an additional

time bound, per acre bonus payment could be administered if 50% or more of the acreage in a watershed is enrolled.

Delivery Agent

The rebate program and collective bonus could be administered by the provincial governments as part of the cost-share programs. Conservation authorities or watershed districts could also be involved to help monitor adoption rates or promote the collective adoption bonus program to farmers.

5.3.5. Eliminating Fall Application

Average Net Returns

On average, farmers will experience either no change to their economic outlook, or a net loss from adopting this practice if they need to pay for custom application in the spring.

Current Delivery/Policy

There are no current programs offering financial support for the use of spring applications. In fact, some provinces have begun to regulate the timing of nutrient applications in areas that are considered to be of high risk. For example, British Columbia's Code of Practice for Agricultural and Environmental Management places restrictions on nutrient application between November 1st and February 1st (Government of British Columbia, 2019). Ontario has also placed certain restrictions and conditions on nutrient application during the winter through the 2002 Nutrient Management Act. While initiatives like these do not prevent farmers from applying in October or September, it does begin to set precedent for responsible nutrient application.

Upfront/Time Costs

There are no additional equipment or management costs associated with switching from fall to spring application; however, implications on a farmer's time in the spring to apply fertilizer before planting may be a significant perceived barrier. In addition, some members of the task force have suggested that fertilizer is less expensive to purchase in the fall and that storage limitations may be impacting the decision to apply in the fall.

Advisory Services Required

We do not expect that advisory services or training would be needed to switch from fall to spring application.

Long Term Economic Benefit

The benefits of more efficient nitrogen use tend to occur within each production year. We do not identify any significant benefit that builds over time.

New Policy Suggestion

The monitoring or enforcement of this practice is extremely difficult and given that provinces like British Columbia and Ontario have already begun to move towards a more regulated approach, it would be good to motivate farmers to get into the habit of spring application in the event that the rest of the country enforces similar standards. A cost-share option to increase fertilizer storage, contingent on a nitrogen management plan, is also an option for farmers wishing to take advantage of lower prices for fertilizer in the fall. In the long term, due to the difficulty of creating or monitoring an incentive program to promote spring application, regulations prohibiting fall application of nitrogen fertilizer should be adopted provincially.

Delivery Agent

This program could simply be managed by submitting fertilizer purchase receipts to provincial cost-share agencies, or a similar provincial agency. Cost-share would be run by current provincial cost-share programming agents.

5.3.6. 4R Management of Manure

Average Net Returns

On average, farmers will experience net benefits from adopting this practice; however, the size of the net benefit is highly dependent on transportation costs.

Current Delivery/Policy

Currently, Ontario offers support for adding organic amendments to soil at 40% of the costs up to \$10,000 (or 180 per acre). The program includes transportation costs, which help address one of the potential barriers to using this practice, but farmers need an approved soil test to access this funding and there are some limitations on the content of liquid manure. Both Ontario and British Columbia also offer funding for equipment to improve the land application of agricultural by-products like manure, with 30% to 40% of the costs available up to \$20,000.

Upfront/Time Costs

Using manure avoids some of the costs of purchasing nitrogen fertilizers, but transportation costs can become very high due to the bulky qualities of manure, as well as fuel costs. When farmers produce their own manure, we do not expect significant upfront costs. This analysis does not include the purchase of new equipment to apply manure. Custom application of liquid manure is estimated at \$14 per 1000 gallons.

Advisory Services Required

Farmers would benefit from having a manure nutrient test performed on their manure so they can appropriately manage the application rate. We do not expect one-on-one advisors or ongoing advisory support to be necessary.

Long Term Economic Benefit

The benefits of rate reduction or more efficient N use tend to occur within each production year. We do not identify any significant benefit that builds over time.

New Policy Suggestion

Given the average net benefits associated with adopting this practice, governments may want to first rely on extension and outreach to better educate farmers about the benefits of applying manure using the 4R framework. There is existing precedent for providing support for transportation and custom application costs. These programs should continue to be available in the next APF to address the needs of smaller or newer farmers that may need financial support to overcome the upfront costs. Finally, farmers who complete a nitrogen management plan should also be eligible for cost-sharing for manure nutrient testing and soil testing.

Delivery Agent

The cost-shares and extension would continue to be provided through existing or expanded provincial channels.

5.3.7. Improved Crediting of Organic N Sources

Average Net Returns

On average, farmers will experience a net benefit from adopting this practice. This is primarily due to a farmer being able to decrease their synthetic fertilizer applications. The total saving to the farmer will depend on how much nitrogen is credited to organic sources, and the price of fertilizer at the time.

Current Delivery/Policy

Most provinces offer a cost-share or subsidy for nutrient management planning, but generally it is only available one time and only available to farmers who have not developed a nutrient management plan in the past. For example, Ontario's crop nutrient planning cost-share is only available for first-time plan development and explicitly excludes renewals or updates of existing plans. In Manitoba, the same BMP can only be applied for once for each parcel of land. Conversely, in British Columbia, farmers receive a subsidy of up to \$3000 for their first nutrient management plan and up to \$1500 for their second plan.

Upfront/Time Costs

Manure tests represent a small upfront cost to the farmer and completing a detailed nutrient management plan that includes all organic sources might be a significant time cost associated with this BMP. Time costs will likely depend on the farmer's familiarity with accounting for various organic sources of N.

Advisory Services Required

Farmers would benefit from having a manure nutrient test performed on their manure so they can appropriately manage the application rate. One-on-one advisory services might be required to help farmers assess the various organic N sources available on their farm (i.e., cover crops, rotational impacts, etc.).

Long Term Economic Benefit

The benefits of rate reduction or more efficient N use tend to occur within each production year. We do not identify any significant benefit that builds over time.

New Policy Suggestion

To improve the crediting of organic N sources, more provinces should move to adopting BC's model for nutrient management plans. The cost of advisory services and soil tests that are used to determine the credits associated with organic sources should be included in the nutrient management plan (similar to British Columbia's structure where thresholds for laboratory analysis costs are also included in the total). Farmers should also be encouraged to renew their plan more frequently, and so should again refer to the British Columbian structure where renewals or updates are still offered funding but to a smaller degree.

Delivery Agent

This could be offered through the existing provincial cost-share program channels. Provinces may want to make additional crop advisors or related staff available to support an increase in requests for nutrient management support.

5.3.8. Synthetic Manure Covers

Average Net Returns

On average, farmers will experience a significant net loss from adopting this practice. This is primarily because the cover is a significant capital expense that provides mostly social benefits rather than positively impacting farm productivity.

Current Delivery/Policy

Currently several provinces offer cost shares for manure storage and coverage equipment. As examples, British Columbia and Manitoba offer between 30% and 50% up to \$50,000 for manure storage covers, and Ontario offers a manure storage improvement cost share that covers 25% of the costs up to \$25,000. The federal government's Agricultural Clean Technology program does list manure management as a focus, but only when projects costs exceed \$50,000, the project generates bioenergy, or the project generates an enhanced bio-product.

Upfront/Time Costs

Manure covers are a significant upfront cost for farmers with estimates between \$1,500 and \$5,000. The covers must also be replaced every few years, with some of the task force members suggesting a cover would last for about 5 years. Some research also suggests that manure storage BMPs take the longest for farmers to implement, compared to other BMPs such as nutrient management, or soil health (Smith et al, 2020).

Advisory Services Required

We do not expect that advisory services would be needed to purchase and install a cover; however, some brief training may be required to ensure safe and efficient gas capture and/or flaring.

Long Term Economic Benefit

There are no long-term benefits from manure covering over time. Manure that is acidified or composted could result in a higher quality fertilizer product; however, this is outside the scope and objective of implementing a manure cover.

