# Review and Evaluation of Program Models for Increasing the Adoption of Cover Crops and/or Soil Testing

Prepared for the Ontario Soil and Crop Improvement Association

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*The Reducing Barriers to BMP Adoption – Soil Testing and Cover Crops is a three-year applied research initiative that began in 2019. The initiative supports improving soil health, productivity, and water quality on farms across Ontario. The Ontario Ministry of Agriculture, Food and Rural Affairs identified the need for the project and the Ontario Soil and Crop Improvement Association is delivering it. This project is funded by the Canadian Agricultural Partnership, a five-year federal-provincial-territorial initiative.*

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# 1.0 Introduction

Cover crops and soil testing are widely recognized as beneficial management practices (BMPs) for improving soil health and reducing nutrient runoff and water pollution from agricultural land. As such, agricultural conservation programs are increasingly promoting and providing incentives for their use. However, despite the incentives and clear benefits, these specific BMPs have not been adopted to the same degree as many others. For instance, cover crops have yet to be widely implemented in Ontario, and indeed have been utilized on only a small percentage of available cropland across North America (Arbuckle and Roesch-McNally 2015; OCCS 2017). Similarly, the best estimates of soil testing place its use at 25-30% in the US and Australia (Lobry de Bruyn and Andrews 2016), which is in line with anecdotal reports that only 25% of Ontario's fields have a current soil test.

In order to increase adoption of these BMPs, jurisdictions worldwide have utilized a range of programs and approaches, with varying levels of success. Learning about these program models, and identifying particularly effective tools and strategies for encouraging behavioural change, will lead to valuable insights for use in developing programming for increasing the use of soil testing and cover crops across Ontario.

With this in mind, the broad aim of this research is to:

- identify and characterize the range of program models that exist for increasing adoption of cover crops and soil testing; and
- identify key themes and lessons learned from program implementation, including effective and innovative approaches, tools, strategies, and tactics that have been successfully used to increase the adoption of cover crops and soil testing.

In order to accomplish these objectives,19 programs aimed at increasing the adoption of cover crops and/or soil testing were qualitative evaluated, representing a variety of approaches across a range of geographic and agri-environmental contexts. Phone interviews were conducted with program administrators and supplemented with data from academic literature and program documentation. Based on the data collected, programs were categorized into four distinct models, each of which was analyzed using a SWOT approach to identify strengths, weaknesses, opportunities and threats. Key themes that emerged from qualitative analysis were identified, along with particularly effective and innovative strategies used by individual programs.

This report begins with a review of relevant literature pertaining to the factors that influence adoption of cover crops and soil testing (section 2.0). Section 3.0 describes the methods employed in this research, while section 4.0 provides an overview of all 19 programs selected for review. Section 5.0 contains the program characterizations and SWOT analysis of each model, while section 6.0 serves to highlight key themes and lessons learned.

# 2.0 Literature Review

## 2.1 Factors that influence BMP adoption

How do farmers make decisions about management practices on their farms? What factors influence those decisions, and how can policymakers incentivize the adoption of beneficial management practices (BMPs)? A great deal of research over the years has sought to answer these questions, including several recent review studies (e.g., Carlisle, *et al.* 2016 ; Liu, *et al.* 2018; Prokopy, *et al.* 2019). One of the most comprehensive studies to date, based on systematic review of 35 years of research on agricultural conservation practices in the US (Prokopy, *et al.* 2019), revealed that while few independent variables consistently account for agricultural BMP adoption, some factors are positively associated with adoption across different contexts:

**Factors that positively influence adoption of agricultural conservation practices**

- Farmer identifying as stewardship motivated or otherwise non-financially motivated
- Environmental attitudes and a positive attitude toward the particular program or practice
- Previous adoption of other conservation practices
- Seeking and using information related to agricultural practices
- Awareness of programs or practices
- Operating on vulnerable land
- Greater farm size
- Higher levels of income and formal education
- Engaging in marketing arrangements (such as third party certifications)
- Positive yield impact expected from adoption of conservation practices

(from Prokopy, *et al*. 2019)

While generalizations about influential factors can be useful, the specific factors that influence any particular case will vary based on geographic location, local norms, social context, and characteristics of the specific BMPs in question. With this in mind, this review focused on the factors found to influence the adoption of cover crops and soil testing.

## 2.2 Factors influencing the adoption of cover crops and soil testing

Research focused specifically on the adoption of cover crops and soil testing has indicated a number of factors that influence their implementation. While not necessarily an exhaustive list, key factors identified in the literature are described here and summarized in Table 1, organized according to broad categories adapted from Liu, *et al.* (2018): information and awareness, financial incentives, social norms and networks, and internal and external factors.

## Information and awareness

### Cover crops

Providing credible information and creating awareness of cover crops, specifically relating to implementation strategies, benefits, and risks, are among the most important factors that influence adoption (SARE 2019). Research conducted by Burnett *et al.* (2016) in the western Lake Erie basin found that farmers were more likely to have used cover crops if they were more educated, more risk-tolerant, owned more acreage, had a higher sense of control over nutrient loss, and believed strongly in the effectiveness of cover crops at reducing nutrient runoff. Similarly, a survey of almost 1,000 farmers in Iowa found that perceived benefit was the critical determinant of cover crop adoption, and a lack of knowledge and uncertainty regarding the risks of cover crop establishment, termination, and crop yield were critical factors for those who did not utilize cover crops (Arbuckle and Roesch-McNally 2015). Expected impacts of cover crops on crop yield also influence whether producers are likely to trial the practice (SARE 2019).

“Observability” - being able to physically observe the benefits of a practice - is a key determinant of BMP adoption (Reimer, *et al.* 2012). This has proven true in the case of cover crops, as in-person demonstrations of cover crop implementation are often cited as being instrumental in their promotion and adoption. For example, research in Indiana has shown a significant positive relationship between producer attendance at demonstration sites and field days, and the adoption of cover crops (Singh, *et al.* 2018; SARE 2019).

### Soil testing

For soil testing, online platforms and web-based tools offer an accessible way for producers to examine and interpret soil information (Lobry de Bruyn and Andrews 2016). However research has also noted that despite the proliferation of technology-based tools relating to soil health, there is still an essential role for direct, face-to-face interaction between experts and producers, as well as peer-to-peer among producers, in the form of training, field tours, and hands-on demonstrations (Lobry de Bruyn, *et al.* 2017).

## Financial incentives

### Cover crops

Implementing cover crops often comes at an increased cost and financial risk for producers. Therefore financial incentives are one way that the practice can be encouraged. Research in Iowa’s corn belt found that in order to see more widespread adoption of cover crops, farmers believed that greater economic incentives would be needed (Roesch-McNally et al. 2017). A survey of early adopters of cover crops found that those who had stopped the practice perceived the success of cover crops to be limited by the increased costs and difficulties they caused for farm management in their area (Dunn, *et al.* 2016). Indeed, in recognition of the risks taken on by producers who implement cover crops, Roesch-McNally *et al.* (2017) recommend that cost-share or other financial mechanisms be instituted to allow farmers adequate time to experiment with cover crops in order to successfully integrate them into their operations over the long-term. The availability of financial incentives from government or private sector cost-share

programs can facilitate the adoption of cover crops, especially if those incentives are able to be combined, or “stacked”, by producers (Plastina, *et al.* 2018; SARE 2019).

### Soil testing

Cost has also been noted as a barrier to widespread adoption of soil testing (Bennett and Cattle 2014). However other studies examining barriers to soil testing have found the cost of soil analysis to be less of a barrier than knowledge of how to interpret soil test results and apply the results to management decisions on the farm (Lobry de Bruyn 2019). Hence the role of financial incentives alone for incentivizing soil testing behaviour is uncertain.

## Social norms and networks

### Cover crops

The dominant agricultural production system acts to reinforce existing social norms, framing what farmers see as opportunities or reasonable changes to their current production systems (Roesch-McNally, *et al.* 2017). In other words, producers are influenced by social pressure and the actions of their peers; if no one around them is using cover crops, it becomes harder to imagine how it might be possible to integrate the practice into their own operations.

On the other hand, where producers can see that peers have successfully implemented cover crops, and when peer-to-peer support is provided via local farmer networks and organizations, it becomes more likely that producers will be willing to adopt the practice themselves (OCCS 2017; SARE 2019). For example, a major factor in the adoption of cover crops by farmers in Iowa has been their ability to engage with farmer networks to gain strategies for overcoming the management challenges associated with cover crops (Roesch-McNally, *et al.* 2017).

### Soil testing

Similarly, with respect to soil testing, research in Australia has found that farmer-to-farmer networks and farmer-led conservation group networks have been essential for spreading information and changing social norms around soil testing and soil health (Packer, *et al.* 2017).

## Internal factors

### Cover crops

Characteristics of incentive programs themselves can impact BMP adoption and whether and how they are adopted by producers. For cover crops specifically, the provision of education and technical training as part of program delivery is critical to supporting their widespread adoption. Among farmers that have used cover crops in Iowa, most noted that the support they had received from conservation agencies and watershed groups had been instrumental in their decision and capacity to adopt them (Arbuckle and Roesch-McNally 2015). Program characteristics such as the timing of the program in relation to the planting season and administrative and paperwork requirements for participants can also impact participation (OCCS 2017), as can the length and terms of payment contracts (American Farmland Trust 2013).

### Soil testing

Much of the research on soil testing programs emphasizes the importance of education and capacity-building. Lobry de Bruyn and Andrews (2017) found that program models that engage farmers to become their own researchers, observers and decision makers are more beneficial than the standard technology transfer model in which experts provide information to producers in a linear manner. That being said, many researchers also noted the importance of expert advice and technical assistance in relation to soil testing, in both one-on-one (Bennett and Cattle 2014) and group/workshop formats (Packer, *et al.* 2019), and ensuring that independent expert advice is provided to participants on an ongoing basis after the initial program or workshop (Andersson and Orgill 2019). From a program delivery standpoint, Lobry de Bruyn and Andrews (2017) noted that farmers often prefer having soil testing done for them rather than doing the testing themselves, and so a program designed to address this barrier can improve participation rates.

## External factors

### Cover crops

Structural factors external to BMPs and incentive programs also impact their adoption or lack thereof. The move in agriculture toward a more commodity-oriented and economically-specialized system has resulted in a narrowing of land use diversity and a reduction in mixed crop-livestock operations. This acts to constrain the use of cover crops, which are more likely to be utilized by farmers with greater crop diversity and mixed crop-livestock operations (Singer, *et al.* 2007; Arbuckle and Roesch-McNally 2015). There is also a risk (both perceived and real) that planting and termination of cover crops could affect the crop insurance eligibility of main cash crops (OCCS 2017). If left unaddressed, this can serve as a significant barrier to cover crop adoption. Land tenure can also constrain adoption, as owners who are not enthusiastic about cover crops can dissuade tenant farmers from trialing the practice (Dunn, *et al.* 2016).

