2012 Environmentally Sustainable Agriculture Tracking Survey

Final Report

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# Table of Contents

**Executive Summary** ........................................................................................................... 1

**Background and Methodology** .......................................................................................... 16

**Perceptions of ESA Issues** .................................................................................................. 25

**ESA Adoption Score (ARD Performance Measure 2a)** ......................................................... 26

**Soil Conservation Practices** ................................................................................................ 28
  - Soil Conservation Practices ESA Adoption Score ........................................................................ 28
  - Use Reduced Tillage ................................................................................................................. 29
  - Use of Perennial Forages, Pulse Crops and Winter Cereals in Rotation .................................... 30
  - Soil Conservation Practices Summary ..................................................................................... 31

**Practices that Impact Water Quality and/or Quantity** ............................................................ 32
  - Water Quality and/or Quantity Practices ESA Adoption Score .................................................. 32
  - Maintain Buffer Areas along Edge of Natural Water Bodies ..................................................... 33
  - Have Grassed Waterways .......................................................................................................... 33
  - Avoid Draining or Filling in Natural Wetlands or Sloughs ......................................................... 33
  - Apply Chemical Fertilizer at Recommended Rate Based on Soil or Tissue Test ......................... 34
  - Control Runoff from Manure Storage, Livestock Pens and Feeding Areas .............................. 35
  - Plug or Seal Abandoned Wells / Properly Seal and Maintain Active Wells ............................. 36
  - Maintain a 10 Meter Buffer Area from Water Bodies / Water Wells when Applying Pesticides ... 37
  - Prevent Runoff from Irrigated Fields ....................................................................................... 38
  - Manage Livestock Access to Water Bodies that are Used as a Water Source .......................... 39
  - Choose Wintering Site to Avoid Manure Contamination .......................................................... 39
  - Water Quality and Quantity Practices Summary .................................................................... 40

**Wildlife Habitat Conservation Practices** ............................................................................. 41
  - Wildlife Habitat Conservation Practices ESA Adoption Score .................................................. 41
  - Wildlife Habitat Conservation Practices .................................................................................. 42
  - Wildlife Habitat Conservation Practices Summary ................................................................. 43

**Grazing Management Practices** .......................................................................................... 44
  - Grazing Management Practices ESA Adoption Score ............................................................... 44
  - Grazing Management Practices ............................................................................................... 45
  - Grazing Management Practices Summary .............................................................................. 47
2012 Environmentally Sustainable Agriculture Survey
Final Report

MANURE MANAGEMENT PRACTICES

Manure Management Practices ESA Adoption Score

Avoid Applying Manure or Compost on Frozen or Snow Covered Ground

Avoid Storing Manure near Water Wells

Frequency of Application

Incorporate Manure after Applying

Applying Liquid Manure

Avoid Applying Manure Close to Waterways to Minimize Increased Nutrients Runoff

Sampling and Analyzing the Manure for Nutrient Content

Manure Application Based on P or N&P

Applying Manure when Crop Requires It

Keeping Manure Records

Extend the Grazing Season

Managing Odour and Dust

Manure Management Practices Summary

AGRICULTURAL WASTE MANAGEMENT PRACTICES

ENERGY AND CLIMATE CHANGE PRACTICES

Energy and Climate Change Practices ESA Adoption Score

Energy Saving Practices and Renewable Power

Participate in Carbon Credit Trading

Energy and Climate Change Practices Summary

GENERAL PRACTICES

General Practices ESA Adoption Score

Precision Farming: Variable Rate Technology

Environmental Farm Plan

Soil Sampling Fields at Least Once Every Three Years

Trees for Agriculture Purposes

General Practices Summary

INFORMATION CHANNELS

KEY TAKEAWAYS AND RECOMMENDATIONS FOR MOVING FORWARD

APPENDIX A: METHODOLOGY

APPENDIX B: QUESTIONNAIRE
EXECUTIVE SUMMARY

Alberta Agriculture and Rural Development (ARD) provides technical expertise and targeted programs to assist primary producers in addressing a broad range of environmental issues relating to the agricultural industry. The main outcome in providing resources to address environmental issues is to encourage producers to adopt environmentally sustainable agriculture practices.