New Policy Suggestion

Given the significant upfront costs and lack of productive benefit, governments should continue to offer cost-share funding for manure covers. Of the current cost-shares, Manitoba's 50% cost-share seems most appropriate for this BMP because its adoption provides almost entirely public benefits. However, FCS suggests that provinces should consider paying for the entire cost of the cover outright, as well as for the required cost of gas capture or flaring infrastructure.

Delivery Agent

This program could be delivered through the existing provincial cost-share channels. If offering full payment for this BMP, funding could be offered through the Agricultural Clean Technology Program at the federal level.

5.3.9. Acidifying Manure

Average Net Returns

On average, farmers will experience a small net loss from adopting this practice. This is primarily due to the new, ongoing expense of sulphuric acid purchase, as well as maintenance for acidification infrastructure.

Current Delivery/Policy

Manure acidification is currently excluded from many of the existing cost-share programs. For example, additives, aeration, and agitation equipment are all ineligible expenses under Ontario's manure storage cost-share. The federal government's Agricultural Clean Technology program does list manure management as a focus, but only when projects costs exceed \$50,000, the project generates bio-energy, or the project generates an enhanced bio-product.

Upfront/Time Costs

For the purposes of this report, manure acidification equipment is excluded from the analysis. This means that the upfront costs of the acid represent a potential cost barrier; however, these additives are not expected to be exceptionally expensive. Manure acidification does add additional farm management responsibilities and potentially introduces health and safety concerns.

Advisory Services Required

Training or advisory support would likely be required for first time users of the practice; however, we do not expect on-going support to be required. Manure testing may be required to help farmers understand how much valuable acidification makes manure as a fertilizer.

Long Term Economic Benefit

Manure may become a higher quality fertilizer product once it has been acidified, and subsequently treated with a nitrification inhibitor, due to potentially higher nitrogen content (Regueiro et al, 2020). This would benefit the farmer in the following production season rather than immediately.

New Policy Suggestion

To encourage the use of acidification, a new program should be created that allows farmers to submit for the full cost of their sulphuric acid and associated infrastructure to be rebated back to them. The costs of training required to train farmers to handle the acid safely should also be covered. To further emphasize the value of acidification to farmers, a subsidy for manure testing could also be offered. This would show to what extent acidification increased the nitrogen content of the manure and help them determine how to adjust their application rates accordingly.

Delivery Agent

This program could be delivered through the existing provincial cost-share channels. If offering full payment for this BMP, funding could be offered through the Agricultural Clean Technology Program at the federal level.

5.3.10. Legumes in Pasture

Average Net Returns

On average, farmers in the Prairies will experience more upfront costs from adopting this practice, while farmers in the rest of Canada will experience a significant net benefit. This is primarily due to the change in the costs of pasture conversion across Canada.

Current Delivery/Policy

Manitoba currently offers funding for this BMP through their provincial cost-share programs under the CAP, at a cost share of 25% up to \$10,000. In addition, the On-Farm Climate Action Fund offers direct subsidy support for this BMP in all provinces, but it is unclear at this time exactly what subsidy level is available. Finally, Ontario's SARPAL program offers cost-share funding for this BMP but access is restricted to farms that can provide positive benefits to species at risk in the area.

Upfront/Time Costs

The additional seeding and planting costs are higher for legume seeds and legume mixes. Costs associated with pasture conversion are most significant in the Prairies, but do not appear to be a significant barrier in the rest of Canada.

Advisory Services Required

We do not expect that planting legumes will require the use of advisory services. Provinces may want to develop reference manuals for the best seed mixes for various agricultural zones in their province.

Long Term Economic Benefit

Legume nitrogen fixation can reduce fertilizer needs in subsequent years, resulting in net benefits for farmers across Canada.

New Policy Suggestion

The financial support for this BMP should be targeted towards the Prairies, as farmers are expected to experience more significant upfront costs in the Prairies than in the rest of Canada. Support for the costs of legume seeds could be offered as a cost-share, with a larger portion of the funding being devoted to the Prairies. In the rest of Canada, encouraging legume pastures might require more targeted outreach and extension to make farmers aware of the benefits of practice adoption. As a final note, the program should also target pasture that is not currently native grassland or prairie, but rather more managed pastures or haylands.

Delivery Agent

This program could be delivered through the existing provincial cost-share channels.

5.3.11. Rotational Grazing

Average Net Returns

Almost all farmers are expected to experience a net benefit from adopting this BMP. This benefit is primarily from the increase in stocking rates and finishing weights.

Current Delivery/Policy

Manitoba currently offers funding for this BMP through their provincial cost-share programs under the CAP, at a cost share of 25% up to \$10,000. In addition, the On-Farm Climate Action Fund offers direct subsidy support for this BMP in all provinces, but it is unclear at this time exactly what subsidy level is available. Finally, Ontario's SARPAL program offers cost-share funding for this BMP, but access is restricted to farms that can provide positive benefits to species at risk in the area.

Upfront/Time Costs

Fencing and watering infrastructure can represent a significant upfront cost, and management responsibilities increase when managing a rotational grazing system.

Advisory Services Required

Farmers may require the assistance of an advisor to set up their grazing system; however, we do not expect there to be an ongoing need for advisors.

Long Term Economic Benefit

Rotational grazing has a positive impact on pasture productivity and builds soil health over time. Carbon sequestration could also provide future farmers with access to offset credits.

New Policy Suggestion

Extending existing financial supports like the On-Farm Climate Action Fund could help address some of the upfront costs of fencing or water infrastructure. We recommend that financial assistance for this BMP only cover the infrastructure costs associated with adoption, rather than a per-acre payment. Given the significant potential benefits to the farmer, extension and outreach should also be a priority to increase the adoption of this BMP.

Delivery Agent

The program could be delivered through existing provincial extension channels, cost-share programs, or through organizations that received money from the On-Farm Climate Action Fund to deliver rotational grazing support to farmers.

5.3.12. Extended Grazing

Average Net Returns

On average, farmers will generally experience a small net benefit from this practice. While feed and manure management costs may be reduced, there are risks associated with animal performance (i.e., sufficient weight gain) when adopting this BMP (Beef Cattle Research Council, n.d.).

Current Delivery/Policy

OFCAF funding for watering infrastructure, currently targeted to rotational grazing, would logically support extended grazing as well. Existing provincial cost-share programs could also support the infrastructure needed for this BMP by expanding their offerings to include watering infrastructure.

Upfront/Time Costs

Watering infrastructure has been noted as a barrier to the adoption of this practice, and may come with a significant cost, particularly when the water must be heated to prevent freezing. In addition, this BMP requires the farm to keep a close eye on their herd and its feed intake to ensure weight is maintained. Conversely, extended grazing may reduce manure management costs, as manure is naturally deposited across the entire field during grazing. This also positively impacts soil fertility (Beef Cattle Research Council, n.d.).

Advisory Services Required

Farmers may require the assistance of an advisor to set-up their grazing system; however, we do not expect there to be an ongoing need for advisors.

Long Term Economic Benefit

Adopting this practice is expected to improve soil fertility and forage yields (Beef Cattle Research Council, n.d.).

New Policy Suggestion

As with rotational grazing, the upfront costs associated with infrastructure could be addressed by a cost-share program. The costs of water infrastructure have been noted as a significant financial burden for farmers and so sharing some of these costs would help farmers access this BMP.

Delivery Agent

Cost-share programs for watering infrastructure should be delivered through the existing provincial cost share program delivery channels or through organizations that received money from the On-Farm Climate Action Fund to deliver rotational grazing support to farmers.

5.3.13. 50% Legume Cover Crops

Average Net Returns

On average, farmers would experience a net benefit from adopting this practice. This is primarily due to the nitrogen fixation of legumes, which reduces subsequent fertilizer input needs, and weed control and soil health benefits to subsequent cash crops.