### Soil testing

Soil testing behaviour can also be constrained by issues related to land tenure. The prevalence of short term leases means that there is less incentive for tenant farmers to engage in long-term planning and investments in soil health (Lobry de Bruyn and Andrews 2016). Trends in increasing farm size also impact soil testing behaviours. Fewer farmers in total farming larger land areas mean that their limited time and resources have to go further; this leaves less time and resources for carrying out soil tests and monitoring soil health as closely as they might if they had less acreage (Lobry de Bruyn and Andrews 2016).

Table 1: Summary of factors influencing adoption of cover crops and soil testing

| **Factor Category** (from Liu et al. 2018) | **Factors influencing adoption of cover crops** | **Factors influencing adoption of soil testing** |
|---|---|---|
| Information and awareness | ● Communication of benefits and risks of cover crops (Burnett, *et al.* 2016)<br>● Type of outreach (e.g. peer-to-peer, government, farm associations, social media, etc.) (SARE 2019)<br>● Observability (Reimer, *et al.* 2012)<br>● Use of local demonstration sites and training opportunities, field days (Dunn et al. 2016; Singh, *et al.* 2018)<br>● Credibility of information sources (SARE 2007) | ● Online platforms and web-based tools offer an interactive way to examine and interpret soil data (Lobry de Bruyn and Andrews 2016)<br>● Important role for direct interaction with face-to-face communication, training, field tours, hands-on demonstrations (Lobry de Bruyn, *et al.* 2017)<br>● Observability is key (Reimer, *et al.* 2012), visually or through lab tests (Lobry de Bruyn and Andrews 2016) |
| Financial incentives | ● Level of financial support (Roesch-McNally, *et al.* 2017; SARE 2019)<br>● Supply chain incentives (SARE 2019)<br>● Availability of multiple or "stacked" incentives (SARE 2019) | ● Cost can be as a barrier to soil testing (Bennett and Cattle 2014)<br>● Cost not as much of a barrier as knowledge of how to interpret soil test results and make decisions based on them (Lobry de Bruyn 2019) |
| Social norms | ● Peer-to-peer networks (OCCS 2017)<br>● Local "champions" (OCCS 2017)<br>● Engaging with farmer networks to gain strategies for overcoming management challenges of cover crops (Roesch-McNally, *et al.* 2017) | ● Farmer-farmer networks, farmer conservation group networks are essential for spreading information about soil testing and soil health (Packer, *et al.* 2017) |
| Internal factors (characteristics of incentive programs) | ● Timing of program in relation to planting season (OCCS 2017)<br>● Administrative/paperwork requirements (OCCS 2017)<br>● Provision of education/technical assistance as part of program (Arbuckle and Roesch-McNally 2015) | ● Engaging farmers to become researchers, decision makers more effective than linear model (Lobry de Bruyn and Andrews 2017)<br>● One-on-one expert advice/technical assistance (Bennett and Cattle 2014)<br>● Workshop format highly effective (Packer, *et al.* 2019)<br>● Ongoing extension and expert advice (Andersson and Orgill 2019)<br>● Farmers often prefer having soil testing provided (Lobry de Bruyn and Andrews 2016) |
| External factors | ● Decrease in land use diversity and mixed crop-livestock farms (Arbuckle and Roesch-McNally 2015)<br>● Crop insurance risks (perceived and real) (OCCS 2017)<br>● Land tenure - rented land can constrain adoption of cover crops (Dunn, *et al.* 2016) | ● Less farmers on more land, lack of time/resources (Lobry de Bruyn and Andrews 2016)<br>● Land tenure - short term leases mean less incentive for long term planning (Lobry de Bruyn and Andrews 2016) |

# 3.0 Methods

This research aimed to identify and characterize program models for increasing the adoption of cover crops and soil testing, with a focus on those in Ontario and the northern US. Key themes and lessons learned were identified from the implementation of those programs, including innovative and effective approaches, program components, strategies and tactics that have been used to increase the adoption of these BMPs. In order to accomplish these objectives, a qualitative evaluation was carried out of 19 programs in Canada, the United States, and Australia. The methods employed to conduct this research are detailed in this section.

## 3.1 Program selection

The researchers, in consultation with OSCIA staff, identified an initial list of programs to review, which were aimed at increasing adoption of cover crops and/or soil testing. Efforts were made to include programs that utilized a range of tools, including conventional cost-share incentive programs as well as novel approaches such as pay for practice and water quality trading. Geographically, priority was given to programs in and around Ontario, the Great Lakes, and the northeastern US. However, literature review and suggestions from key informants led to additional programs being identified outside of this priority area, which were included where appropriate. In total, 19 programs were evaluated (listed in Section 4.0). This is not meant to be a comprehensive list of all programs aimed at increasing the adoption of cover crops and/or soil testing, but rather represents a diverse cross-section of approaches and models.

## 3.2 Data collection

Data for this project were collected through primary qualitative research (phone interviews with program administrators) and secondary sources (literature review). An initial review of relevant literature was conducted initially to gain an understanding of the factors known to influence adoption of agricultural BMPs generally, as well as cover crops and soil testing specifically. Based on this review, a set of open-ended questions was developed to guide interviews with program administrators (Appendix A). Grounding the interview guide in the results of the literature review ensured that factors known to influence BMP adoption were addressed in key informant interviews. Contact information for program staff was found on websites or provided by key informants. In total, 17 telephone interviews were conducted with 19 program coordinators or staff members (some interviews included multiple participants). All interviews were conducted between January 28 and February 25, 2020. Additional program-specific information was collected from websites and related publications, or by email where interviews could not be conducted. A detailed overview of data collected for each program can be found in tabular form in Appendix B.

## 3.3 Analysis

Based on literature review and data collection, all programs included in the evaluation were categorized into four distinct program models, which are described in section 5.0. A SWOT analysis, which seeks to identify the internal strengths and weaknesses of, and external

opportunities and threats to an organization or entity in order to provide systematic support for decision making (Ghazinoory, *et al.* 2011), was then conducted for each program model. Examples of particularly effective or innovative programs within each model have been highlighted.

In order to identify key themes and lessons learned across programs, all interview notes were coded thematically using the inductive coding method, meaning that the themes emerged from the data during analysis (Thomas 2003). These key themes are summarized in section 6.0. Particularly effective or innovative program strategies have also been highlighted in this section.

# 4.0 List of Programs Reviewed

In total, 19 programs were reviewed for this research and are listed in Table 2, below. The majority of programs (18/19) are located within the Great Lakes basin in Canada and the USA. One novel approach to increasing adoption of soil testing was identified in Australia, and was also included in the review.

Table 2: Overview of programs reviewed

| Program and Jurisdiction | Program Overview |
|---|---|
| **ALUS Canada** (PE, QC, ON, MB, SK, AB, Canada) | A community-developed and farmer-delivered program that makes per-acre annual payments to participants for managing and maintaining projects that provide ecosystem goods and services. Focus on marginal and sensitive land; no projects on actively farmed land. ALUS New Acre project is a program for private companies to meet corporate sustainability outcomes by funding ALUS projects. |
| **Chesapeake Bay Program** (USA - Delaware, Maryland, New York, West Virginia, Virginia, Pennsylvania, DC) | Basin states are responsible for achieving nutrient reduction targets under the Total Maximum Daily Load for the watershed. States report BMP adoption to the Chesapeake Bay Program (CBP), which models impacts on nutrient loading. CBP funds projects not covered by federal and state funding, but does not run BMP incentive programs themselves. |
| **Clean Water - Green Spaces** (Essex Region CA, Essex Region, ON) | Financial incentive program funds cover crops and soil testing through Crop Nutrient Management Plans (CNMP). 20 applicants this year: 10 for cover crops and 10 for the CNMP. |
| **Clean Water - Healthy Land** Financial Assistance Program (Ganaraska Region CA, Ganaraska watershed, ON) | Financial incentive program that includes cover crops and soil testing. There have been two participants for cover crops, and soil testing has never been funded. |
| **Healthy Soils Check Up Program** (Bay of Quinte Remedial Action Plan (RAP), Bay of Quinte watershed, ON) | Bay of Quinte RAP provides cost-share funding for cover crops and free soil testing (they do the soil testing, help interpret results, and help make decisions one-on-one with participants as well as through workshops). There have been 55 participants, 27 of whom have done cover crops (1,700 acres over three years). |
| **Healthy Soils, Healthy Farms, Healthy Environment (H-3 Pilot)** (OMAFRA, York, Durham, Haliburton, Peterborough and Kawartha Regions, ON) | Three-year pilot program focused on improving awareness of agronomic soil testing. It offered soil testing at reduced cost (and did the testing for them), as well as offered workshops to help participants understand and interpret soil test results using nutrient management software. Well-received; 135 farms participated. |
| **Huron County Clean Water Project** (Ausable-Bayfield CA, Huron County, ON) | Financial incentive program that includes cost-sharing for cover crops and other BMPs. |

| Program and Jurisdiction | Program Overview |
|---|---|
| **Manage Your Soil Program** (Lake Simcoe Region CA, Lake Simcoe watershed, ON) | Financial incentive program that covers 100% of the cost of cover crop seed and 50% of the cost of soil testing and Nutrient Management Planning. A total of 46 participants in cover crops since 2012. Soil testing has had only a handful of participants since 2017. |
| **Maryland Agricultural Water Quality Cost-Share Program - Cover Crop Program** (Maryland, USA) | State-funded financial incentive program for cover crops with a high payment ($45-90/acre) and no cap on funding or acreage. Maryland has the highest cover crop adoption rate in the US (almost 50% of eligible farmland planted in cover crops). |
| **Ohio Environmental Quality Incentives Program (EQIP)** - **Cover Crops** (Ohio, USA) | Financial incentive program offered across the US (delivered by USDA) for agricultural BMPs (including cover crops); federally-mandated BMP funding (legislated in the US Farm Bill). |
| **Ohio River Basin Water Quality Trading Project** (Indiana, Ohio, Kentucky, USA) | A first-of-its-kind market-based water quality trading program wherein farmers earn tradable credits by implementing BMPs that reduce nutrient loss (including cover crops). Credits are bought by watershed point-source polluters and globally on the open market. |
| **Peel Rural Water Quality Program** (Credit Valley Conservation, Peel Region, ON) | Financial and technical assistance program for private rural landowners to encourage the implementation of BMPs that protect and improve water quality. There have been 23 cover crop participants. |
| **Pennsylvania No-Till Alliance** (Pennsylvania, USA) | A grassroots, farmer-led organization whose mission is to promote the successful application of no-till through shared ideas, experiences, education and new technology. They have been instrumental in increasing the use of cover crops in Pennsylvania through research, education, and capacity-building. |
| **Practical Farmers of Iowa (PFI) Cover Crop Cost-Share Program** (Iowa, USA) | PFI delivers supply chain-linked cost-share programs for cover crops funded by the private sector as part of corporate sustainability efforts (Pepsico/Cargill - Low Carbon Corn Program; Unilever/ADM - Sustainable Soy Program). |
| **Resource Enhancement and Protection Program** (Pennsylvania, USA) | Farmers earn state income tax credits for installing BMPs (including 50% of the cost of cover crops). Credits can be sold to other taxpayers after one year, and businesses can sponsor BMPs in order to claim tax credits themselves. |
| **Rural Water Quality Program** (Grand River watershed, ON) | Farmers receive grants to cover costs of water quality BMPs on their land. The program offers grants of 50-100% of the cost of selected BMPs. Eligible projects vary by county, as do funding rates. There have been 338 cover crop projects implemented since 2014. |
| **Saginaw Bay Watershed Pay for Performance Program** (Saginaw Bay watershed, Michigan, USA) | Participants receive annual payments ($225 per pound) for the sediment load reductions they achieve by implementing soil conservation practices (including cover crops and other BMPs). Sediment loss and nutrient reductions from BMPs are determined by field-scale modeling using the Great Lakes Watershed Modelling System. Five year pilot program running 2015-2020. |

| Program and Jurisdiction | Program Overview |
|---|---|
| **Soil Pits & Kits Soil Health Workshop Program** (Central West Local Land Services and Soil Knowledge Network of NSW, New South Wales, Australia) | The Soil Knowledge Network of NSW (a group of retired soil scientists) delivers a soil testing workshop program for local land managers and government employees. Participants learn about soil testing, learn how to take soil samples in the field, go and sample their own soil, then come together for a second workshop to learn how to interpret the results. |
| **South Nation Clean Water Program & Ottawa Rural Clean Water Grant Program** (South Nation watershed, ON) | A financial incentive program that provides grants for cover crops that are solely used for winter cover. |

# 5.0 Program Model Characterization and SWOT Analyses

Based on the attributes of whether or not they offer financial incentives, whether those incentives are based on practice (input) or performance (output), and other tools they employ, the 19 programs reviewed for this research have been divided into four distinct program models, characterized in this section. Programs within each model are further distinguished based whether their source of funding is public or private (see Table 3, below).