Ipsos Reid conducted a telephone survey with a random and representative sample of 500 Alberta agricultural producers between January 18th and February 1st, 2012. The final data were weighted to ensure the overall sample’s regional and gross farm sales composition reflects that of the actual distribution of farms in Alberta based on the 2006 Census of Agriculture. With a sample of 500, results are considered accurate to within ±4.4 percentage points, 19 times out of 20, of what they would have been had the entire population of Alberta farms been surveyed.

The Environmentally Sustainable Agriculture Tracking Survey (ESATS) measures Alberta producers’ awareness of, attitudes toward, and adoption of environmentally sustainable agriculture (ESA) practices. Key environmental issues examined in the 2012 survey were: Soil conservation; management practices that impact Water quality and/or quantity; Wildlife habitat conservation; Grazing management; Manure management; Agricultural waste management; Energy and climate change; and, General practices. Additional areas explored included assessing concerns about various ESA issues and preferred channels for accessing information on environmental farm stewardship.

What follows is a summary of key research findings.

Perceptions of ESA Issues

Respondents were asked to indicate their level of concern regarding 18 ESA issues as they pertain to their farm today. Among issues applicable to the majority of operations, disposal of agricultural waste and soil issues are the top concerns for Alberta farmers.

- Overall, ‘proper disposal of agricultural waste’ (56% concerned) emerges as the top concern, followed by two soil related issues – ‘loss of soil fertility’ (49% concerned) and ‘soil erosion from wind and water’ (45% concerned). Levels of concern for most of the remaining issues fall between the 25% and 40% marks. Again looking at issues applicable to the majority of operations, the issues of least concern are ‘odour from manure spreading on land’ (16% concerned), ‘greenhouse gas emissions on your farm’ (21% concerned) and ‘bank erosion from livestock access’ (21% concerned).
- Although ‘water quantity adequate for irrigation’ garners the highest level of concern overall (64% concerned), only 12% of farms have irrigated land, thus, it is not a widely held concern.
**ESA Adoption Score (ARD Performance Measure 2a)**

A total of 41 ESA practices were used to derive the result for this measure. The 2012 adoption score – i.e. Performance Measure 2a – is 55%. Across key areas of focus, the strongest adoption is seen for manure management practices, while the lowest adoption is seen for soil conservation practices.

A number of significant differences in ESA adoption are seen when the data are analyzed by farm operations/operator characteristics. The overall ESA Adoption score is significantly higher on operations:

- With gross farm sales of $250K or more in 2011 (60%);
- Operations where the primary source of revenue is livestock (58%) or a mix of crops and livestock (58%);
- Which are expanding (60%);
- Where the key decision maker has attended a degree or diploma program in an agriculturally related area (61%); and,
- Where the key decision maker has attended a farm conservation training program, workshop or seminar in the past two years (64%).

There are no significant regional differences, with adoption ranging from 53% to 57% across the five regions.
The majority (59%) of operations are classified as medium adopters – that is, they have adopted 50.1% to 80% of the practices for which they are eligible. Just over one-third (36%) are low adopters (have adopted 50% or less eligible practices), while only 5% are high adopters (have adopted more than 80% of eligible practices). The graph below illustrates the distribution of adoption.

![2012 ESA Adoption: Distribution]

In the areas of both energy and climate change and soil conservation, the vast majority of operations are low adopters; general practices and agricultural waste management also see a significant percentage of low adopters. The adoption distribution within each practice area is as follows:

- Manure management: 14% low adopters, 42% medium adopters, 44% high adopters
- Water quality and quantity: 24% low adopters, 28% medium adopters, 48% high adopters
- Wildlife habitat conservation: 29% low adopters, 12% medium adopters, 59% high adopters
- Grazing management: 42% low adopters, 58% high adopters
- General practices: 68% low adopters, 18% medium adopters, 14% high adopters
- Agricultural waste management: 59% low adopters, 41% high adopters
- Energy and climate change: 91% low adopters, 6% medium adopters, 3% high adopters
- Soil conservation: 87% low adopters, 12% medium adopters, 1% high adopters
The tables that follow summarize adoption scores for each of the eight topics assessed.

In general, one can see that adoption tends to be higher on larger operations (i.e. with gross farms sales of $250K or more). It is worth noting that while operations in the $250K+ gross farm sales category account for only 15% of total farms in Alberta, they account for 76% of total gross farm sales in Alberta (according to 2006 Census of Agriculture data); these operations manage the vast majority of livestock and land in the province.