Current Delivery/Policy

Ontario offers a cost-share for the use of cover crops through its provincial cost share program under the Canadian Agricultural Partnership. The funding is offered at 50% of the costs up to a maximum of \$8,000. The On-Farm Climate Action Fund also offers direct subsidy support for this BMP in all provinces, but it is unclear at this time exactly what subsidy level is available. In Manitoba's GROW program, the 'Upland Area Conservation, Restoration, and Enhancement' priority provides funding for cover crop adoption. For example, the Assiniboine West Watershed District offers farmers who adopt cover crops a subsidy of up to \$25 per acre.

Upfront/Time Costs

The costs of seeds, planting, and termination can be a significant barrier for some farmers. In addition, where cover crops require more passes over the field or do not self-terminate, farmers would need to deal with additional management responsibilities.

Advisory Services Required

Advisory services might be needed to identify what leguminous cover crop species fits best into the farmer's rotation to maximize the nitrogen and weed control benefits.

Long Term Economic Benefit

There are many long-term benefits associated with cover crop use, including: yield increases over time, building soil health, contributing to climate adaptation, reducing compaction, and providing erosion control.

New Policy Suggestion

FCS recommends that existing cost-share and subsidy programs continue their current trajectory, with added support from extension and outreach providers to highlight the potential benefits of practice adoption. Although net benefits are positive for the average farmer, many of the benefits associated with cover cropping build up over time. In the first 3 to 5 years, it makes sense to support cover crop adopters as they wait for the long-term benefits to set in. It might be worth considering a limit on the number of consecutive years a farmer can apply for funding for the same parcel of land or decreasing the cost-share by a certain percentage for each consecutive year of funding for the same parcel of land.

Delivery Agent

The program could be delivered through existing provincial cost-share channels or through organizations that received money from the On-Farm Climate Action Fund to deliver cover cropping support to farmers.

5.3.14. Intercropping

Average Net Returns

On average, farmers would experience either no change or negative net returns from adopting this practice.

Current Delivery/Policy

Currently there are some provinces that offer insurance for intercropping (sometimes called polycropping). For example, Manitoba's crown corporation offers a polycrop establishment insurance that provides farmers with a payment if their crop fails to establish after seeding (MASC, 2022). Saskatchewan offers a more robust program for farmers who want to try intercropping, but offers this coverage on a maximum of 30% of total acreage (SCIC, n.d.)

Upfront/Time Costs

If the farmer also needs to change equipment to either seed and/or harvest the two crops (or separate the two crops), this will cause significant upfront costs.

Advisory Services Required

As this is a fairly new option of cropping, at least for those who have practiced conventional cropping in North America, so advisory services would be extremely helpful for the farmer (as they could spend time looking at current best practices); the on-the-ground learning would also be beneficial to the advisors.

Long Term Economic Benefit

This BMP should not change the overall economics of the farm in the long run, unless the combined crops are able to be grown on less land than it would take to grow the two separately. In these cases, there is the potential for economic benefit (however would likely not increase year over year).

New Policy Suggestion

Farmers could be offered a per-acre payment to trial the adoption and maintenance of intercropping on their farm. Cost-share for the purchase of new equipment could also be provided. The BRM task force also recommended expanding AgriInsurance offerings to include intercropping; read more on that [here](#).

Delivery Agent

This program could be offered by expanding OFCAF to include intercropping in its offerings. The cost-share program could be delivered through existing provincial cost-share channels.

5.3.15. Alley Cropping

Average Net Returns

On average, farmers will experience a net loss from the adoption of alley cropping, with the costs stemming from the cost of new trees.

Current Delivery/Policy

Few current programs in Canada. It appears that some trial and workshops on alley cropping are supported by Agroforestry British Columbia, but it is not clear what types of support are offered (Federation of British Columbia Woodlot Associations, n.d.).

Upfront/Time Costs

It would likely be quite costly to the farmer to purchase and establish trees. If the farmer also needs to change equipment to accommodate having trees in the field, this will also result in significant upfront costs.

Advisory Services Required

As this is a fairly new method of cropping, at least in North America, advisory services would be extremely helpful for the farmer (as they could spend time looking at current best practices); the on-the-ground learning would also be beneficial to the advisors as well.

Long Term Economic Benefit

If the farmer later wants to switch from alley cropping to cropland, trees may reduce the land value. Other ongoing costs include maintenance of trees, as well as the replacement of damaged trees.

New Policy Suggestion

A cost-share program to help cover the costs of tree purchase, planting, and maintenance would be a strong candidate for an incentive for this BMP, as well some additional funds for any equipment upgrades or purchases needed to accommodate the trees. Due to the novelty of this practice to conventional Canadian farmers, these programs should be targeted to smaller farmers or those highly motivated to implement the practice on their land.

Delivery Agent

This program could be offered by expanding OFCAF to include alley cropping in its offerings. The cost-share program could be delivered through existing provincial cost-share channels.

5.3.16. Silvopasture

Average Net Returns

On average, a farmer will experience net costs in adopting this BMP. These costs come from the cost of trees and fencing to exclude livestock from the young trees.

Current Delivery/Policy

Few current programs in Canada target silvopasture. It appears that some trial and workshops on alley cropping are supported by Agroforestry British Columbia, but it is not clear what types of support are offered (Federation of British Columbia Woodlot Associations, n.d.).

Upfront/Time Costs

There will be upfront costs for tree purchase, as well as ongoing costs as trees establish; there will also be the need to exclude livestock from trees until they are established, which will require exclusion fencing.

Advisory Services Required

Advisory services would likely be needed to create a planting plan as well as an updated grazing plan, as well as to ensure pasture and tree species work well together and will still meet the nutritional needs of the livestock.

Long Term Economic Benefit

If the farmer later wants to switch from rangeland to cropland, trees may reduce the land value. Other ongoing costs include maintenance of trees and exclusion of livestock as trees grow, as well as the replacement of damaged trees.

New Policy Suggestion

A cost-share program to help cover the costs of tree purchase, planting, maintenance, and fencing for animal exclusion could be a useful incentive for this BMP. Due to the novelty of this practice to conventional Canadian farmers, these programs should be targeted to smaller or highly motivated farmers wishing to implement this practice on their land.

Delivery Agent

This program could be offered by expanding OFCAF to include silvopasture in its offerings. The cost-share program could be delivered through existing provincial cost-share channels.

5.3.17. New Riparian Trees

Average Net Returns

In general, adopting this practice does not provide any productive benefits to farmers, meaning that it results in negative net returns.

Current Delivery/Policy

A similar program which looks to increase habitat connectivity is SARFIP, a subsidiary of OSCIA who delivers current CAP cost-share programming provides cost-share for native tree planting up to \$50/tree at 45% cost-share, or up to 75% if program requirements are met for additional funds (OSCIA, 2022). This program also offers cost-share funding to erect fencing to prevent livestock from entering treed areas at a maximum of \$18/m of fencing (up to \$20,000 across all programs offered per year). ALUS also offers tree and shrub projects to farmers located in ALUS communities (ALUS, n.d.-b).

Upfront/Time Costs

Tree purchase can be quite expensive, particularly if older saplings are desired for purchase. Farms with livestock may also need to purchase exclusion fencing to keep livestock away from trees as they grow. Maintenance to ensure trees are not outcompeted by other forms of vegetation or otherwise harmed in early years may also be required.

Advisory Services Required

Advisory services would likely be needed to help farmers identify the best species selection for the site, as well as ongoing maintenance needs until trees are old enough to require less tending (particularly as the need of the trees will change more rapidly in their first few years of establishment).

Long Term Economic Benefit

Tree plantings do not likely provide any productive benefit; however, future tree plantings that qualify for carbon credits under voluntary or federal systems could become an economic benefit of adopting this practice.

New Policy Suggestion

A program to offer farmers a payment to plant new trees on their farm and maintain them into maturity. Cost-share payments would cover the planting costs and exclusion fencing if required.

Delivery Agent

This program could be offered by expanding OFCAF to include riparian tree plantings in its offerings. The cost-share program could be delivered through existing provincial cost-share channels.