Table 3: Program model characterization

| Program Model | Funding | Programs |
|---|---|---|
| **Pay for Practice** (input-based; conventional cost-share model) | Public | • **Ontario Conservation Authority stewardship programs:**<br>  • **Rural Water Quality Program** (Grand River CA, Nottawasaga CA)<br>  • **Peel Rural Water Quality Program** (Credit Valley CA<br>  • **South Nation Clean Water Program** (South Nation CA)<br>  • **Clean Water - Healthy Land** (Ganaraska CA)<br>  • **Huron County Clean Water Project** (Ausable Bayfield)<br>  • **Manage Your Soil Program** (Lake Simcoe Region CA)<br>• **Ohio Environmental Quality Incentives Program (EQIP)** – **Cover Crops** (Ohio, USA)<br>• **Maryland Agricultural Water Quality Cost-Share Program - Cover Crop Program** (Maryland, USA)<br>• **Chesapeake Bay Program** (USA - Delaware, Maryland, New York, West Virginia, Virginia, Pennsylvania, DC)<br>• **Resource Enhancement and Protection Program (REAP)** (Pennsylvania, USA) |
| | Private | • **Practical Farmers of Iowa Cover Crop Cost-Share Program** (Iowa, USA) |
| **Enhanced Pay for Practice** (input-based; pay for practice + capacity building) | Public | • **Healthy Soils, Healthy Farms, Healthy Environment (H-3 Pilot)** (ON)<br>• **Healthy Soils Check Up Program** (Bay of Quinte watershed, ON) |
| **Pay for Performance**/ Ecosystem Services (output-based; market-based) | Public-Private | • **Saginaw Bay Pay for Performance Program** (Michigan, USA)<br>• **Ohio River Basin Water Quality Trading Program** (Indiana, USA)<br>• **ALUS Canada** (PE, QC, ON, MB, SK, AB, Canada) |
| | Private | • **ALUS New Acre Program** (Canada) |
| **Education and Capacity-building** (no financial incentives) | Public-Private | • **Soil Pits & Kits Soil Health Workshop Program** (New South Wales, Australia)<br>• **Pennsylvania No-Till Alliance** (Pennsylvania, USA) |

Each program model is further described below, along with strengths (S), weaknesses (W), opportunities (O) and threats (T) that emerged during data collection (Tables 4, 5, 6, and 7). Examples of innovative or successful programs within each model are described in “Spotlight” boxes.

## 5.1 Pay for practice

*Pay for practice* programs, also known as conventional stewardship or cost-share programs, are the most common type of incentive program used to encourage BMP adoption. These programs generally offer producers grants to cover a portion of the cost of implementing specified BMP projects. Payments are output-based, which means that funding is tied to the implementation of the practice, regardless of how well it achieves broader agri-environmental outcomes (Weinberg and Claassen 2006). Conventional cost-share programs are most often funded by federal, provincial/territorial and municipal governments (e.g., stewardship cost-share programs offered by most Ontario Conservation Authorities), but can also be privately-funded by businesses within the agricultural supply chain (e.g., the Practical Farmers of Iowa Cover Crop Cost-Share Program, highlighted below).

Table 4: SWOT analysis – Pay for Practice model

| **Strengths** | **Opportunities** |
|---|---|
| ● Familiar approach to producers, funders, and program-delivery organizations<br>● Relatively straightforward to implement - do not require technically complex modeling or field-scale measurement<br>● Farmers view grants as risk-free ways to experiment/trial BMPs (regardless of outcomes or environmental benefit)<br>● Seen as equitable for participants - all producers and fields are eligible for same level of funding | ● Most government funding for agricultural stewardship is earmarked for pay-for-practice programs<br>● Mainstreaming of corporate social responsibility efforts means that private sector funding for cost-share programs could increase |
| **Weaknesses** | **Threats** |
| ● Inflexible in terms of eligible practices and funding (standardized practices and payments)<br>● Unknown technical effectiveness of BMPs at reducing nutrient and sediment runoff; efforts to quantify conservation outcomes are limited<br>● Can result in inefficient allocation of conservation dollars - BMPs are funded similarly regardless of field-scale impact; dollars spent does not equal a quantifiable correlation in pollution reduced<br>● Often lengthy and complex administration | ● Publicly-funded programs are susceptible to changes in or losses of funding due to changes in government programs/priorities<br>● Greater desire for quantifiable outcomes resulting from public investment in conservation may mean reduced support for practice-based funding not tied to performance |

## **Spotlight:** Lake Simcoe Region Conservation Authority's Manage Your Soil Program

The Lake Simcoe Region Conservation Authority has delivered rural restoration programs since the 1950s. With farmlands covering over 36% of the Lake Simcoe watershed, they have recently focused on funding agricultural BMPs. In 2012, a program review led to the addition of a cover crop incentive that now funds 100% of the cost of cover crop seed, up to $2,000. In 2017, following another program review, they began offering a grant that covers 50% of the cost of soil testing. To date, there have been 46 cover crop projects funded in the watershed.

## **Spotlight:** Pennsylvania's Resource Enhancement and Protection Income Tax Credit Program

The state of Pennsylvania (within the Chesapeake Bay watershed) has implemented an innovative statewide income tax credit program to incentivize agricultural BMP adoption. The program allows farmers, landowners, and businesses to earn state income tax credits in exchange for implementing BMPs, including cover crops (PDA 2019b). Uniquely, after one year, participants can sell their tax credits to individuals or businesses through a broker, for which they often receive up to 90 cents on the dollar. The program also allows private businesses to sponsor agricultural BMPs in order to claim the tax credits themselves. In 2018, $96,648 in tax credits were awarded for 77 cover crop projects, representing 18% of the program's total projects (PDA 2019a). The first-come, first-served program is exceptionally well-funded and well-utilized; it is allocated $10 million per year, and the number of applications exceeds funding allocations every year (PDA 2019b).

## **Spotlight:** Practical Farmers of Iowa Cover Crop Cost-Share Program

Practical Farmers of Iowa (PFI) is a farmer-led organization that has been instrumental in increasing the number of cover crop acres in Iowa from less than 10,000 acres in 2009 to over 1.2 million acres in 2017 (Bader 2017). PFI provides information, research, and extension, and since 2014 has delivered an innovative privately funded, supply-chain linked cost-share program for cover crops. Through this unique program, Unilever funds farmers who supply soybeans through their Sustainable Soy Program, and PepsiCo funds farmers who supply corn through their Low Carbon Corn Program. Farmers are eligible for $10/acre for the larger of 160 acres or 10% of their total acres (first-time participants are eligible for $40/acre up to 40 acres, recognizing that keeping it small and manageable at first leads to a greater chance of long-term success). Funding can be combined with government cost-share payments to increase profitability for producers. Participants provide detailed reports on cover crops, crop yields, and fertilizer use at the field-level to PFI, who models the results for PepsiCo and Unilever to report as part of their corporate sustainability efforts. The program is growing, with 300 participants in 2019 and a goal of 700 for 2020. PFI is working to expand the program to include other private businesses within the local agricultural supply chain.

## 5.2 Enhanced pay for practice

*Enhanced pay for practice* programs offer financial incentives for BMP adoption (which are output or practice-based) but also incorporate a significant level of education and capacity-building into program design and delivery. While many conventional pay for practice programs offer some degree of education and capacity-building through expert advice or demonstration sites, for example, this research identified a specific sub-set of programs which offered education and capacity-building as part of the program itself. Capacity-building exercises, such as workshops, training sessions, and peer-to-peer or expert consultation, are integral to the program, and financial incentives cannot be accessed without participating. From a participant's perspective, enrolling in an enhanced pay for practice program means engaging in a *process*, not just a cost-share program. Both programs identified within this model were aimed at building capacity around soil testing (the H-3 Pilot and the Healthy Soils Checkup Program, which also includes funding and support for cover crops).

Table 5: SWOT analysis – Enhanced Pay for Practice model

| **Strengths** | **Opportunities** |
|---|---|
| ● Includes familiar pay for practice cost-share model<br>● Focuses on building capacity; more likely to lead to ongoing behavioural change<br>● Removes barriers to participation other than just cost, as even more of the program is facilitated<br>● Trust/community building among participants and between delivery agency and participants | ● Most government funding for agricultural stewardship is earmarked for pay-for-practice programs<br>● Mainstreaming of corporate social responsibility could mean private sector funding for incentive programs increase<br>● Opportunity to involve industry, such as seed suppliers and soil testing labs to help promote or deliver programs |
| **Weaknesses** | **Threats** |
| ● Higher costs and staffing requirements e.g. for conducting on-site soil sampling<br>● Higher administrative costs to run workshops/training, provide individualized support to participants<br>● Greater time investments required by producers could constrain participation | ● Publicly-funded programs are susceptible to changes or losses of funding due to changes in government programs/priorities<br>● Greater desire for quantifiable outcomes resulting from public investment in conservation may mean reduced support for practice-based funding not tied to performance |

### **Spotlight:** Bay of Quinte RAP Healthy Soils Checkup Program

The Bay of Quinte, in Lake Ontario, was designated a federal Area of Concern in 1985 and since then has been working to delist the area through their Remedial Action Plan (RAP). Phosphorus pollution in the bay is a major issue of concern, especially during the non-growing season, which led to the development of a soil and cover crop program. Delivered by the RAP since 2015, the Healthy Soils Checkup Program provides free soil testing (with sampling done by program staff), and once the results come back, staff goes out to the farm to meet with the producer and provide personalized, one-on-one expert guidance to interpret the results and make evidence-based recommendations (including cover crops, if appropriate). They also provide a detailed map of the farm including soils and erosion potential, which helps to interpret results and make decisions, and can also be provided to crop advisors or agronomists. Workshops on interpreting soil testing and using nutrient management software are also offered. In addition to soil testing, the program funds cover crops at $10 per acre, up to $1,000 per year per farm. From 2015-2018, 55 farms participated, with 27 receiving cover crop grants. Participants especially appreciate that program staff come out and conduct soil sampling for them, as finding time to get out and collect samples has been noted as a key barrier to soil testing.