### ESA Adoption by Region and Gross Farm Sales

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>South</th>
<th>Central</th>
<th>Northeast</th>
<th>Northwest</th>
<th>Peace</th>
<th>&lt;$50K</th>
<th>$50K to &lt;$250K</th>
<th>$250K+</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012 ESA Adoption</td>
<td>55%</td>
<td>54%</td>
<td>56%</td>
<td>56%</td>
<td>57%</td>
<td>53%</td>
<td>52%</td>
<td>56%</td>
<td>60%</td>
</tr>
<tr>
<td>Manure Management</td>
<td>75%</td>
<td>76%</td>
<td>75%</td>
<td>73%</td>
<td>76%</td>
<td>76%</td>
<td>72%</td>
<td>75%</td>
<td>83%</td>
</tr>
<tr>
<td>Water Quality and Quantity</td>
<td>73%</td>
<td>74%</td>
<td>72%</td>
<td>73%</td>
<td>75%</td>
<td>72%</td>
<td>69%</td>
<td>75%</td>
<td>77%</td>
</tr>
<tr>
<td>Wildlife Habitat Conservation</td>
<td>72%</td>
<td>56%</td>
<td>74%</td>
<td>74%</td>
<td>77%</td>
<td>77%</td>
<td>74%</td>
<td>73%</td>
<td>68%</td>
</tr>
<tr>
<td>Grazing Management</td>
<td>69%</td>
<td>75%</td>
<td>65%</td>
<td>68%</td>
<td>68%</td>
<td>76%</td>
<td>65%</td>
<td>74%</td>
<td>65%</td>
</tr>
<tr>
<td>General Practices</td>
<td>44%</td>
<td>56%</td>
<td>40%</td>
<td>41%</td>
<td>45%</td>
<td>42%</td>
<td>36%</td>
<td>46%</td>
<td>56%</td>
</tr>
<tr>
<td>Agricultural Waste Management</td>
<td>41%</td>
<td>35%</td>
<td>41%</td>
<td>36%</td>
<td>44%</td>
<td>44%</td>
<td>47%</td>
<td>38%</td>
<td>34%</td>
</tr>
<tr>
<td>Energy and Climate Change</td>
<td>21%</td>
<td>22%</td>
<td>19%</td>
<td>23%</td>
<td>17%</td>
<td>28%</td>
<td>18%</td>
<td>21%</td>
<td>26%</td>
</tr>
<tr>
<td>Soil Conservation</td>
<td>20%</td>
<td>27%</td>
<td>22%</td>
<td>21%</td>
<td>14%</td>
<td>15%</td>
<td>15%</td>
<td>16%</td>
<td>35%</td>
</tr>
</tbody>
</table>

*Within region and gross farm sales categories, numbers in bold red font are significantly lower than numbers in bold black font.*
Adoption also tends to be higher on operations that are in an expansion stage, on operations where the key decision maker has attended a degree or diploma program in an agriculturally related area, and on operations where the key decision maker has attended a farm conservation training program, workshop or seminar in the past two years. This last factor – that is, farm conservation training – has a significant impact on adoption scores for six of the eight practice areas.

It is also noteworthy that among operations with $250K+ gross farm sales, a significantly higher percentage are in an expansion stage, and incidence of the decision maker having attended an agriculture-related degree or diploma program and farm conservation training also tends to be higher.