5.3.18. Avoided Conversion of Shelterbelts

Average Net Returns

A farmer will experience negative net returns from the adoption of this practice. There are the costs of not planning on land they could have cropped as well as nuisance costs and maintenance or replacement costs.

Current Delivery/Policy

A similar program which looks to increase habitat connectivity is SARFIP, a subsidiary of OSCIA who delivers current CAP cost-share programming which provides cost-share for native tree planting up to \$50/tree at 45%, or up to 75% if program requirements are met for additional funds (OSCIA, 2022). This program also offers cost-share funding to erect fencing to prevent livestock from entering treed areas at a maximum of \$18/m of fencing (up to \$20,000 across all programs offered per year).

Upfront/Time Costs

Should not have high upfront costs to farmers as this program is aimed at conserving shelterbelts that are already in existence. Costs would be more related to any required continuing maintenance, and opportunity costs.

Advisory Services Required

Advisory services would be helpful for farmers to understand what types of maintenance should be done to keep their shelterbelts healthy long-term.

Long Term Economic Benefit

Tree plantings do not likely provide any productive benefit; however, future tree plantings that qualify for carbon credits under voluntary or federal systems could become an economic benefit of adopting this practice. Some potential savings in the form of reduced soil erosion and if near the homestead, some reduction in heating and/or cooling costs. Conversely, there will be long-term maintenance costs including the replacement of the shelterbelt as it ages.

New Policy Suggestion

FCS suggests that the government should offer a program that provides farmers a payment to maintain shelterbelts on their farm. The payment would be compensating for the opportunity cost of not farming the land. Farmers would bid in a reverse auction to offer the price they are willing to accept for the conservation of shelterbelts on their farm. These reverse auctions could seek out both farmers looking to place permanent easements and receive a one-time payment, or farmers looking for term contracts and a yearly payment to maintain trees.

Delivery Agent

Provincial agencies who deliver cost-share programming, or other federal government agencies that deliver the reverse-auction program outlined in Budget 2021.

5.3.19. Avoided Conversion of Wetlands

Average Net Returns

In general, adopting this practice does not provide any productive benefits to farmers, meaning that it results in negative net returns – both through opportunity costs, and any ongoing maintenance requirements.

Current Delivery/Policy

ALUS offers wetland restorations in their western communities (ALUS, n.d.-b); Ducks Unlimited Canada offers Wetland Restoration Programs for many provinces in the country (DUC, n.d.-a.; DUC, n.d.-b). While these programs focus more on restoration of wetlands versus wetland preservation, these programs essentially become avoided conversion of wetland programs once the wetland is restored.

Upfront/Time Costs

This BMP may require some upfront time to plan how to maintain the wetland. Depending on where the wetland is located, an increase in time to farm around the wetland (particularly if the farmer agrees to conserve a number of small wetlands or potholes on their farm) may occur.

Advisory Services Required

Very unlikely advisory services would be required to maintain a wetland that already exists on the farmers' property.

Long Term Economic Benefit

The long-term benefit remain negative due to maintenance costs and nuisance costs. There is the potential that the maintenance of the wetland allows the farmer to participate in a carbon market in the future.

New Policy Suggestion

The government could offer farmers a payment to maintain existing wetlands on their farm that would otherwise be at risk of conversion. The payment would be for the opportunity costs that come from not draining the wetland. Farmers would bid in a reverse auction to offer the price they are willing to accept for the conservation of wetlands on their farm. Payments would be for a one-time payment for the placing of a permanent easement on the land; another option is a per-year payment for medium-term conservation (e.g. contracts of 10 to 25 years) of the wetland.

Delivery Agent

One option is expanding the Nature Smart Climate Solutions Fund reverse auction program to allow for the additional wetlands conservation. Another option is the creation of a government

agency that could run the reverse auctions itself. Extension services could be provided to farmers through either the delivery agents, and/or expanded provincial and federal extension agents.

5.3.20. Wetland Restoration

Average Net Returns

In general, adopting this practice does not provide any productive benefits to farmers, meaning that it results in negative net returns – due to the opportunity costs, substantial upfront costs for restoration, and any maintenance requirements (e.g. ensuring new trees establish).

Current Delivery/Policy

ALUS offers wetland restorations in their western communities (ALUS, n.d.-b); Ducks Unlimited Canada offers Wetland Restoration Programs for many provinces in the country (DUC, n.d.-a.; DUC, n.d.-b).

Upfront/Time Costs

Yes, with the initial cost in particular being a key factor. The upfront time and monetary costs will be dependent on the landscape, the state of the wetland to be restored, and the land value. Depending on the restoration needed, there may be some ongoing time requirements for maintenance of the wetland, particularly in the initial years as new species establish themselves.

Advisory Services Required

Advisory services are likely needed initially to determine the plan for restoration. There is also the potential for ongoing consultations to aid in maintenance decisions until the wetland is fully re-established (possibly 3 – 4 years from outset).

Long Term Economic Benefit

The long-term benefit remain negative due to maintenance costs and nuisance costs. There is the potential that the maintenance of the wetland allows the farmer to participate in a carbon market in the future.

New Policy Suggestion

Similar to ALUS or DUC programs, the Government of Canada would offer farmers a payment to restore wetlands on their farm. The payment would cover the upfront costs of restoration, as well as to compensate for lost potential revenue from no longer farming that land. Farmers would bid in a reverse auction to offer the price they are willing to accept for the restoration and subsequent conservation of wetlands on their farm.

Delivery Agent

The Government of Canada could provide additional funds to third-party delivery organisations for the expansion of delivery of these programs, as with their existing infrastructure they are well-positioned to get these programs off the ground quickly. Another option is expanding the Nature Smart Climate Solutions Fund reverse auction stream at the federal level. Extension services could be provided to farmers through either the delivery agents, and/or expanded provincial and federal extension agents.

6. Broader Provincial Policy Suggestions to Encourage BMP Adoption

It is clear from the [FCS Emissions Report](#) that no one practice will help the sector reach its 2030 emissions reduction targets on its own. This is where a broader, systems-level approach to on-farm climate action must be considered. One of the easiest ways to do this is to use the existing infrastructure of the EFP program to further encourage farmers to adopt multiple practices that target different aspects of their production system. This section first explores how extension practices might be improved to encourage BMP adoption, and then presents two policy suggestions that look to support BMP adoption on a more systems-based scale. Section 6.2 will outline a collective adoption bonus program that looks to encourage BMP adoption at a landscape scale to encourage broader environmental improvements in high-risk or low adoption areas. Then, section 6.3 will present options for a program that provides farmers with an incentive to adopt BMPs that address various different sources of on-farm emissions simultaneously by linking with the EFP program.

6.1. Increasing Government Extensions Services

Improving extension services will be a key component to the success of APF programming and encouraging long-term practice change. Previous studies of farmers implementing EFPs found that one-on-one extension services were the number one choice for additional support to help them complete the implementation of their EFP (Smith et al, 2020). For this reason, **FCS recommends that provinces work towards increasing the availability of extension and outreach services, with a focus on in-person delivery or demonstrations.** This method may be more costly than online services but will increase the quality of knowledge transfer and improve the farmer's trust in the information.

6.1.1. Why Use Preferred or Trusted Messengers?

Social science shows that people put more trust in the information that they are given when it comes from someone they regard highly. Highly regarded individuals can be considered friends, family, or even experts, like veterinarians. People also tend to trust information more when it comes from someone that they share characteristics with, such as a peer or someone of a similar cultural background (Dolan et al., 2012). To improve the effectiveness of extension and outreach, new initiatives to interact with farmers should leverage trusted or preferred sources of information and use peer farmers, when possible, to demonstrate or deliver information.