## 5.3 Pay for performance

An emerging model for achieving agri-environmental goals, *pay for performance* is an approach that rewards producers for the quantifiable environmental outcomes resulting from agricultural conservation practices (Winsten and Hunter 2011; Fisher, *et al.* 2016). In other words, financial incentive payments are based on the output, or performance, of BMPs. This is in contrast to a conventional pay for practice approach, in which producers are paid for adopting a set of specific, pre-defined practices, regardless of the environmental outcomes that actually result from those practices. For example, in pay for practice program, payments are based on the number of acres of cover crops planted, whereas in a pay for performance program, payments are based on the pounds of nutrients and/or sediment runoff prevented by the cover crops, which may differ on a field-by-field basis. This results in higher priority BMPs being targeted, as producers are incentivized to take the actions that result in the biggest impact, and thus the biggest payments. The environmental outcomes resulting from the adoption of a practice (e.g. nutrient or sediment reductions resulting from planting of cover crops or buffer strips) are determined by field-scale modeling calibrated for use in the watershed, and validated by watershed monitoring (Fisher, *et al.* 2016).

Table 6: SWOT analysis – Pay for Performance model

| **Strengths** | **Opportunities** |
|---|---|
| ● Cost-efficient - allows producers to prioritize actions; potential to achieve better outcomes with fewer dollars; estimated to be twice as effective as a practice-based program of the same cost (Weinberg and Claassen 2006)<br>● Flexible - producers can choose how to implement BMPs to maximize environmental outcomes<br>● Provides producers with field-specific data on outcomes of BMPs to inform farm business decision-making<br>● Outcome-oriented, flexible incentives, and opportunities to maximize profit improves motivation for producers to participate | ● An increasingly budget-constrained environment will require more efficient use of limited conservation funds<br>● Mandated caps on nutrient discharge are conducive to performance-based tools and are increasingly common (e.g., TMDL in Chesapeake Bay)<br>● Mainstreaming of corporate sustainability reporting means that private business is increasingly looking to invest in quantifiable, results-oriented conservation |
| **Weaknesses** | **Threats** |
| ● Funding can be inconsistent and unpredictable as it is based on performance (compared to conventional cost-share programs) - can be frustrating for producers<br>● Time- and resource-intensive: highly skilled technical staff are required to work closely with producers<br>● Information-intensive: requires detailed and quantified field-level data<br>● Requires accurate and accessible field-scale modeling and verification data<br>● Challenging to administer: can be difficult to prioritize resource concerns, structure payments, and set payment levels | ● Economic uncertainty for farmers mean they may be less likely to try a new program model that might be perceived as risky<br>● A lack of clear goals for total watershed pollutant loading and/or for loading by source can mean reduced motivation for change and difficulty assessing appropriate incentives for a successful PfP program<br>● Current regulatory requirements that specify program approaches (e.g. US Farm Bill mandates pay for practice programs) can limit the opportunity for implementation of novel PfP programs |

## **Spotlight:** Saginaw Bay Watershed Pay for Performance Program

Funded by the US EPA's Great Lakes Restoration Initiative, the innovative Saginaw Bay Watershed Pay for Performance Program aims to test the efficacy of a pay-for-performance program in accelerating the adoption of key agricultural conservation practices in Michigan's Saginaw Bay watershed (TNC 2018). During the five-year pilot (2015-2020), participants receive annual payments based on the sediment load reductions they achieve by implementing new soil conservation practices, including cover crops along with other BMPs. Payments are $225 per ton of sediment reduced, plus a $500 priority subwatershed bonus and a $50 referral bonus for producers who refer others to the program. For cover crops, this works out to payments of anywhere from $4/acre to $25/acre, depending on the field-scale sediment reductions. Nutrient and sediment reductions are modeled by the Great Lakes Watershed Modeling System. Cover crops have been the most popular BMP adopted through the program, although recent economic uncertainty for farmers has somewhat constrained program uptake. Producers have responded well to the program and to the field-scale modeling and targeted funding that allows them to prioritize fields and conservation practices based on impact. Some producers have been frustrated by inconsistent funding levels that often are not high enough to incentivize new adopters. With the pilot program wrapping up in 2020, program administrators hope to secure supply chain-linked private sector funding to continue the program.

### **Spotlight:** Water Quality Trading

Water quality trading (WQT) is a type of pay for performance program that involves the exchange of nutrient credits that can be bought and sold, often to achieve a specified cap on nutrient loading within a watershed. Typically, agricultural producers implement low-cost BMPs (such as cover crops) to earn nutrient reduction credits, which can then be sold to larger, point source polluters in the watershed to offset their own discharges.

The world's largest WQT program was established in the United States' Ohio River Basin in 2012 (EPRI 2020). Spanning the states of Indiana, Ohio, and Kentucky, this largely agricultural watershed drains into the Mississippi River and eventually the Gulf of Mexico, which has long experienced harmful algal blooms and eutrophic conditions. The program has distributed over $100,000 in cost-share money to producers in each of the three states to implement approved BMPs, including cover crops. Producers earn nutrient credits for each pound of P, N or sediment that they reduce, which are paid for by buyers looking to offset their own pollution, or by anyone who wants to invest in pollution reduction. A recent move to open up the Ohio River Basin WQT Program to the global market now means that anyone with a Paypal account or credit card, anywhere in the world, can purchase nutrient reduction credits in the Ohio River Basin (EPRI and First Climate 2019).

Several water quality trading programs have been established in Ontario, although none have included cover crops. These include South Nation Conservation Authority's Total Phosphorus Management program (Ontario's first and most well-known WQT program), as well as more recent programs in the Nottawasaga Valley, Halton Region, and Lake Simcoe Region. South Nation's program, part of their Clean Water Program, allows industrial polluters to offset phosphorus discharges by funding BMPs in the watershed, while programs in Nottawasaga Valley and Halton Region were aimed at funding agricultural BMPs to offset phosphorus loading from wastewater treatment plants to meet MOECC permit requirements (Region of Waterloo 2017). Lake Simcoe's project is focused on phosphorus discharge from new developments - land developers not able to meet "zero-runoff" requirements can purchase credits from other developers who have earned stormwater management credits (LSRCA 2019).

## 5.4 Education and capacity-building

This research also identified programs that have been effective at increasing adoption of cover crops and soil testing without the use of financial incentives. This model has been termed *education and capacity-building*. Programs within this model are often spearheaded by nonprofit or grassroots organizations, and focus on sharing knowledge and building capacity for implementing BMPs. For example, the Pennsylvania No-Till Alliance - a farmer-led, grassroots organization - is credited with driving a significant cultural shift in the state towards the adoption of no-till agriculture and cover crops, which are now considered mainstream there. Investing in increasing the capacity of grassroots organizations that promote and facilitate the adoption of cover crops and soil testing can be an effective way to increase their uptake among producers.

Table 7: SWOT analysis – Education and capacity-building model

| **Strengths** | **Opportunities** |
|---|---|
| ● High potential for sustained behavioural change when changes are intrinsically- rather than financially-motivated<br>● Potential for high level of engagement when led by grassroots and farmer-to-farmer networks<br>● Builds knowledge and trust - producers and program staff share knowledge both ways<br>● Because no money is changing hands, relationships can be less adversarial and more open and collaborative<br>● Not solely dependent on grants or government funding | ● Opportunity to involve industry, such as CCAs, seed suppliers and soil testing labs to help promote program (e.g. opportunity for seed suppliers work with farmers to come up with seed mixes for cover crops)<br>● Sometimes uncertain nature of government program funding provides an opportunity for grassroots programs to thrive that are not solely dependent on grants or government funding |
| **Weaknesses** | **Threats** |
| ● Relies on the willingness of farmers to change practices or expand their knowledge voluntarily<br>● No financial incentives to compensate for perceived implementation or trial risks<br>● Increased level of organization and delivery of the program - guest speakers, venues, workshops<br>● It can take a lot of time to achieve a paradigm shift and cultural change | ● Inability to build trust in the community that you wish to engage can result in a lack of buy-in<br>● Lack of buy-in from influential producers or community members can result in low participation and engagement<br>● BMPs with high level of risk or high initial cost may not be conducive to this model |

## **Spotlight:** Soil Kits and Pits Program, New South Wales, Australia

The Soil Knowledge Network of New South Wales is an organization of retired and semi-retired soil scientists who are passionate about soil and passing on their knowledge to the next generation (SKN 2020). Through Local Land Services organizations (comparable to Ontario's Conservation Authorities), they deliver a workshop-based program called Soil Kits and Pits, aimed at improving awareness and shared knowledge of soils and testing (McInnes-Clarke, *et al*. 2019; Packer, *et al*. 2019). The program consists of two workshops: in the first, participants learn about soil science and soil testing, and get out in the field to dig soil pits to learn hands-on; in between workshops they are encouraged to sample their own soil, so that at the second workshop they can bring in their soil results to get expert advice on interpretation. Uniquely, evaluation is built into program delivery - a pre-workshop questionnaire drives the topics covered to ensure relevance, and a post-workshop evaluation gauges impact on participants' knowledge and understanding of soil and soil testing. The program has been very successful at achieving soil knowledge transfer and increasing the adoption of soil testing among participants, success which is grounded in data collected through their evaluation process (Packer, *et al.* 2019).

# 6.0 Key Themes and Lessons Learned

## 6.1 Information and awareness

### Sending the right message

- Program messaging should be designed to appeal to the priorities of participants, which may or may not be the same as the overarching goals of the program. This was highlighted by numerous program administrators.
- The language commonly used around soil testing can be confusing to producers, as it is often included within “nutrient management” BMPs. This is often confused with legislated Nutrient Management Planning, and so producers may think it does not apply to their situation if they don’t utilize manure storage or require a Nutrient Management Plan. Terminology around soil testing should be clear and situate it within the realm of crop nutrient planning, soil health planning or a soil checkup to differentiate it.

**Innovative Strategy:** Sending the right message

The Saginaw Bay Pay for Performance Program markets their cover crop program to farmers as being about “erosion control” and “preventing soil loss”, which is what their producers care most about, rather than fish habitat or water quality, which are the overarching issues the program is designed to address.

### Communicating effectively

- Peer-to-peer mentoring and via farmer-to-farmer networks - letting farmers lead the conversation - is the most effective way to educate about benefits and risks of BMPs such as cover crops.
- There is no longer one way to reach all producers (i.e., newspapers and mail-outs). Producers have a wide range of ability to use technology. While online accessibility of tools and information are important, applications should be online as well as in paper format to be able to reach all demographics.