**ESA Adoption by Farm Operations and Operators Characteristics**

<table>
<thead>
<tr>
<th>Total</th>
<th>Operation Type (main source of revenue)</th>
<th>Stage of Operation</th>
<th>Degree or Diploma</th>
<th>Conservation Training</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Crops</td>
<td>Livestock</td>
<td>Mixed</td>
<td>Beginning or Maintaining</td>
</tr>
<tr>
<td>2012 ESA Adoption</td>
<td>55%</td>
<td>52%</td>
<td>58%</td>
<td>58%</td>
</tr>
<tr>
<td>Manure Management</td>
<td>75%</td>
<td>77%</td>
<td>74%</td>
<td>76%</td>
</tr>
<tr>
<td>Water Quality and Quantity</td>
<td>73%</td>
<td>75%</td>
<td>73%</td>
<td>71%</td>
</tr>
<tr>
<td>Wildlife Habitat Conservation</td>
<td>72%</td>
<td>72%</td>
<td>72%</td>
<td>72%</td>
</tr>
<tr>
<td>Grazing Management</td>
<td>69%</td>
<td>63%</td>
<td>70%</td>
<td>69%</td>
</tr>
<tr>
<td>General Practices</td>
<td>44%</td>
<td>48%</td>
<td>38%</td>
<td>51%</td>
</tr>
<tr>
<td>Agricultural Waste Management</td>
<td>41%</td>
<td>42%</td>
<td>38%</td>
<td>41%</td>
</tr>
<tr>
<td>Energy and Climate Change</td>
<td>21%</td>
<td>22%</td>
<td>21%</td>
<td>22%</td>
</tr>
<tr>
<td>Soil Conservation</td>
<td>20%</td>
<td>27%</td>
<td>9%</td>
<td>22%</td>
</tr>
</tbody>
</table>

*Within operation type, stage of operation, degree or diploma and conservation training categories, numbers in bold red font are significantly lower than numbers in bold black font.*
Considering individual practices, 13 have **high** levels of adoption at 80% or higher, while 13 practices have **low** levels of adoption at 50% or less.
The graphs in each of the following sections summarize the adoption of each practice as well as the percentage of operations eligible for each practice. From an environmental perspective, increasing adoption of practices that currently have low levels of adoption – but high levels of eligibility – should have a strong impact. Additionally, increased adoption of these practices would have the greatest impact on ESA adoption scores. Of course, other factors such as degree of environmental benefit, potential for increased adoption, understanding barriers to use, ease of adoption and influence of ARD on practice adoption, should also be considered in prioritizing areas for focus.

Manure Management Practices

The ESA adoption score for the 12 manure management performance measures is very high at 75% – the highest score among the eight practice areas assessed. Adoption levels of several manure management practices are extremely high while others lag. Four manure management practices have greater than 90% adoption, while adoption levels of another three sit around the 80% mark. Comparatively, incorporation of both liquid and solid manure within an optimal timeframe as well as nutrient testing practices have low levels of adoption. Eligibility for both nutrient testing practices is moderate. ARD may wish to further explore barriers to adopting these practices – in particular, are they practical to do, and what are the time and cost/benefit implications.
Practices that Impact Water Quality and/or Quantity

The ESA adoption score for water quality and quantity practices is high at 73% — a very close second to manure management among the eight practice areas assessed. Of the 12 specific practices, six have adoption levels of roughly 80% or higher, while adoption of the other six practices are comparatively lower but all top the 50% mark. Eligibility for the practices is also mixed — more than six-in-ten operations are eligible for six of the practices, while half or fewer are eligible for the remaining six. Three practices have relatively lower levels of adoption and relatively higher levels of eligibility — control runoff from livestock pens, control runoff from feeding areas and apply chemical fertilizer at recommended rate.
Wildlife Habitat Conservation Practices

The ESA adoption score for wildlife habitat conservation practices is strong at 72%, and just slightly trailing adoption of manure (75%) and water (73%) practices. Of the three specific practices, one tops the 80% mark while the other two enjoy moderate adoption levels. Eligibility ranges from near universal to moderate.

<table>
<thead>
<tr>
<th>Practice Description</th>
<th>Adoption</th>
<th>Eligibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retain bush or native grassland</td>
<td>83%</td>
<td>99%</td>
</tr>
<tr>
<td>Manage grazing to encourage natural rejuvenation of understory</td>
<td>53%</td>
<td>71%</td>
</tr>
<tr>
<td>Manage grazing for wildlife habitat</td>
<td>61%</td>
<td>64%</td>
</tr>
</tbody>
</table>

Grazing Management Practices

The grazing management ESA adoption score is also in the top tier at 69%. Adoption levels of the two grazing management practices are good, both at the 70% mark, while eligibility levels are moderate. Given moderate levels of concern regarding the ‘loss of riparian areas,’ gains could be seen in practice adoption.