While leveraging trusted messengers can better educate farmers and address knowledge barriers, it does not address financial concerns regarding the upfront costs of adoption. Improving extension through the use of trusted messenger tactics would be applicable to most of the nitrogen, manure, livestock, and soil health BMPs included in this report, but should be combined with incentives for practices that have significant upfront or time costs, or that do not positively impact productivity.

In fact, Pannell's (2008) Public Private Benefits Framework for agri-environmental policy choices suggests that extension should be reserved only for practices that provide a productive and environmental benefit (i.e., those in the economics report that display positive net returns to the farmer). This is because practices that are not beneficial for the farmer to adopt will likely not be influenced by the provision of extension services. For instance, even if farmers are provided extension services on how to use a manure cover or restore a wetland, these practices have very little benefit to the farm's bottom line and so it is unlikely they would choose to undertake them without a financial incentive.

6.1.2. Who are the Preferred or Trusted Sources of Information?

There are a few studies that help identify trusted sources of information that farmers look to when thinking about the environment or innovation. For instance, one study in Ontario found that 43% of farmers ranked OMAFRA as the most important source of information on environmental practices and stewardship. Participants ranked conservation authorities as the second most important source. Anecdotally, the study also suggests farmers are more likely to adopt BMPs when they hear about the experiences of other peer farmers or if the BMP is promoted by an information source that they trust (Lamba, Filson & Adekunle, 2009). Another study found that over 60% of farmers identified BMP booklets from the government as a source of information (Smith et al, 2020). Other sources that farmers relied upon were fact sheets from the government (51%), information from government agricultural staff (42%), and information from their social networks, with just over 25% reporting neighbours and friends as an influential source of information (Smith et al, 2020).

Although using trusted messengers can improve knowledge transfer, there is no one 'right' messenger for everyone. For example, the Ontario Soil Network (2018) and Weber (2017) contrast some of the findings of Lamba et al. (2009) – suggesting that the farm community does not trust government messengers that much. To add to the discussion, research on knowledge transfer to the farming community from the University of Guelph indicates that veterinarians, farm organizations, and commodity groups are essential to establishing trust during outreach and extension (Bergen et al., 2018).

Studies in Atlantic Canada have found that farmers prefer their information to come from peer farmers, commodity groups or farm organizations, and provincial government agencies (Yiridoe et al., 2010). McFtridge et al. (2022) also highlight that participants in their workshop in Charlottetown, PEI emphasized close ties between farmers and provincial government representatives. Yiridoe et al. (2010) also identified agricultural research and information centres, as preferred sources of information (ranking them within the top five preferred information sources in Atlantic Canada). Conversely, private sources, such as agricultural consultants, were identified much lower on the list and were used by between 59 to 63% of the respondents.

While internet-based information sources were noted as gaining popularity in Yiridoe et al. (2010), these sources were still not preferred over traditional methods of communication, including newsletters, field demonstrations, and interpersonal sources. Other studies have also suggested internet-based information sources are not preferred by the farming community and that these sources may not be enough to get farmers to adopt new innovative farming practices. These studies again reinforced the importance of peer farmer interactions and the use of local agencies to help promote farm-level practice change (Hambly et al., 2007; Gilbert et al., 2010; Rust, 2022).

The consensus seems to be that in-person interactions are the preferred mode of communication with the farming community, even though many farmers can access the internet and have an online presence. One recent study in Ontario re-examined the use of internet-based sources, particularly social media platforms, as a means of fostering communication between food network stakeholders. The study suggests that social media platforms are used to some degree to access or share information, but that farmers rely much more heavily on face-to-face interactions or connections they have established offline. In addition, the farmer networks examined did not show a significant interest in expanding their online networks (Kaushik et al., 2018). Although the study works with a relatively small sample size, the results are consistent with some of the earlier research mentioned above.

6.1.3. Considerations to Improve Extension Services

In the past, both Farmers for Climate Solutions (2020) and the Ontario Soil Network (2018) have expressed that peer farmers are the best messengers for promoting environmental management practices. However, there are some important factors that need to be considered when using farmers as extension agents. One important consideration, raised by the Ontario Soil Network (2018), is that the use of peer farmers may be limited due to farmers' availability during the growing season and the potential for them to experience burnout. Other concerns include that some farmers may be reluctant to deliver information or formal presentations to their community, because they do not want to project an air of superiority. Asking farmers to help convene more informal or smaller scale meetings may be a one option for mitigating some of these concerns (McFatridge et al., 2022).

Potential best practices could include having governments provide grants to organizations that host on-farm and interactive demonstration events or even more informal social gatherings. These can be used to promote better communication between farmers, the implementing organization, and government staff, which can result in higher program buy-in. Provinces like Nova Scotia and Saskatchewan have already started including these types of funding opportunities in their provincial cost-share programs. In cases where local farmers are reluctant to play the role of messenger, another option identified by SPI's past convening could be to fly in progressive or leading-edge farmers from other jurisdictions (McFatridge et al., 2022). Encouraging smaller-scale and regional meetings could also help develop farmer networks and address specific priorities in each watershed or district.

In-person demonstrations of BMPs could be held at trade shows or by setting up the demonstration on a willing farmer's farm. Offering in-person, on-farm demonstrations of BMPs is currently part of OSCIA's On-Farm Applied Research and Monitoring Program and the Atlantic Grains Council's Check-Off programming. Expanding the use of these types of programs would provide tailored advice to farmers and enable them to become word-of-mouth 'salesmen' for the trials and BMPs that are implemented on their farms.

Advisory services should be offered for one-on-one help, which previous studies have found to be one of the key areas identified for increased EFP implementation by farmers (Smith et al, 2020). Other types of support would include on-farm visits, assistance in the creation of nutrient management plans or understanding of various tests (e.g. nitrogen content tests for manure, feed nutrient tests for forage, nitrogen soil levels), as well as online resources. **FCS suggests that the next APF support scaling up the amount of provincial advisory services that work for the province, as well as increasing advisory support offered through EFP programs.**

6.2 Landscape-level Targeting via Collective Adoption Bonuses

6.2.1. Overview

Landscape-scale agri-environmental programming to improve overall outcomes, or to target interventions to a particular area of concern have become more popular in recent years. Some examples of this are the native sod provisions in USDA programming, landscape-scale bundling in the CSP, or landscape-scale planning for drought resilience in Australia. In Canada, the Lake Erie Agriculture Demonstrating Sustainability (LEADS) is a CAP program that takes this approach to reducing runoff in two watersheds in southern Ontario (OSCIA, n.d.). Additionally, a 2018 report from the Standing Committee on Agriculture and Agri-Food recommended that the Government of Canada should create incentives for farmers to adopt integrated watershed management (AGRI Committee Report, 2018).

Provinces in Canada without landscape-scale or watershed-based priorities for BMP implementation should be encouraged to develop this kind of framework. Regional or watershed level planning can encourage farmers to adopt BMPs that collectively benefit water quality or mitigate flooding risks, while also reducing emissions. In addition, this type of planning can also promote the adoption of BMPs that have low current adoption rates by creating bonus incentives based on the amount of land area in the watershed that adopts the targeted BMP.

6.2.2. Collective Adoption Bonus Payment Research

A collective adoption bonus is one method of achieving the two objectives mentioned above. To apply this structure to the agriculture sector, we can look at one example from France. In a choice experiment study conducted by Kuhfuss et al. (2016), farmers were offered contracts that combined an individual payment with a collective bonus payment that was disbursed when a certain proportion of total farm area was enrolled in the program at the regional level (ex., 50%

of arable land in the watershed). The study found that the collective bonus option increased the participation rate by about 4%, compared to offering the incentive as an individual equivalent payment. In addition, farmers were willing to enrol 3% more of their land area, equivalent to an additional 221 hectares, compared to offering an individual equivalent payment (Kuhfuss et al., 2016).