**Innovative Strategy:** Communicating effectively

The Practical Farmers of Iowa Cover Crop Program found that by far the most effective way to engage participants is to have farmers recruit farmers through informal “beer and pizza” meet-ups. The program coordinator brings a case of beer and stack of pizzas to a farm, the farmer invites friends over, and before long they’re all talking about cover crops and sharing ideas, experiences and troubleshooting. This also highlights the flexibility of a privately-funded program.

## 6.2 Financial incentives

### Funding a program

- Different funding sources (i.e., public, private, nonprofit) have differing advantages and drawbacks, which can influence program participation and BMP adoption.
    - Private sector funding tends to be more flexible and generally comes with less restrictions than government funding; privately-funded programs can be more responsive and adaptable to changing conditions.
    - Government funding can provide consistency and predictability, which can facilitate adoption (as in the case of Maryland's high rate of cover crop adoption, highlighted below).
    - On the other hand, government funding can also leave programs "high and dry" when programs end or priorities change (e.g., the Bay of Quinte RAP program recently lost provincial funding, jeopardizing the future of the program).

**Innovative Strategy**: Funding a program

Maryland, part of the Chesapeake Bay watershed, has achieved the highest cover crop adoption rate in the US (at almost 50% of eligible fields planted in cover crops annually). Their state government-funded cost share program has the highest incentive levels of any program reviewed, at $45-90 per acre annually, with no maximum acreage or grant level. Program administrators credit their success to the high level of funding ($24 million annual budget) and the consistency of the program - producers know funding will be there year after year.

### Finding the right incentives

- In a pay for practice program, incentives should be high enough that they make cover crops "trial-able" and remove the risk of initial failure. If farmers are able to experiment with them and have a good initial experience, they are more likely to continue using them in the future. Anecdotally, program administrators reported that farmers tended to go above and beyond maximum cost-share acreage in most cases.
- Pay for performance programs naturally prioritize BMPs that will have the biggest impact, but it is still a challenge to find the right level of payment per unit of sediment or nutrients reduced - some trial and error is to be expected.
- Incentives can be more than just financial. Personalized information and farm-scale and field-scale data and mapping were mentioned by three program administrators as being highly valued by participants and providing an incentive for participation in programs.
- Identify key barriers to BMP adoption and design incentives to directly address those barriers.

**Innovative Strategy:** Finding the right incentives

Both the H-3 Pilot and the Healthy Soils Checkup Program identified that cost is *not* the main barrier to soil testing in their areas - instead, the time and effort it takes to conduct sampling are, as well as a lack of knowledge and confidence to accurately interpret soil test results. By addressing these barriers, they achieved high rates of participation and increased the use of soil testing through their programs.

## 6.3 Social norms

### Supporting early adopters and innovators

- One of the most effective ways to get producers to try cover crops is for them to see others in their area who have been successful; supporting and providing incentives to influential early adopters and innovators will have ripple effects in the community.

### Choosing the right people

- Build trust by working with established and trusted groups (e.g., OSCIA), suppliers and professionals (e.g., agronomists and CCAs).
- Consider dynamics between groups. For example, the Bay of Quinte RAP has an easier time signing people up for programs than the Conservation Authority, because producers feel more comfortable dealing with an agency that lacks regulatory “teeth”.

**Innovative Strategy:** Choosing the right people

South Nation Conservation’s Clean Water Program hires respected local active or retired farmers to assist in filling out program applications and represent the project to the approval committee on behalf of the applicant. This builds trust in the program and allows applicants to maintain anonymity.

## 6.4 Internal factors

### Keeping it simple

- Almost all programs emphasized the importance of a simple and straightforward application process, even having program staff complete the application for participants where possible, thus removing a significant barrier to participation.
- Simplicity and flexibility are key incentives for program participation. In the Saginaw Bay Pay for Performance Program, they knew they couldn’t compete with federal financial incentive levels, but they *could* offer a quicker, easier, and simpler application process, so they focused on maximizing those attributes as a selling point of their program.

**Innovative Strategy**: Keeping it simple

The Nottawasaga Valley Conservation Authority's Healthy Waters Program can approve projects within days of submission, rather than weeks or months, by having a panel of farmers form the guidelines for approval at the beginning of the program cycle and then having a smaller group oversee the approval of each individual application. Minimizing the time it takes for projects to gain approval increases program buy-in and can boost participation.

## Rolling out a new program

- Producers can be intimidated by new programs and concerned with their staying power; it can be difficult to get initial buy-in for new or pilot programs. Adding to an existing program rather than creating something new gives the advantage of familiarity to applicants.
- Phasing in the program with adequate funding is important. Elasticity in yearly budgets allows for the program to build momentum.
- Adjustments to program guidelines can be made with minimal disruption to applicants (i.e. at the beginning of the program cycle, not in the middle).

## Monitoring ongoing behavioural change

- The vast majority of programs do not conduct formal monitoring or follow-up, which made it difficult to assess or compare the effectiveness programs at creating ongoing behavioural change. Many noted they wished they had access to this information. Others noted that due to limited funding they preferred to fund more projects rather than reduce grant funding in order to allocate resources to follow-up and monitoring.
- Programs that do collect data for evaluation or monitoring do so within the realm of program participation and only for the duration of the program; little to no information exists linking ongoing behavioural change to participation in incentive programs.
- Practical Farmers of Iowa is one of the few programs that collects, tracks, and reports detailed field-scale data (on cover crop plantings, crop yields, fertilizer use, etc. for modeling outcomes), but they actually felt that the data collection requirements were intrusive, and created a burden for participants that could deter participation. This highlights the need to tailor monitoring efforts to outcomes that are relevant for participants as well as program staff and funding agencies.
- Programs in the US (Iowa, Maryland, and Pennsylvania) described tracking of cover crop use via remote sensing with some on-ground verification. In contrast, Canadian program staff expressed frustration about the lack of availability of cover crop and remote sensing data, which is seen as less intrusive to collect than surveys or in-person follow-up monitoring.

### **Innovative Strategy:** Monitoring ongoing behavioural change

Australia's Soil Pits and Kits Program integrates simple evaluation tools directly into program delivery. They conduct pre-workshop questionnaires to focus discussions on local priorities, and follow-up surveys to gauge how the program affects participants' understanding of soil health and soil testing, and how it will be used to inform land management decisions going forward.

## 6.5 External factors

### Emerging role for private funding

- The mainstreaming of corporate sustainability efforts creates an opportunity to direct private sector funding toward agricultural BMPs (e.g., ALUS New Acre Program).
- Opportunity exists to leverage supply-chain linkages to fund programs for BMP adoption (e.g., Practical Farmers of Iowa's Cover Crop Program funded by Unilever and Pepsico).
- Opening up market-based programs to the public also represents a simple and quantifiable way for private business (and private citizens) to purchase credits to offset their environmental impacts (e.g., Ohio River Basin Water Quality Trading Program credits are now available on the global marketplace).

### **Innovative Strategy:** Emerging role for private funding

The ALUS New Acre Project is targeted directly as a way for businesses to add to their corporate sponsorship portfolio by sponsoring ALUS projects that provide ecosystem goods and services. Sponsorship packages can be tailored to environmental issues that matter most to a business, whether they want to invest in projects related to their operations (e.g. a shipping company who wants to offset carbon emissions) or in their local area. ALUS provides simple, transparent metrics that businesses can then use for corporate social responsibility reporting.

### Moving beyond cost-share programs

- Novel approaches to increasing cover crop and BMP adoption include pay for performance, water quality trading, and payment for ecosystem goods and services.
- Programs that have increased soil testing tend to utilize an enhanced pay-for-practice model - building education and capacity-building into the program, as well as providing incentives that address barriers to adoption (e.g., time and effort to sample).
- In recognition of the limits of existing cost-share programs, more cost-efficient program models are being developed to target limited funding where it will have the biggest impact (e.g., pay for performance model).

**Innovative Strategy:** Moving beyond cost-share programs

Pay for performance offers a novel approach to agricultural conservation that pays producers for the environmental outcomes they achieve rather than the practices they implement. By paying for quantifiable outcomes (e.g. pounds of nitrogen reduced), programs can achieve a “bigger bang for their buck” as funds are targeted in areas where they will have the most impact.

# 7.0 Conclusion

Despite the clear and numerous benefits of cover crops and soil testing for improving soil health and water quality, their adoption has lagged behind that of other agricultural BMPs. Consequently, many jurisdictions have implemented cost-share or incentive programs aimed at increasing their use. These programs vary in their approach and incentives, as well as in their effectiveness. Evaluating different program approaches and learning from the experiences of other jursidictions will provide valuable guidance to the process of developing a pilot program for increasing the use of these BMPs in Ontario.

With this in mind, this research aimed to identify and characterize the range of program models that exist for increasing the adoption of cover crops and soil testing, and to identify key themes and lessons learned from program implementation, including effective and innovative approaches, tools, and strategies that have been used to increase adoption of these BMPs.

Using data collected from interviews with program administrators as well as literature review, 19 programs were evaluated, representing a range of jurisdictions and approaches to increasing BMP adoption. The detailed information collected on program characteristics, development, delivery, funding, financial incentives, participation, monitoring, and lessons learned will serve as a source of valuable information in the development of future BMP programming.

SWOT analysis of the four distinct program models identified through this research (pay for practice, enhanced pay for practice, pay for performance, and education and capacity-building) allow for the specific advantages and drawbacks of each to be considered, as well as providing insight into the contexts in which each model might be most effective. The key themes emerging from the diverse experiences of program administrators interviewed for this project and highlighted herein will help guide program developers in selecting the most appropriate model (or combination of models) to serve as the basis for a future pilot program, as well as provide an overview of practical lessons learned from program implementation elsewhere.

As Ontario decides on its own course of action for increasing adoption of cover crops and soil testing among agricultural producers, it is hoped that the findings of this research will be a source of valuable ideas and guidance.

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# Appendix A - Interview Guide

# INTERVIEW QUESTIONS

**Introduction**

The aim of this project is to review different program models for increasing the adoption of cover crops and/or soil testing. We are specifically looking at how programs encourage ongoing behavioural change among participants.

I will not be recording our discussion, but will be taking notes. We are collecting this information on behalf of the Ontario Soil and Crop Association (OSCIA), and we will be summarizing our findings in a report that will be provided to OSCIA for use in developing future BMP pilot programming. We will not publish your name or any direct quotes, but will include an overview of your program in the report. Before publication, we will send you a copy for review to make sure your answers are accurately reflected and you will have the opportunity to provide feedback.

**Program Background**

1. Why/how did the program get started and how long has it been running?

2. How successful has the program been at increasing the use of cover crops/soil testing in your area? How is success measured? *(i.e. What percentage of eligible producers/farmers have participated? What proportion of eligible land is enrolled?)*

**Information and Awareness**

3. How do you encourage participation? Have you faced any challenges in finding participants? If so, how did you address them?

4. How do you communicate the benefits and risks of the BMP (cover crops or soil testing) to potential participants? What methods have you found to be most/least effective?

**Financial Incentives & Eligibility**

5. How did you decide on the financial incentives and what the maximum grants would be?

6. Are producers who have previously adopted this BMP eligible for this program, or is it only for first time adopters?

7. Does your program provide ongoing funding or just a one-time cost-share? How do you think this affects program participation?