<table>
<thead>
<tr>
<th>Practice Description</th>
<th>Adoption</th>
<th>Eligibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time grazing to avoid vulnerable times of the year for riparian areas</td>
<td>56%</td>
<td>70%</td>
</tr>
<tr>
<td>Protect riparian areas from grazing to prevent over use</td>
<td>61%</td>
<td>68%</td>
</tr>
</tbody>
</table>
General Practices

The ESA adoption score for general practices is 44% – putting it in the second tier of the eight practice areas assessed. Adoption levels of the five practices included in ‘general practices’ is variable – planting trees for agricultural practices and soil sampling fields are both high, while using variable rate technology in the application of crop protection products is at the 50% mark, and environmental farm planning and the use of variable rate technology in the application of commercial fertilizer are both very low. Eligibility for environmental farm planning is extremely high while eligibility for precision farming is roughly 60%.

Considering a key barrier to having an environmental farm plan is lack of knowledge/lack of information, there exists the potential for significant gains in this area – particularly given the impact of education and training. Since lack of time also emerges as a barrier, ARD may wish to explore how the process could be streamlined or made easier for farmers to complete.

With regards to precision farming, it is important to recognize that is a relatively new technology, viewed by some as expensive to adopt – ARD may wish to explore the degree to which cost versus perceived benefits is a barrier to adoption. Despite the initial financial investment, the benefits in terms of potential cost savings are considerable given that it can result in the optimal use of crop inputs – that is, input costs can be reduced, productivity or yields are optimized, and consequently, profitability increases. Given the concrete benefits of precision farming, training or education in this area could accelerate the adoption of these practices.
**Agricultural Waste Management Practices**

Only one agricultural waste management practice is included in the ESA adoption score: **Recycle agricultural plastics** (i.e. recycle plastics such as baler twine, feed bags, silage wraps and/or bale wraps). The adoption score is low at 41%, while eligibility is moderate at 67%. Given that ‘proper disposal of agricultural waste’ garners the highest level of concern among the commonly applicable environmental issues evaluated, farmers should be open to learning about how they can improve their disposal of agricultural plastic waste.

**Energy and Climate Change Practices**

The ESA adoption score for energy and climate change practices is 21% – this is the second lowest adoption rate of the eight practice areas assessed.

Adoption levels of both energy saving practices as well as carbon credit trading are very low, with the utilization of sub-meters at only 10%. Eligibility for all three practices is very high, with the potential to adopt the two energy saving practices universal.

Increasing adoption of energy saving practices perhaps has the greatest potential given the dual benefits of cost savings as well as a positive impact on the environment.

Increasing adoption of carbon credit trading may be challenging. While the majority of operators (77%) are aware of the Alberta Carbon Offset market, for some, their farming practices may not allow them to meet some qualifying criteria (e.g. minimum till or zero till), while others may question the return on investment (i.e. does the reward offset the cost).
Soil Conservation Practices

The ESA adoption score for soil conservation practices stands at 20% – this is the lowest adoption rate of the eight practice areas assessed.

Further, adoption levels of all three specific practices are below the 50% mark – with use of pulse crops and winter cereals in the cropping rotation extremely low. Eligibility, however, is relatively high with two-thirds or more farms eligible for each practice.

Given that ‘loss of soil fertility’ is a key issue of concern, farmers should be open to learning about improvements they could make in the area of soil conservation. Increasing adoption of reduced tillage is perhaps the strongest opportunity, particularly given the benefit of carbon sequestering (i.e. less disturbance of the soil acts as a carbon sink). ARD may wish to explore and gain a stronger understanding of barriers to reduced tillage for Alberta farmers.

Information Channels

Overall, hardcopy materials and face-to-face interactions are the preferred channels for getting information on environmental stewardship, while online channels are the least preferred.

Operators were asked to indicate their preference for 11 specific information channels that could be used to get information on environmental stewardship. The highest preference goes to ‘paper such as newsletters, newspapers, magazines, pamphlets or workbooks’ (69% prefer), followed by ‘advice from a specialist’ (56%) and ‘informally through other farmers’ (54%). In the next tier are ‘demonstrations and field days’ (47%), ‘radio’ (44%) and ‘workshops, courses or conferences’ (43%). Next are ‘TV’ (37%), ‘email’ (34%) and the ‘Internet’ (33%). The least preferred channels are ‘webinars’ (17%) and ‘electronic media such as blogs, Facebook, Twitter, YouTube and apps’ (12%).