Overall, about 70% of the farmers who participated in the study felt that the collective bonus would be achievable when set at 50% of the land area, and the results show that farmers prefer the collective bonus structure over an equivalent increase in individual payments. It was suggested that encouraging a sense of collective action motivated farmers to participate in the scheme because they sensed that the rest of the community was also involved in working toward the common goal (Kuhfuss et al., 2016).

Collective incentives have also been considered in a few other jurisdictions. For example, India's Modified National Agriculture Insurance Scheme encouraged farmers to adopt conservation practices that reduce future water risks or improve sustainability. Farmers can receive a discount on their premium if all the farmers in a specified area have adopted the necessary practices (Surminski & Oramas-Dorta, 2011). This functions similarly to the Kuhfuss et al. (2016) example but could be significantly less costly to the administering party.

Other studies have used framed field experiments in Indonesia to determine how a collective incentive would impact environmentally friendly land use decisions. The study found that collective and individual incentives work equally well across farm sizes, but that collective incentives could motivate behaviour change at lower payment levels. Collective incentives at a low payment level increased the participation by about 6%, which is more than double the participation rate (2.6%) recorded in response to offering a small individual incentive. The study also finds the amount of land enrolled is significantly influenced by the attitudes or motivations of the farmer networks in the region because the actions of the network as a whole impact the potential payouts (Maria et al., 2021).

6.2.3. Applications to Canada's Agriculture Sector

In Canada, these adoption bonuses could be used to target BMPs that help achieve broader 2030 targets by focussing on how individual watersheds or districts can make a significant difference. Manitoba's GROW program or the various ALUS communities could be a great example of how to structure the program. Both of these programs focus on addressing priorities on a regional or watershed scale and offer financial incentives to farmers in the area to adopt conservation practices that achieve their desired outcomes. A collective adoption bonus would add to these programs by setting a target acreage under conservation practices within a specified timeframe. The program would then disburse an additional per acre bonus payment if the acreage target was achieved, calculated by adding up all of the acreage contributed by the various farmers located in the target area.

Collective incentives are best applied to practices that can be adopted on a per-unit basis (i.e., per head of livestock or per acre of land), meaning that this instrument is not well placed to encourage the purchase of equipment. For example, a per-acre subsidy payment would likely not motivate a farmer to purchase a new manure management system; however, it could be useful for incentivizing some farmers to engage in rotational grazing or cover cropping. BMPs like cover cropping, nitrogen management, rotational grazing, or tree planting could all be considered candidates for this type of program. This is because they can be applied on a per-unit basis and have benefits over and above emissions reductions. While emissions reductions are important, other environmental benefits, such as improving water quality, building soil health, or supporting species at risk habitat, might be more tangible or relatable to farmers – which may provide additional motivation for them to participate.

It is also important to consider how the per-acre payment and bonus would be calculated. One option is to offer a direct annual payment based on the calculations in the FCS Economics Report, at 90% of the total inducement cost. Then, if after 5 years the adoption target is reached, all farmers receive the additional bonus payment, worth the final 10% of the inducement cost for each acre and each year of participation. For example, one delivery agent of Manitoba's GROW programs offers a subsidy of \$25 per acre to induce cover crop adoption. Therefore, $\$25 \text{ per acre} * 90\% = \22.50 per acre , per year for 5 years. After the 5 years, if adoption level is reached, all farmers get an additional $\$12.50/\text{acre}$ ($\$25 * 10\% = \$2.50 * 5 \text{ years} = \12.50 per acre).

There are a few alternative designs for a collective adoption bonus. The first is a practice-based approach – where the collective bonus depends on all farmers adopting specific BMPs within the targeted region. The second is an outcomes-based approach – where payment is conditional on achieving a collective environmental target, rather than rewarding collective adoption of specific BMPs. McFatridge et al. (2022) found that some participants in their workshop thought an outcome-based approach would further tap into farmers' sense of community and foster innovation among farmers; however, a practice-based approach is probably the more suitable policy where the target BMPs are easily observed or verified (i.e., cover cropping or rotational grazing). The EFP program could also be used as a means of monitoring progress over time if a practice-based approach was adopted. Monitoring and promotion of the program could also be devolved to conservation authorities or watershed districts; however, the government should remain the primary delivery agent of the program.

An outcome-based approach would potentially drive up the monitoring costs associated with the program, as consistently trying to monitor N₂O emissions reductions or reductions in runoff are not highly observable and require equipment to quantify accurately. An outcome-based approach might be feasible in cases where environmental outcomes can be monitored at a reasonable cost. Soil health indicators such as SOM or RSN are potential candidates here, although in this case the expected benefits of the outcome-based approach need to be balanced against the monitoring costs.

This approach was favoured by members of Farmers for Climate Solutions' Task Force because it includes all farmers in a target area in achieving a common goal – meaning that small farmers, and potentially other equity-deserving farmers like specialty crop or livestock farmers, would also be incentivized to participate. The collective structure would also help create a network amongst farmers in the target area and could help farmers who may not be familiar with the practice move up the learning curve more quickly by interacting with peers and neighbours (i.e., knowledge spillovers).

6.3. EFP and Tiered Incentive Payments & Systems-Based BMP Adoption

6.3.1. Overview

Tiered adoption payments are a concept that was explored in section 3.1 on the UK's new Environmental Land Management scheme. The tiered payment structure encourages farmers to undertake various levels of BMP adoption, with more difficult and extensive agri-environmental practice adoption resulting in higher payments. There is also a program in the United States (i.e., EQIP, which is discussed in section 3.3) that rewards farmers already undertaking conservation efforts or those who are willing to undertake additional efforts to improve conservation outcomes.

In Canada, one province has also taken the initiative to incentivize a systems-based approach to BMP adoption through the Canadian Agriculture Partnership's cost-share programs. The Ontario Soil and Crop Improvement Association (OSCIA) offers farmers an additional 5% in cost-share funding if they declare that they have adopted BMPs that address multiple environmental outcomes. To qualify for the additional funding, farmers must have already adopted BMPs from 3 different categories. For instance, this could involve adopting a nutrient management plan, cover crops, and a windbreak. There are systems-based approach criteria for both crop and livestock farmers (OSCIA, n.d.-b).

6.3.2. Establishing a National Program

To put a similar program in place in Canada at a national level, FCS recommends that the program be linked into the EFP program. OSCIA's program has already broken down the BMPs into different categories to represent a systems-based approach to adoption; however, the EFP might be a more effective guide for this type of program, as it would mean that the set of BMPs and associated compensation is tailored towards the most relevant on-farm risks in each province. All farmers should be eligible to participate in this program and receive compensation, whether they are farmers who have already adopted a suite of BMPs that represent a systems-based approach or farmers who are planning to adopt new BMPs in this program year.

Another advantage of using the EFP is that it encourages farmers to complete their EFPs and standardizes the data collection template. Each province would be able to work in concert with the federal government to set appropriate standards for systems-based BMP adoption, similar to how multiple sets of standard practices were developed for the UK program. Regardless of

the practices needed to achieve each payment level, data would be collected in the standardized EFP format and could be rolled up to provide regional, provincial, and national data on BMP adoption.

6.3.3. Payment Structure

The program would use the EFP to determine the various categories of BMPs or environmental priorities that need to be addressed. As with the Ontario program, the first few BMPs adopted would be subject to regular cost-share or subsidy support, but once farmers had adopted a BMP from a fourth category, they would then be eligible for an additional incentive payment. Additional practice adoption addressing a fifth or sixth priority or BMP category would result in higher incentive payments. The program could also be simplified slightly by offering the additional incentive based on the number of BMPs adopted (i.e., 4 BMPs from any category make the farmer eligible for the payment); however, this structure may not encourage a systems-based approach to BMP adoption.