**Social Norms**

8. How have you leveraged existing local networks to help the program succeed? *(e.g. peer-to-peer outreach, farmer-to-farmer workshops, existing farm networks, industry associations, relationships among seed or fertilizer dealers and producers, etc.)*

**Program Characteristics**

9. Are farmers/producers involved in developing or delivering the program? If so, how?

10. Does your program provide workshops, demonstrations, or in-person training and administrative technical support to participants? When/how is this support available to participants? *(e.g. prior to, during adoption, or ongoing/in-person, by phone, etc.)*

11. How do you evaluate the program? *(e.g. Is evaluation built in to program design? Do the participants have a chance to provide feedback or evaluate their experience with the program?)*

12. Do you monitor ongoing adoption of these BMPs beyond the initial stage? If so, how? (*i.e. whether farmers are continuing with these practices after the initial cost-share?)*

13. Are participants able to stack your funding with other programs? Do you think this is an important factor for increasing participation?

14. Do you track whether participants go beyond the maximum grant funding when implementing the BMPs? *(i.e. implementing BMP on more acres than are covered under grant program? number of soil tests?*)

**Overall**

15. What do you see as the biggest barriers to adoption of these BMPs in your area? How have you tried to address these barriers?

16. What lessons have you learned that might be relevant for designing a new program? *(i.e. If you were to re-launch, what would you change/do differently?)*

# Appendix B - Detailed Program Summaries

Table B1: Detailed Program Summaries

| Program | Jurisdiction | Delivered by | Key Program Contact | BMP(s) | Overview | Model | # of Participants? | Who pays? | Financial incentives |
|---|---|---|---|---|---|---|---|---|---|
| ALUS Canada | Canada (currently has projects in PEI, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, Canada) | ALUS Canada | Casey Schelock, ALUS Hub Manager (Eastern Canada) | None - ALUS does not fund projects on actively farmed land (focus on taking marginal and sensitive land out of production). | ALUS is a community-developed and farmer-delivered grassroots program that makes per-acre annual payments to participants for managing and maintaining ALUS projects on their land, which includes restoring wetlands, reforesting, planting windbreaks, installing riparian buffers, managing sustainable drainage systems, creating pollinator habitat and establishing other ecologically beneficial projects on their properties. | Payment for ecological services (market-based) | Varies across project sites. | ALUS is a non-profit charity that receives funding from the government and private sector (ALUS is a Weston Family initiative). ALUS New Acre project is funded by private companies who want to do CSR by paying for ALUS projects. | ALUS payments are determined based on average land rental rates in the local area. In general, a maximum of 20% of a farmer's land is eligible for ALUS. The idea is for the payments to be reflective of the market value of the EG&S provided by the project, but markets are not there yet, so payments are for the ongoing maintenance and management of ALUS projects. Rates are set by the community. |
| Chesapeake Bay Program | USA (Maryland, Pennsylvania, Delaware, New York, West Virginia, Virginia, DC) | Multijurisdictional - Federal-State partnership (US - Delaware, Maryland, New York, West Virginia, Virginia, Pennsylvania, DC) | Jake Reilly, Program Director, Chesapeake Bay, National Fish and Wildlife Foundation | n/a | Basin states are responsible for implementing programming and reporting on land use and BMP implementation to the Chesapeake Bay Program, who then models the impacts on nutrient loading in the watershed as a whole. States have mandated nutrient reduction targets as part of meeting the Bay's federally-legislated Total Maximum Daily Load (TMDL). States have the flexibility to decide how to achieve nutrient reductions, and all have their own programs/approaches. Federal programs such as EQIP and CRP are also implemented in the Chesapeake Bay watershed. The CBF funds programming not covered by state and federal programs. | Most basin states appear to be implementing pay for practice programs (even though the impacts of those programs are modeled and quantified at the watershed scale by the Chesapeake Bay Program). We did not find any cover crop programs in the Chesapeake Bay that utilized the PfP approach. | n/a | Public | n/a |
| Clean Water - Green Spaces (Essex Region Conservation) | Lake Erie watershed, Essex Region, Ontario, Canada | Ontario Conservation Authority | Michael Dick, Agricultural Technician, Essex Region Conservation | Cover crops, soil testing + other BMPs | A financial incentive program that funds cover crops and soil testing through Crop Nutrient Plans. Soil health and nutrients reduction projects are eligible in the Lake Erie watersheds only. Farm businesses must have a Farmland Health Checkup from a Certified Crop Advisor to be eligible as well. A copy of the crop nutrient plan with soil test results are required when submitting for funds. | Pay for practice | 20 applicants this year (10 for CC and 10 for Nutrient Management Plan). | Public | Cover crops are funded $60/acre up to 150 acres ($9,000). Crop nutrient plans are 80% funded up to $8,000. Total max funding up to $12,000. |
| Clean Water - Healthy Land Financial Assistance Program (Ganaraska Region Conservation Authority) | Municipality of Clarington (within the GRCA), the Municipality of Port Hope, the Township of Hamilton, and the Town of Cobourg | Ontario Conservation Authority | Pam Lancaster, Stewardship Technician, Ganaraska Region Conservation Authority | Cover crops, soil testing + other BMPs | Financial incentive program for projects that improve, maintain or protect water quality, quantity, and/or aquatic or terrestrial habitats. | Pay for practice | There have been a total of 2 participants in CC. Soil testing has never been funded. | Public | Cover crops are funded $10/acre, up to $500. |
| Healthy Soils Check Up (Bay of Quinte Remedial Action Plan) | Bay of Quinte Watershed | Ontario Conservation Authority | Sarah Midlane-Jones, Community Outreach Specialist, Bay of Quinte Remedial Action Plan; Anne Anderson, Manager, Community Outreach and Special Projects, Lower Trent Conservation | Soil testing + cover crops | Delivered by the Bay of Quinte Remedial Action Plan, this program provides cost-share funding for cover crops and free soil testing (they do the soil testing for you, help interpret results, and make decisions with results one-on-one and through workshops). | Enhanced pay for practice | 55 in total (6 in first pilot year); 27 have done cover crops (1,700 acres planted total over 3 growing seasons) | Public | Cover crops are funded $10/acre, up to $1,000. Soil testing is free. |
| Healthy Soils, Healthy Farms, Healthy Environment (H-3 Pilot) | York, Durham, Haliburton, Peterborough and the Kawartha Regions | Ontario Soil and Crop Improvement Association | Peter Doris, Environmental Specialist, Ontario Ministry of Agriculture, Food and Rural Affairs | Soil testing | A 3-year pilot program focused on improving the awareness of agronomic soil testing. | Enhanced pay for practice | 135 farms over 3 years | Public | Farmers paid a subsidized rate for soil testing at $13.56 per sample and had all sulphur and organic matter soil testing paid by the program. |
| Huron County Clean Water Project (Ausable Bayfield Conservation Authority) | Huron County | Ontario Conservation Authority | Kate Monk, Stewardship, Land and Education Manager, Ausable Bayfield Conservation Authority | CC + other BMPs | Financial incentive program to improve soil health, preserve topsoil, reduce erosion, and protect water quality. | Pay for practice | Not available | Public | Grant is $10/acre, up to 100 acres ($1,000). |

Table B1: Detailed Program Summaries

| Program | Jurisdiction | Delivered by | Key Program Contact | BMP(s) | Overview | Model | # of Participants? | Who pays? | Financial incentives |
|---|---|---|---|---|---|---|---|---|---|
| Manage Your Soil Program (Lake Simcoe Region Conservation Authority) | Lake Simcoe Watershed | Ontario Conservation Authority | Lori McLean, Restoration Project Specialist, Lake Simcoe Region Conservation Authority | Cover crops, soil testing + other BMPs | Financial incentive program that provides grants for cover crop seed 100%, and 50% of the cost of soil testing and Nutrient Management Planning. | Pay for practice | CC had 12 participants last year, with a total of 46 participants since 2012. Soil testing has had only had a handful of participants since 2017. | Public | 100% of the cost of cover crop seed, up to $2,000 (also a minimum of $200 and 50% of the cost of Soil Testing and Nutrient Management Planning, up to $500 (stand alone) or $1,000 (with another project). |
| Maryland Agricultural Water Quality Cost-Share Program - Cover Crop Program | Maryland, USA (within the Chesapeake Bay Watershed) | Maryland Department of Agriculture | Alisha Mulkey, Program Planning and Development, Executive Secretary, State Soil Conservation Committee, Maryland Department of Agriculture; Dawn Bradley, Cover Crop Program Administrator, Maryland Department of Agriculture | Cover crops | Financial incentive program for cover crops with a high payment ($45-90/acre) and no maximum grant amount or limit on compensation. | Pay for practice | Not available | Public | $45/acre base rate, plus bonuses for specific practices or timings, up to a maximum of $90/acre |
| Ohio Environmental Quality Incentives Program - Cover Crops | Ohio, USA | US Federal Government - USDA NRCS Ohio | John Wilson, ASTC Programs, USDA Natural Resource Conservation Service | Cover crops + other BMPs | Financial incentive program offered across the US (delivered by USDA) for agricultural BMPs (including cover crops); federally-mandated BMP incentive funding (in the US Farm Bill). | Pay for practice | Not available | Public | Ohio EQIP payments for cover crops are $30 per acre with a 500 acre or $15,000 maximum cap. |
| Ohio River Basin Water Quality Trading Project | USA (States of Indiana, Ohio, Kentucky within the Ohio River Basin) | Electric Power Research Institute (EPRI) in conjunction with the states of Indiana, Ohio, Kentucky, the U.S. Department of Agriculture Natural Resources Conservation Service, American Farmland Trust, the Ohio Farm Bureau, and ORSANCO. It was initially funded by a US Federal Government Conservation Innovation Grant (CIG) to the EPRI and is now privately funded and supported by over a dozen organizations and utilities with technical support from local, state and federal agencies. | Brian Brandt, Director, American Farmland Trust | Cover crops + other BMPs | The Ohio River Basin Water Quality Trading Project is a market-based approach to improving water quality through a first-of-its-kind credit trading program that reduces nutrient (N and P) run-off through agricultural BMPs (including cover crops). Agricultural producers apply to generate "water quality credits" and are paid per pound of nutrients they reduce, then those credits are made available for purchase by point-source polluters in the watershed, and more recently on the open market for anyone looking to offset their environmental footprint. The ORBWQTP began in 2009 to test the viability of market-based approaches for achieving water quality goals through nutrient reduction, and is the world's largest water quality trading program. | Pay for performance (water quality trading; market-based) | $100,000 of funding was available in total for 2018-19 growing season for Indiana. | Public-Private | We select projects based on the cost per pound of TN reduction, not on the practice type. Since efficiency of practices varies depending on farm location, soil types, slope, and other factors, we are not able to set a standard payment per practice.In the most recent Indiana cover crop funding portion of the ORBWQT program, producers are asked to submit bids for their nutrient reductions and the cost per pound. Projects will be selected based on the ones that have the least cost for the highest nutrient reductions (which are verified by modeling). Selected applications will have costs less than $4 of cost share per pound of total nitrogen. Maximum Funding request per project: $15,000 Maximum cost-share percent: 75% (EPRI 2018) |
| Peel Rural Water Quality Program (Credit Valley Conservation) | Peel Region, ON | Credit Valley Conservation Authority | Mark Eastman, Senior Coordinator, Agricultural Outreach, Credit Valley Conservation | Cover crops, Nutrient Management Plan (soil testing) + other BMPs | A voluntary program offering financial and technical assistance offered to private rural landowners to encourage the implementation of BMPs that protect and improve water quality. | Pay for practice | CC - 23 (out of 408 farms in the watershed - based on 2016 census data - so 5.6% of total farms have participated)<br>ST - only for manure storage upgrades | Public | Cover crops are funded $100/acre up to 50 acres ($5,000). |