It is notable, however, that larger operations ($250K+ gross farm sales) – the ones that manage the vast majority of land and livestock – show a much stronger preference for email (44%), the Internet (44%) and social media (19%).
Key Takeaways and Recommendations for Moving Forward

What follows is a summary of key takeaways and recommendations based on the research findings as well as publicly available information on the agriculture sector in Alberta. One should note that these recommendations have been put forth by Ipsos and may not align with ARD’s perspective on the issues and/or ARD’s policies and programs.

- From an environmental perspective, increasing adoption of practices that currently have low levels of adoption – but high levels of eligibility – should have a strong impact. Additionally, increased adoption of these practices would have the greatest impact on ESA adoption scores. Of course, other factors such as degree of environmental benefit, potential for increased adoption, understanding barriers to use, ease of adoption and influence of ARD on practice adoption, should also be considered in prioritizing areas for focus.

- While the overall weighted sample’s gross farm sales composition reflects that of the actual distribution of farms in Alberta based on the 2006 Census of Agriculture, there is a strong argument to be made that ARD’s focus should be on larger operations (i.e. with gross farm sales of $250,000 or more). It is these operations that manage the vast majority of livestock and land in the province; while they account for only 15% of total farms in Alberta, they account for 76% of total gross farm sales in Alberta.

- Adoption of many ESA practices is quite high – particularly in the areas of manure management and preserving water quality and quantity. Understanding why adoption of some practices has been highly successful is critical; is it due to regulation, grants, education, perceived return on investment, or other aspects? Identifying key success factors for certain practices may allow ARD to apply them in other areas.

- Larger operations have higher levels of adoption of many ESA practices. Since they have the biggest impact on the environment, this finding is encouraging and decidedly positive. Clearly understanding why they have higher adoption levels may also provide insights that will help increase adoption among smaller farms.

- Of course, understanding barriers to adoption and developing strategies to address key barriers is also essential. In many cases, we know a key barrier is cost, particularly when farmers cannot pass on the cost to consumers; emphasizing the benefits of adoption and convincing them there is a valid payback may be challenging.

- In the area of manure management, adoption levels for incorporation of both liquid and solid manure within an optimal timeframe as well as nutrient testing practices lag. ARD may wish to further explore barriers to adopting these practices – in particular, are they practical to do, and what are the time and cost implications.

- Adoption of practices related to energy and climate change are very low. Increasing adoption of energy saving practices might have the greatest potential given the dual benefits of cost savings as well as a positive impact on the environment. Conversely,
increasing adoption of carbon credit trading may be challenging. While the majority of operators (77%) are aware of the Alberta Carbon Offset market, for some, their farming practices may not allow them to meet some qualifying criteria (e.g. minimum till or zero till), while others may question the return on investment (i.e. does the reward offset the cost).

- Adoption levels of all three soil conservation practices are very low. Increasing adoption of reduced tillage is perhaps the strongest opportunity, particularly given the benefit of carbon sequestering (i.e. less disturbance of the soil acts as a carbon sink). ARD may wish to explore and gain a stronger understanding of barriers to reduced tillage for Alberta farmers. Since soil fertility is a key issue of concern for farmers, they should be open to learning about improvements they could make in the area of soil conservation.

- In the area of waste management, recycling agricultural plastics is quite low despite the finding that concern regarding the disposal of agricultural waste is relatively high. Gaining a stronger understanding of barriers to recycling agricultural plastics should be a priority as use of grain storage bags is increasing and farmers should be open to learning about how they can improve their practices – there exists the potential for considerable gains in this area.

- Within the General Practices area, adoption of precision farming is low while eligibility is moderate. As we recognize that this is a relatively new technology, viewed by some as expensive to adopt – ARD may wish to explore the degree to which cost versus perceived benefits is a barrier to adoption. Despite the initial financial investment, the benefits in terms of potential cost savings are considerable given that it can result in the optimal use of crop inputs – that is, input costs can be reduced, productivity or yields are optimized, and consequently, profitability increases. Given the concrete benefits of precision farming, training or education in this area could accelerate the adoption of these practices.

- While completion of an Environmental Farm Plan has a low level of adoption, many stated barriers to completion can be addressed. Education and training should deal with the issues of lack of knowledge or information, while streamlining the process could address the matter of time constraints. Still, further examining why adoption is low may be warranted, as well as exploring incentives to adopt among those who have completed a Plan.