There are a few options for providing compensation for systems-based BMP adoption: (1) farmers could receive payments for BMPs on a per-acre basis or, if the farmer also has livestock, on a per-head basis (i.e., cover crops or manure management); (2) farmers could receive their payment as an annual lump-sum deposit into their AgrilInvest bank account, where an additional percentage of matching dollars would be contributed as compensation; or (3) farmers could be incentivized through higher cost-share percentages (i.e., OSCIA's program in Ontario).

FCS recommends that the existing cost-shares and subsidies suggested in the Programs and Policies report should be available to all farmers to help with initial costs of BMP adoption. In addition to these supports, FCS recommends that the systems-based incentive be delivered through AgrilInvest after 3 BMPs in different categories have been adopted. The AgrilInvest incentive would offer additional matching funds to farmers who have adopted or plan to adopt BMPs in different categories (i.e., an extra .5% for adopting 3 BMPs in different categories and 1% for 4 BMPs in different categories). Addressing multiple on-farm sources of emissions should be a key priority of the next Agricultural Policy Framework and this system would help compensate farmers for the additional effort required to address these objectives.

6.3.4. Monitoring

Farmers would need to sign a contract with their delivery agency to agree that they will maintain and/or implement the set of BMPs in their contract for the duration of payments. There is also the opportunity to review past cost-share applications to determine what projects farmers have undertaken already and what additional projects might need to be undertaken to increase the payment level. Multi-year contracts would reduce the administrative burden of the program on departments and farmers; however, farmers who wish to adopt new BMPs before the end of their contract term should be allowed to do so.

Currently, participation in the EFP program and the decision to implement any action items in the EFP is voluntary. This means that farmers are not required to complete their EFP or implement any of the actions within it. Due to its voluntary nature, there is no monitoring of implementation built into the programs at the moment and it is unclear if internal assessments of implementation are completed. One older study of BC's EFP/BMP program found that no evaluation of these programs had occurred as of 2012 (Kitchen, 2012). Although, the existing provincial delivery channels should have data on all farmers currently accessing their programming and would likely be able to engage in monitoring activities through their current channels.

Farmers who enroll in this tiered system would be receiving additional funding and should expect to be required to provide some proof of implementation. This could be done via annual submission of receipts, pictures of the implementation, and other supporting documentation (dependent on the BMP). Provincial delivery agents could also use random compliance checks on a portion of farmers enrolled in the program each year (e.g. 1% to 5%) to ensure that minimal on-farm monitoring is occurring.

The monitoring and data collection associated with this program could also help measure the level and success of BMP adoption in each province. Currently some provinces conduct follow-up surveys and interviews with BMP adopters but standardizing this practice would be extremely helpful for informing future programming, including extension services. For instance, farmers who participate in these interviews could reveal barriers associated with adopting the BMPs and could advise on how to communicate with other farmers about the BMP or financial support program. Whenever possible, aggregated feedback should be published and willing participants' success stories should be highlighted to attract attention from peer farmers.

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Appendix 1 – BMP Cost-Share Information by Province

Province	Administrator	BMP Cost-share	Other FPT programming
PEI	Agriculture Stewardship Program	<p>Requires an EFP completed in past 5 years to participate</p> <p>A maximum of \$100,000 per farming operation over the life of the CAP is permitted; maximum \$20,000 per fiscal year.</p>	ALUS administered on provincial scale to run agricultural set-aside program
NS	Soil and Water Sustainability Program	<p>Requires an EFP completed in past 5 years to participate</p> <p>Eligible projects must be directly applicable to the registered farm on agricultural land owned or leased.</p> <p>A copy of the long-term lease (10 years) or rental agreement must accompany the Application for all physical projects applicable to leased/rented land</p>	<p>Novel management trial option for up to 75% cost-share (however, focus is NOT on sustainability)</p> <p>Advisory services (not sustainability focussed)</p>
NB	Environmentally Sustainable Agriculture programs	<p>Requires a 4th edition EFP (2004) to participate</p> <p>The total program cap for an individual farm operation for all combined BMP activities is \$50,000 over lifetime of the CAP</p>	<p>Environmental Management Planning to foster environmental leadership across agriculture sectors and regions by increasing knowledge, and information and technology transfer as it relates to environmental sustainability</p> <p>Environmental Management Planning funded up to 100% of activities – makes it competitive with free services provided by other means (e.g. vendors)</p> <p>Agro-Environmental Club Program to foster environmental leadership across agriculture sectors and regions by increasing</p>

			knowledge, and information and technology transfer as it relates to environmental sustainability
NL	Environmental Sustainability and Climate Change Program	<p>No EFP requirement to participate</p> <p>Maximum of \$400,000 over the CAP (however this is across all cost-share programs; many are not agri-environmental focussed)</p>	<p>Mitigating Agricultural Risks Program Risk Assessments - Development of risk management strategies and tools to enhance the sustainability and profitability of the sector. (However, seems to be minimal focus in this program on sustainability)</p> <p>The Implementation Committee may consider BMPs not listed below if it is shown that the activity enhances environmental stewardship within the agri-business.</p>
QC	Programme Prime-Vert, administered by the Ministère de l'Agriculture, des Pêcheries et de l'Alimentation (MAPAQ)	<p>Requires an EFP-equivalent (PAA) completed in the past 7 years to apply for funding and BMP to implement must part of PAA-related action plant</p> <p>A higher cost-share can be received (up to 90%) if certain extra environmental targets are met (e.g. in a focus region or part of a collective adoption)</p> <p>Each BMP has funding cap instead of a farmer cap</p>	<p>3 streams which focus on individual BMPs, group or regional BMPs, and the research and extension of BMP knowledge</p> <p>Regional action plans can be created and provide greater cost-share for farmers</p>
ON	Ontario Soil and Crop Improvement Association (OSCIA)	<p>Requires a 4th edition EFP for funding</p> <p>A farm business may have up to two (2) applications approved in an intake or under consideration at one time; total cap set by category of BMP</p>	<p>Lake Erie Agriculture Demonstrating Sustainability (LEADS) program offers enhanced funding in priority target area</p> <p>SARPAL and SARFIP programming offers funding for species at risk conservation related BMPs</p>

			Offers BMP “Fragile Land Retirement” 50% cost-share up to \$10k; requires commitment of 15 years of retirement
MB	Ag Action Manitoba Plan	<p>Requires an EFP completed in past 5 years to participate</p> <p>The total maximum amount payable to one farm operation is \$60,000. The farmer must own or control land where the project will be located (or have permission from the land owner to execute the project)</p>	<p>Ag Action under the CAP also supports pilots and R&D (including sustainability research)</p> <p>Ag Action Manitoba funding new release for R&D with other partners</p> <p>Pilot of sustainable forage production that does not impact funding cap for other BMPs</p>
SK	Farm Stewardship Program	<p>Does not require a completed EFP</p> <p>Farmers must have at least \$50,000 in gross income to participate</p>	<p>Irrigation Efficiency Program to improve energy and water efficiencies in irrigation systems.</p> <p>Agri-Environmental Technical Services provides agri-environmental technical services and critical habitat support.</p> <p>Previously used to offer a program that administered projects through group plans, which captured farmers who did not participate in individual EFPs</p>
AB	Agriculture Environmental Stewardship Program	<p>Requires an EFP completed in past 10 years to participate</p> <p>Overall cap for funding is \$100k over lifetime of CAP</p> <p>Has innovation BMP category that allows trial of proven technology or BMP from other jurisdiction but new to AB; can be eligible for an <i>additional</i> \$100k</p>	<p>Agriculture and Food Sustainability Assurance Initiatives Program offers funding to industry groups or not-for-profits to develop or enhance sustainability certification or assurance systems (Government of Alberta, 2019).</p> <p>Environmental Stewardship and Climate Change – Group program supports group funding to improve extension delivery, research, and</p>

			data management to improve sustainability (Government of Alberta, 2018).
BC	Investment Agriculture Foundation (IAF)	<p>Requires an EFP completed within 5 year to participate</p> <p>Overall farm cap for BMP Program remains at \$70K for any farm that has or is participating in the Canada-BC Environmental Farm Plan Program. This cap runs back to the original APF.</p> <p>Offers BMP cost-share and other program funding at a regional scale.</p>	<p>Farm Adaptation Innovator Program</p> <p>Supports projects that work to build adaptive capacity and/or encourage the adoption of farm practices that mitigate impacts related to climate change. Projects can promote innovative technologies, provide on-farm demonstrations, or develop knowledge-sharing (Government of BC, n.d.).</p> <p>Offers area-based project funding where projects are implemented as a collaborative effort by two or more farmers working together to resolve a defined environmental issue. If approved, projects would be funded based on Project Code criteria plus an incentive premium equivalent to a 10% lift in the individual practice code cost share up to the Practice Code Cap</p>