Table B1: Detailed Program Summaries

| Program | Jurisdiction | Delivered by | Key Program Contact | BMP(s) | Overview | Model | # of Participants? | Who pays? | Financial incentives |
|---|---|---|---|---|---|---|---|---|---|
| Pennsylvania No-Till Alliance | Pennsylvania, USA | Pennsylvania No-Till Alliance | Lisa Blazure, Soil Health Coordinator, Stroud Water Research Center, and 2020 Board Member, Pennsylvania No-Till Alliance | Cover crops + no-till agriculture | A grassroots, farmer-led organization whose mission is to promote the successful application of no-till through shared ideas, experiences, education and new technology. Historically a low-capacity, farmer-led group; funded by the Stroud Center for Water Research and Chesapeake Bay Foundation to increase their ability to do capacity building and hire a full-time staff person, to put more effort into promoting conservation agriculture and they are now having a big impact as a result. They are one of the key players in capacity-building and promoting the use of cover crops in Pennsylvania. | Education + capacity-building | n/a | Public/private (PANTA is funded by the Chesapeake Bay Program via the Stroud Center for Water Research; PA Association for Sustainable Agriculture; seed, fertilizer and ag-business corporations; farm credit organizations | None |
| Practical Farmers of Iowa Cover Crop Cost-Share Program | Iowa, USA | Practical Farmers of Iowa | Sarah Carlson, Strategic Initiatives Director, Practical Farmers of Iowa | Cover crops | PFI delivers supply chain-linked cost-share programs for cover crops funded by the private sector as part of their corporate sustainability efforts (PepsiCo/Cargill - Low Carbon Corn Program; Unilever/ADM - Sustainable Soy Program). | Pay for practice | 300 participants in 2019; their goal is to get to 700 participants in two years. The program is growing. | Private (Private corporations - Unilever/ADM pays soybean farmers Sustainable Soy Program; PepsiCo/Cargill pays corn farmers under Low Carbon Corn program | Unilever/ADM pays $40/acre up to 40 acres for new adopters, and $10/acre for up to 160 acres or 10% of area farmed (whichever is larger); PepsiCo/Cargill offer $10/acre for corn growers who use cover crops on 10% of their acreage in 2019. |
| Resource Enhancement and Protection Program (Pennsylvania, USA) | Pennsylvania, USA | Pennsylvania State Conservation Commission | Joel Semke, Resource Enhancement and Protection Program Administrator | Cover crops + other BMPs | State income tax credit equal to 50-75% of the cost of BMP installation (50% for cover crops), max. $250,000 per farm per seven year timeframe, and tax credits may be used incrementally as needed for up to 15 years. Tax credits are earned after the BMP is installed, and must be returned if not maintained over its lifespan. Credits are transferable and can be sold to other taxpayers after one year (often for 90 cents on the dollar - L. Blazure, pers. comm.). A sponsor business can pay for BMP purchase or installation and then apply for the tax credit instead of the producer or landowner. | Pay for practice - tax credit with market-based component | In 2018, $96,648 in tax credits were awarded for 77 cover crop projects, representing 18% of the program's total projects (PDA 2019a). | Public/private (State government provides the income tax credit; private business can purchase tax credits from producers, or can directly sponsor BMPs in order to claim tax credits) | Tax credits for cover crops are for 50% of eligible costs. Credits are capped at $35/acre for single species plantings and $45/acre for multi-species plantings. Only seed and planting costs are eligible. Herbicide/nutrient/lime applications are not eligible. Cover crop equipment is eligible for tax credits at 50% of costs (cover crop rollers and roller attachments used to roll down cover crop residue prior to no-till planting). |
| Rural Water Quality Program - Dufferin County | Dufferin County | Ontario Conservation Authority | Shannon Stephens, Healthy Waters Program Coordinator, Nottawasaga Valley Conservation Authority | Cover crop + other BMPs | A financial incentive program that provides $40/acre for cover crops up to $1,600. An Environmental Farm Plan or completed Rural Landowner Stewardship Guide is required to apply, as is a short application form. Project sites must be located in Dufferin County. | Pay for Practice | Only 2-3 participants | Public | Cover crops are funded $40/acre up to 40 acres ($1,600). |
| Rural Water Quality Program (GRCA) | Grand River Conservation Authority | Ontario Conservation Authority | Louise Heyming, Supervisor of Conservation Outreach, Grand River Conservation | Cover Crops, soil testing + other BMPs | Farmers receive grants to cover costs of water quality BMP on their lands. The program grants 50 to 100% of the cost of selected BMPs. Eligible projects vary by county, as do the grant rates. | Pay for Practice | CC - 338 projects implemented since 2014. | Public (Municipalities) | Varies per county. Cover Crops: Brant $60/acre up to 50 acres, Dufferin $40/acre up to 40 acres, Grey - no incentive, Haldimand $20/acre up to 50 acres, Oxford - no incentive, Waterloo $100/acre up to 30 acres, Wellington $60/acre up to 50 acres. Nutrient Management Plans (soil tests included): Brant 70% up to $1,500, Dufferin 75 to 100% up to $2,000, Grey - no incentive, Haldimand - no incentive, Oxford 50% up to $500, Waterloo 50% up to $2,000, Wellington 75 to 100% up to $2,000. |

Table B1: Detailed Program Summaries

| Program | Jurisdiction | Delivered by | Key Program Contact | BMP(s) | Overview | Model | # of Participants? | Who pays? | Financial incentives |
|---|---|---|---|---|---|---|---|---|---|
| Saginaw Bay Watershed Pay for Performance Program | Saginaw Bay Watershed, Michigan, USA | The Nature Conservancy (Michigan Chapter); the Delta Institute; Great Lakes Commission; MSU-Institute of Water Research; Blue Water Conservation District (state agency - responsible for on-the-ground program delivery) | Megan Naplin, Program Administrator, Blue Water Conservation District | Cover crops + other BMPs | Participants in the Saginaw Bay Watershed PfP Program receive annual payments based on the sediment load reductions they achieve by implementing new soil conservation practices (including cover crops and a range of BMPs). Sediment loss and nutrient reductions are modeled online at the field-scale by the Great Lakes Watershed Modelling System. It is a five-year pilot program (2015-2020). | Pay for practice | n/a | Public/private | Annual payment rate of $225 per ton of sediment reduced. A $500 priority sub-watershed incentive is given to producers with land in impaired areas. A $50 referral bonus is available to producers who refer others into the program. |
| Soil Pits & Kits Soil Health Workshop Program (Central West Local Land Services, New South Wales, Australia) | New South Wales, Australia | Central West Local Land Services (catchment management agency), Soil Knowledge Network (a legacy soil science non-profit group) | Sally McInnes-Clarke, Knowledge Broker, Partnerships and Community, Science Division, New South Wales Department of Planning, Industry and Environment | Soil testing | The Soil Knowledge Network of NSW is a legacy soil knowledge organization that offers workshops for farmers, government officers and extension staff. They deliver many different types of workshops and presentations, including ones aimed at farmers whereby they share knowledge about soils and soil science. Farmers are encouraged to bring their own soil samples and test results, then they get expert advice on how to interpret the results and next steps. This organization has increased soil knowledge transfer and soil testing in NSW. | Education + capacity-building | Hundreds of participants per year attend their workshops. | Public (funded by the Local Land Services agency, which is a watershed-based management agency somewhat comparable to Ontario's Conservation Authorities) | None |
| South Nation Clean Water Program & Ottawa Rural Clean Water Grant Program (South Nation Conservation Authority) | South Nation Conservation jurisdiction with the exception of the City of Ottawa | Ontario Conservation Authority | Ronda Boutz, Team Lead - Special Projects, South Nation Conservation Authority | Cover Crops + other BMPs | A financial incentive program for cover crops that are solely used for winter cover. | Pay for practice | There have been about 5 participants total for each program (SNCWP and ORWP). About 1 or 2 per year. | Public | Cover crop incentive of $50/acre/year up to a maximum of 20 acres. |

Table B1:Detailed Program Summaries

| Program | First time only? | Stacking? | Ongoing/one-time? | Support? | Monitoring/ Evaluation? | Evidence of lasting change | Related legislation? | Lessons learned | Noteworthy |
|---|---|---|---|---|---|---|---|---|---|
| ALUS Canada | n/a | n/a | ALUS contracts range from 3-10 years in length. | Yes, ALUS provides ongoing support for implementing, managing, and maintaining ALUS projects on the landscape over their lifespan. | No | Research found that when ALUS funding expired in Manitoba, most projects remained in place. Surveys of landowners in Norfolk County showed that 75% of projects would remain in place if ALUS funding stopped (France and Campbell 2015). | ALUS does not fund projects on actively farmed land because as they are a charity, there are laws around whether or how they are allowed to subsidize farm income/farmed land (trade laws around farm subsidies?). | n/a | Program coordinator mentioned that part of the reason they don't subsidize on-farm programs is that they don't have enough funding to do so ("If we paid for cover crops, we'd be broke in a day."). So they have decided to focus on marginally productive land rather than farmed land, for which incentive programs already exist. |
| Chesapeake Bay Program | n/a | n/a | n/a | n/a | The Conservation Effects Assessment Program (CEAP) tracks the impact of agricultural BMPs in the Chesapeake Bay watershed (undertaken by the USDA). | n/a | U.S. Environmental Protection Agency 2010 Chesapeake Bay Total Maximum Daily Load (TMDL) mandates levels of nutrient and sediment pollution reductions that must be achieved by each sector (agriculture, urban stormwater, etc.) in each Bay state by 2025. | n/a | In the Chesapeake Bay Watershed, between 2006 and 2011, land with cover crops in a cropping system increased from 12% of acres to 52% (USDA NRCS 2013). |
| Clean Water - Green Spaces (Essex Region Conservation) | No, however applicants must not have implemented CC in the past 3 years. | Yes | Participants can re-apply every year for funding. | No | No | No | No | (1) Balancing funding availability with program uptake is tricky when programs have a short run. (2) Even with easy online applications, most are not filled out correctly. (3) The success of the soil testing, through the Nutrient Management Program, is from the CCAs getting the word out and recommending the farmers do a soil heath check up and 5-year nutrient plan. | Soil testing results are submitted to the CA resulting in recommendations for amounts of fertilizer to be applied. |
| Clean Water - Healthy Land Financial Assistance Program (Ganaraska Region Conservation Authority) | No | Yes | Ongoing | Yes, assists with filling out the application either in person or over the phone. | No | No | | (1) Make filling out the application form as simple as possible. (2) Give recognition to those that implement the BMPs, may not need to be funded. | It only takes 2 weeks for applications to be approved. |
| Healthy Soils Check Up (Bay of Quinte Remedial Action Plan) | No | No | Ongoing | Yes, free soil testing, detailed field map showing areas of the field that may be prone to erosion, go over results one-on-one at their farm, hold follow-up workshops that go over software and how to input soil sampling results, and interpret results. | No | No | Federal RAP designation key to funding and development of this program. | (1) Time is the biggest barrier to soil testing (not the cost). So we have tried to address this by having people go out and actually do the sampling for them, then going out and helping them interpret the results. | |
| Healthy Soils, Healthy Farms, Healthy Environment (H-3 Pilot) | No | n/a | Ongoing | Yes, held 7 workshops where half of the participants would attend. Explain how soil testing works, sampling methods, information on soil chemistry, and went over nutrient budgeting program software on their computers. | No | No | No | (1) There is value in keeping it simple. We tried to keep this as simple and straightforward as possible. Not a lot of paperwork, not a lot of follow-up. And it worked well. (2) I wouldn't make them free because people tend to value things more highly if they have to pay something for them. | You shouldn't overlook the importance of personal relationships in something like this. |
| Huron County Clean Water Project (Ausable Bayfield Conservation Authority) | No | Yes, however must be in the Ausable River watershed | Ongoing | Yes, assist with application over the phone. Farmer to farmer workshops. | No | Sep 2019 Meeting Notes recorded - 2,500 planted with 2,000 funded (20% non-funded)<br>Sep 2018 Meeting Notes recorded - 4,100 planted with 3,700 funded (10% non-funded) | No | Found that checking on crop residue percentage is time intensive, residue measurements are something that if could be changed, would be helpful. | To be eligible, the cover crop must be made up of 3 or more species. |