- Education emerges as a major factor contributing to ESA adoption. Farmer education – specifically, attending a farm conservation training program, workshop or seminar – has a strong relationship with adoption of most ESA practices. Participation in farm conservation training should be encouraged and such training should be easy to access as well as financially feasible.

- Given the impact of education, ARD may need to spend more on communications. Using the preferred communications tools to create awareness and knowledge will be critical. With learning ‘informally through other farmers’ a preferred channel, ARD may
wish to consider creating clubs or forums. It is also important to keep in mind that while the preference for electronic media and email is low overall, larger operations – the ones that manage the vast majority of land and livestock – show a much stronger preference for both channels.

- The 2012 data were weighted based on the 2006 Census of Agriculture. Both the regional and gross farm sales composition of farms in Alberta has changed significantly over the past six years. Statistics Canada data indicates that farm cash receipts in Alberta increased by 15% from 2010 to 2011 alone. Since Performance Measure 2a and other ESA adoption scores in the 2012 ESATS survey will be tracked and reported bi-annually, we strongly recommend that ARD weights the 2012 data based on 2011 Census of Agriculture statistics when they become available. If there are significant differences in adoption scores using the 2006 versus 2011 weights, the scores weighted to the 2011 Census should be used for reporting and tracking going forward.
**BACKGROUND AND METHODOLOGY**

**Background and Objectives**

Alberta Agriculture and Rural Development (ARD) recognizes it has a role to enable the industry to innovate, create and capture value, and build competitive capacity by meeting consumer and public expectations around the environment. The agriculture, agri-food and agri-business industry will build on opportunities to realize the benefits associated with production systems that manage risks, address public concerns, and improve efficiencies while stewarding Alberta's air, water, and land for the well being of current and future generations.

ARD provides technical expertise and targeted programs to assist primary producers in addressing a broad range of environmental issues relating to the agricultural industry. Specifically, environmental issues encompass soil conservation, water quality and quantity, wildlife habitat conservation, grazing management, manure management, agricultural waste management, energy and climate change, and planning approaches regarding sustainable agriculture. The main outcome in providing resources to address environmental issues is to encourage producers to adopt environmentally sustainable agriculture (ESA) practices.

The Environmentally Sustainable Agriculture Tracking Survey (ESATS) was undertaken in 1997, 2001, 2004, 2007, 2010 and again in 2012. ESATS measures Alberta producers’ awareness of, attitudes toward, and adoption of ESA practices. ARD and other agencies use the survey results to improve ESA programs and activities. ARD also uses ESATS as a vehicle for the Ministry to track its progress in assisting primary producers in addressing the broad range of environmental issues supported by the Ministry.

After the 2010 survey, ARD decided a revision was required to make the survey questions more reflective of current environmental conditions and ARD’s work in helping producers to address them. ARD also decided to update the survey sampling frame.

Thus, in February, 2011 an “Environmentally Sustainable Agriculture Tracking Survey Team” formed to oversee the development and delivery of the 2012 ESAT Survey. Based on recommendations from the ESAT team, a number of key changes were made to the focus areas as well as the ESA practices. *The final 2012 questionnaire is provided in Appendix B of this report.*

The primary objective of the 2012 survey was to collect data for ARD Performance Measure 2a which is defined as ‘the average percentage of improved environmentally sustainable agriculture practices adopted by producers’. This measure tracks the level of adoption of environmentally sustainable agriculture practices by primary producers seeking to improve environmental stewardship on their farm operations.
A key secondary objective was to inform future directions for ARD in with regard to policy decisions and program development.

Key environmental issues examined in the 2012 survey were:

- Soil conservation;
- Management practices that impact Water quality and/or quantity;
- Wildlife habitat conservation;
- Grazing management;
- Manure management;
- Agricultural waste management;
- Energy and climate change; and,
- General practices.

Additional areas explored included assessing concerns about various ESA issues and preferred channels for accessing information on environmental farm stewardship.

**Methodology**

Ipsos Reid conducted a telephone survey with a random and representative sample of 500 Alberta agricultural producers between January 18\(^{th}\) and February 1\(^{st}\), 2012. A telephone methodology was selected to be consistent with previous ESA tracking surveys. The average interview length was 20.5 minutes.