Appendix 2 – Environmental Farm Plan (EFP) by Province

Province	Contents of EFP	Administration of EFP
PEI	GIS mapping of fields, properties, buffer zones and infrastructure	<p>Must be renewed every 5 years</p> <p>Can be completed in less than 2 hours with an environmental planning officer; can be done virtually or in an office</p>
NS	<p>General</p> <p>Wells</p> <p>Watercourses</p> <p>Riparian Zones, Hedgerows, Shelterbelts & Biodiversity</p> <p>Waste Management</p> <p>Nutrient Management</p> <p>Manure and Compost Management</p> <p>Pesticides</p> <p>Fuel</p> <p>Soil</p> <p>Cover Crops</p> <p>Irrigation</p> <p>Livestock Watering</p> <p>Livestock Feeding</p> <p>Fly Management</p> <p>Energy</p> <p>Miscellaneous</p>	<p>Must be updated every 5 years</p> <p>Initial review includes on-farm visit where risks are discussed with farmer; after the visit farmer receives EFP report</p> <p>Coordinator assigned for follow-ups</p> <p>Farm plan must be updated every 5 years (done with further input from expert)</p>
NB	<p>The workbook is divided into seven sections: Introduction, Farmstead and Homestead, Livestock Operations, Soil and Crop, Ecological Resources, Acts and Regulations, Conversion, Table and Glossary, and Action Plan; these are subdivided into 22 subsections on risk assessment.</p> <p>Each sub-section provides information on five topics: soil health, water quality, air quality, biodiversity and profitability.</p>	<p>Individual or workshop; 5 steps.</p> <ol style="list-style-type: none"> 1. Facilitator provides introduction on how to sample soils and complete EFP. 2. Individual completes self-assessment (can be with help of a coordinator) 3. Submitted for third-party review to be certified 4. Implementation 5. Must update every 5 years <p>Last revised 2004</p>

<p>NL</p>	<p>Farmstead and Homestead</p> <ul style="list-style-type: none"> ● Wells ● Petroleum, pesticide, fertilizer storage and handling ● Farm waste ● On-farm composting ● Energy efficiency ● Farmstead windbreaks <p>Livestock Operations</p> <ul style="list-style-type: none"> ● Facilities ● Manure storage and handling ● Pasture management <p>Soil and Crop</p> <ul style="list-style-type: none"> ● Soil management ● Nutrient management ● Pest management ● Irrigation ● Field windbreaks ● Peatlands, dykes, and floodplains <p>Ecological Resources</p> <ul style="list-style-type: none"> ● Riparian buffer zones ● Wetlands ● Woodlots ● Species at Risk 	<p>Completed by the farmer either at a scheduled workshop, through one on one sessions or through consultation. Completion involves rating potential risks and then identifying alternative activities that are less of a risk.</p> <p>Last updated 2007.</p>
<p>ON</p>	<p>Looks at 23 areas on farm to improve environmental awareness</p> <p>Has two parts – Farm Review (identify potential risks) and Action Plan (management risk vs natural risk)</p> <p>Focus areas include:</p> <p>Water:</p> <ul style="list-style-type: none"> ● Wells ● Water efficiency ● Stream, floodplain, ditch management ● Wetlands/ponds <p>Storage/handling/disposal of:</p> <ul style="list-style-type: none"> ● Pesticides ● Petroleum ● Household wastewater ● Manure ● Farm waste ● Livestock mortalities 	<p>In-person, 2-day workshop, or electronically</p> <p>Online info sheets to address issues identified in EFP, sorted into the 23 sections</p>

	<ul style="list-style-type: none"> ● Silage ● Milking washwater <p>Energy efficiency Pest management Manure and other organic materials Woodlands and wildlife Horticultural production Field crop production</p>	
QC	<p>Adaptation to climate change and reducing GHG emissions Managing fertilizers and residuals on-farm Soil health and conservation Use and management of water IPM Biodiversity in agricultural landscapes</p>	<p>In Quebec, farmers consult with a third-party agronomist or other authorized expert to create an Agri-Environmental Support Plan (Plan d'accompagnement agroenvironnemental – PAA), Quebec's equivalent of an EFP.</p> <p>To remain valid, farmers must begin implementing some of the actions set out in their plan</p> <p>Plan guides are updated every year</p>
MB	<p>Farmstead review</p> <ul style="list-style-type: none"> ● Water source protection ● Feed storage ● Nuisance control ● Fertilizer, pesticide, petroleum, manure, storage and handling ● Farm wastes ● Energy efficiency <p>Field review</p> <ul style="list-style-type: none"> ● Focus in crop or pasture land <p>Water requirements</p> <p>Management review</p> <ul style="list-style-type: none"> ● Soil management ● Crop management ● Pest management ● Fertilizer management ● Drainage ● Irrigation ● Manure application ● Ecological goods and services 	<p>Workshop (half-day) with facilitators and resource specialists to guide farmers through their workbook</p> <p>Workbook review offered as final step for statement of completion</p> <p>Once complete, can display an EFP farm gate sign</p> <p>Must be renewed every 5 years to remain valid</p>

	<ul style="list-style-type: none"> ● Climate change <p>Creation of action plan including BMPs already underway, short term plan (within 2 years), long term plan (over 2 years) challenges to implementation</p>	
SK	<p>Looks at farmstead and field sites including:</p> <ul style="list-style-type: none"> ● Storage and handling of chemicals and wastes (including manure, silage) ● Energy efficiency ● Soil management ● Nutrient management ● Water bodies ● Natural areas (includes shelterbelts, woodlots, wildlife) ● Water conservation ● Irrigation <p>Also includes an emergency response plan</p>	<p>Administered online by the farmer</p> <p>Once complete, a specialist will review and be available for assistance if required</p> <p>Sets out timelines for implementation</p>
AB	<p>Site and Soil Characteristics Water sources Water bodies Environmental Emergency Planning Habitat Management Trees, Shelterbelts, Woodlots and Bush</p>	<p>Technician from the region works with farmer</p> <p>Option for workshops on EFP</p> <p>Can be completed online</p> <p>Must be renewed every 10 years</p>
BC	<p>Farmstead Livestock</p> <ul style="list-style-type: none"> ● Housing ● Outdoor livestock areas ● Manure handling and storage ● Mortality disposal <p>Crops</p> <ul style="list-style-type: none"> ● Soil management ● Carbon sequestration ● Flood management ● Erosion control ● Wildlife Habitat ● IPM <p>Nutrient Application</p> <ul style="list-style-type: none"> ● 4Rs ● Soil amendments 	<p>Delivered through ARDCorp (now through IAFBC)</p> <p>One-on-one meetings with advisor who helps complete risk assessment and create action plan</p>

<ul style="list-style-type: none">• NMP <p>Biodiversity</p> <p>Soils</p> <p>Water</p> <ul style="list-style-type: none">• Water supply• Drainage• Runoff• Leaching <p>Air</p> <p>Stewardship Areas</p> <ul style="list-style-type: none">• Buffers• Riparian area management <p>Climate Change</p> <ul style="list-style-type: none">• Mitigation• Adaptation	
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