Table B1:Detailed Program Summaries

| Program | First time only? | Stacking? | Ongoing/one-time? | Support? | Monitoring/ Evaluation? | Evidence of lasting change | Related legislation? | Lessons learned | Noteworthy |
|---|---|---|---|---|---|---|---|---|---|
| Manage Your Soil Program (Lake Simcoe Region Conservation Authority) | No | Yes | Provides funding for 3 years. | Yes, assist with application, conducts site visits and one-on-one assistance in person. | No | No | No | (1) Build trust by working with trusted partners (i.e. local agricultural associations, seed suppliers) to get over that barrier for farmers. (2) Have a program that is flexible and easy to administer - assist with paperwork, be available to the farmers, work with partners within the community. (3) Find ways to communicate the benefit to the farmers - CC will protect their crop, increase yields. Benefit to the farmer may sound different than those to the environment, but results in the same outcome. | Program participation has been building year over year with 12 for CC last year. Uptake of their voluntary online survey is very low. |
| Maryland Agricultural Water Quality Cost-Share Program - Cover Crop Program | No | No | Ongoing | District staff provide one-on-one support for signing up and admin; technical support as needed; University of Maryland extension work | The States track and report to Chesapeake Bay Program, who receives data and models the impact; they assign nutrient reductions associated with the program. | Running since mid-late 1990s, and increasing cover crops steadily since then | U.S. Environmental Protection Agency's 2010 Chesapeake Bay Total Maximum Daily Load (TMDL) mandates levels of nutrient and sediment pollution reductions that must be achieved by each sector (agriculture, urban stormwater, etc.) in each Bay state by 2025. | (1) High financial incentives work, keep applications simple and provide lots of support to make participation easy. (2) Consistency of program and dedicated funding over the years - so that producers know we will be here year after year. | Maryland is #1 in the USA in terms of % of eligible fields planted in cover crops (400-500,000 acres out of 1.1 million eligible (not counting federal and other programs); approaching 50% adoption rate |
| Ohio Environmental Quality Incentives Program - Cover Crops | Yes | No | Ongoing | No | CEAP | No | No | n/a | EQIP programs are funded federally and delivered by USDA NRCS departments in each state in the US. Funding levels vary by state. |
| Ohio River Basin Water Quality Trading Project | No, but nutrient credits are earned by going above and beyond the "baseline" level over the past three years of farming operations, which must be proven using existing records and remote sensing data. | No - federal or state cost-share programs can be used to get farms to their baseline state, but can't be used to achieve nutrient reductions for credits through the WQT program. | Contracts for cover crops are five years in duration. | Extensive support is available for completing application process. Soil and Water Conservation Districts provide support for BMP installation and maintenance. | Practices are verified and monitored for the duration of the contract (5 years). | No | Applications must be in compliance with all relevant regulatory requirements in order to be eligible for program. | n/a | The ORB WQTP was awarded the 2015 United States Water Prize. |
| Peel Rural Water Quality Program (Credit Valley Conservation) | No, all are eligible. Encourage experimentation with those applicants that have tried CC before. | Yes | Ongoing until maximum is reached | Yes, one-on-one support, support for filling out application (staff goes to their house and fills it out while in conversation with farmer); Twilight Tours, demonstration sites, technical support and advice for planting cover crops | No but wish they were able to. | No | No | Terminology of 'Nutrient Management Plan' has been a barrier. Should change the name to 'Crop Nutrient Planning' so that applicants know it's different from the legislated NMP process. | Commented about breaking from conventional incentive programs to a more long-term, relationship building program that funds outcomes rather than practices. |

Table B1:Detailed Program Summaries

| Program | First time only? | Stacking? | Ongoing/one-time? | Support? | Monitoring/ Evaluation? | Evidence of lasting change | Related legislation? | Lessons learned | Noteworthy |
|---|---|---|---|---|---|---|---|---|---|
| Pennsylvania No-Till Alliance | n/a | n/a | n/a | They provide workshops, resources, training, capacity-building, how-to guides on cover crops, monthly newsletters, and advice from experienced farmers who have used no-till and cover crops successfully to build capacity among PA farmers. | Cover crops in PA are tracked using the Federal Census of Agriculture (they ask about cover crops and no-till acres); remote sensing; and smaller annual surveys. In the Chesapeake Bay watershed portion of central PA, they developed a survey methodology where they did a driving/roadside survey (since 2012), where they came up with fixed driving routes around the counties, and determined fixed roadside survey points (gps), where they would record data on what crops, if cover crop, no-till, etc. Easily repeatable; approx. 10 hours of driving per county, 800 data points per county, got summer students to drive and record data, with a more experienced data collector for consistency - same one did six counties. Gives them a sense of trends over time. | The latest agricultural census shows about 37% of acreage in PA using cover crops (actual number likely higher). There has been a big increase in no-till and now there is a big increase in cover crops. It's becoming the norm rather than the exception in PA (according to L. Blazure). | Funding provided to the PANTA under the Chesapeake Bay Program. | Financial incentive programs are not the only way to increase adoption of cover crops. Providing farmer-to-farmer advice and investing in capacity-building can make a difference. | The PA No-Till Alliance was noted by the Chesapeake Bay Program as an example of an education/capacity-building program that has been very successful at increasing uptake of cover crops in the Chesapeake Bay watershed, without the use of financial incentives. |
| Practical Farmers of Iowa Cover Crop Cost-Share Program | No | Yes, these incentives are available on top of government cost-share program funding. | Ongoing | Yes, PFI provides support, workshops, one-on-one mentoring, twice monthly e-newsletters, administrative support | Program participation, cover crops, crop yields, fertilizer used, are all tracked on a field-by-field basis for modeling and reporting to the companies who provide the funding. They use this information for corporate sustainability reporting purposes. Sarah from PFI felt that monitoring and reporting requirements were too onerous and served as a deterrent to participation in the program. | n/a | n/a | (1) Best recruitment tool by far: beer and pizza meetups (Sarah goes over to a farm with a case of beer and pizzas, and the farmer invites his friends, and they all talk about the program). Sarah wishes she had done them from the beginning. (2) Private sector funding - companies need a way to show they are making changes to be sustainable (CSR), and this model is an easy sell for them. We deliver the program and they get to claim the benefits. It's a win-win. | |

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| Program | First time only? | Stacking? | Ongoing/one-time? | Support? | Monitoring/ Evaluation? | Evidence of lasting change | Related legislation? | Lessons learned | Noteworthy |
|---|---|---|---|---|---|---|---|---|---|
| Resource Enhancement and Protection Program (Pennsylvania, USA) | No | No. State or federal cost-share portions of a project are ineligible for REAP tax credits. | Available annually on an ongoing basis. | No | Investments in the program are tracked and reported on annually in detail. BMPs are reported to the Chesapeake Bay Program, who then calculates and monitors resultant nutrient reductions. | No | The REAP Program was created in 2007 (P.L. 373, No. 55, July 25, 2007) and amended in 2019 (P.L., No. 13, June 28, 2019). Applicants must be in compliance with the PA Clean Stream Law regarding Agricultural Erosion & Sedimentation/Conservation Plans and Nutrient/Manure Management Plans (PDA 2019). REAP also helps Pennsylvania meet legislated TDML targets for the Chesapeake Bay watershed (75% of credits have historically been awarded within the Chesapeake Bay watershed (PDA 2019)). All seed purchased for cover crop must be tested and properly labeled in accordance with the PA Seed Law and regulations. If the grower elects to use home-grown seed, it must be tested for purity, germination, and absence of noxious weeds by a recognized seed laboratory prior to seeding. | n/a | The REAP program is typically allocated $10 million annually, which covers 275-300 applicants per year. In each year since the program's inception (2007), applications for available credits have exceeded the allocation of credits available for that year. |
| Rural Water Quality Program - Dufferin County | No | Yes | Available until max funding is reached ($1,600). | Workshops, soil health demonstration (used a microscope to show farmers their soil), site visits (the best), admin support (farmers adverse to paperwork). | Track metrics with soil loss equation, km of stream, water testing (watershed scale and subwatershed scale) in 5 year rotations.<br>Pre-and post monitoring if project scale is large enough to expect a visible change (above the regular variance).<br>A feedback form is given out with the grant cheque. About ⅓ respond. | No | No | Suggests not to start a new program because of how long it takes a program to get participation - referenced the Adoption of Innovation Curve. | The maximum acreage is 40 acres per applicant. Only cover crops used exclusively for cover are eligible for grants. The cover crop will be verified by program staff before spring planting to ensure that it is providing at least 50% residue. |
| Rural Water Quality Program (GRCA) | No, however once max grant funding is reached, they can no longer receive funding. | Yes | Available until max funding is reached. | No | No | There have been 338 CC projects implemented since 2014. Of those farms, there is 101,000 acres and from the application process we know they have received funding for 10,500 acres. We also know that 21,000 acres were CC'd in total , which means 20% cover on the fields, with only half being incentivised. | No | (1) Even though each county has varying incentive levels for CC, the uptake has been the same. (2) Haldimand County has heavy clay soil and is difficult to get 50% cover as per guideline requirements. Considering allow strip tilling, which is a BMP, in this county. | An Environmental Farm Plan is required. Overall, more than 6,000 voluntary projects have been funded since 1998 with $19 million in grant funding from the Region of Waterloo; Wellington, Brant, Haldimand, Oxford and Dufferin Counties. |