The target population for this survey was primary agricultural operators in Alberta who had gross farm sales of at least $10,000 in 2011, and were most involved in making decisions about the practices and operations used on their farm.

The sample was drawn from Ipsos’ proprietary provincially representative database of over 30,000 unique Alberta agricultural producers.

In previous years, the sample was stratified by five ARD regions. For the 2012 survey, the sampling frame was updated to align with 2006 Alberta Census Agricultural Regions and Census Divisions. This change was made to allow for a better comparison of survey results with Census of Agriculture data.

The 2012 interviews were stratified by the five re-aligned Alberta regions and a disproportionate sampling plan was used in order to allow for a reliable sample size within each region for analysis. Target quotas by CD (within each region) were proportionate to 2006 Census of Agriculture data. In addition to regional quotas, target quotas were also established for gross farm sales within each of the five regions based on 2006 Census of Agriculture data. While no hard quotas were set, targets were monitored throughout data collection.
The final data were weighted to ensure the overall sample’s regional and gross farm sales composition reflects that of the actual distribution of farms in Alberta based on the 2006 Census of Agriculture.

With a sample of 500, results are considered accurate to within ±4.4 percentage points, 19 times out of 20, of what they would have been had the entire population of Alberta farms been surveyed. The margin of error is larger within regions and for other sub-groupings of the survey population.

The table below summarizes the number of interviews conducted by region as well as the corresponding margins of error.

### Sample Stratification

<table>
<thead>
<tr>
<th>Region</th>
<th>% of 2006 Census Farms in Alberta with $10K+ in gross farm sales (39,640)</th>
<th>Number of Interviews</th>
<th>Maximum margin of error</th>
</tr>
</thead>
<tbody>
<tr>
<td>South</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CD1</td>
<td>14.5%</td>
<td>100</td>
<td>±9.8%</td>
</tr>
<tr>
<td>CD 2</td>
<td>3.4%</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>CD 3</td>
<td>7.2%</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>CD 3</td>
<td>3.9%</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Central</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CD 4</td>
<td>36%</td>
<td>100</td>
<td>±9.8%</td>
</tr>
<tr>
<td>CD 5</td>
<td>3.0%</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>CD 6</td>
<td>6.1%</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>CD 7</td>
<td>8.9%</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>CD 8</td>
<td>6.7%</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>CD 9</td>
<td>8.8%</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>CD 15</td>
<td>2.3%</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>CD 15</td>
<td>0.2%</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>North East</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CD 10</td>
<td>15.9%</td>
<td>100</td>
<td>±9.8%</td>
</tr>
<tr>
<td>CD 12</td>
<td>11.1%</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>CD 12</td>
<td>4.8%</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>North West</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CD 11</td>
<td>20.9%</td>
<td>100</td>
<td>±9.8%</td>
</tr>
<tr>
<td>CD 13</td>
<td>10.9%</td>
<td>52</td>
<td></td>
</tr>
<tr>
<td>CD 14</td>
<td>8.7%</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td>CD 14</td>
<td>1.3%</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Peace</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CD 17</td>
<td>12.5%</td>
<td>100</td>
<td>±9.7%</td>
</tr>
<tr>
<td>CD 18</td>
<td>4.8%</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td>CD 19</td>
<td>1.3%</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>CD 19</td>
<td>6.4%</td>
<td>52</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100%</td>
<td>500</td>
</tr>
</tbody>
</table>
Data Analysis

Survey results are presented for the overall weighted sample of primary agricultural operators in Alberta with gross farm sales of $10,000 or more. Further, significant differences – by region as well as farm and operator characteristics – are highlighted throughout the report.

Please note, throughout the report, graphs show responses for all operators asked the question. The ESA adoption score, however, is calculated excluding ‘don’t know’ and ‘not applicable’ responses. Therefore, for ESA performance measures, the ESA adoption score is provided below the graph and may not correspond to the data shown. Also, throughout the report, numbers in some graphs may not sum to 100% due to rounding.

Given the changes to the sample source and sample stratification in 2012, as well as the substantive changes made to the questionnaire, it is not possible to track data from previous years. There was consensus among the ESAT Survey Team that the benefits realized from these changes outweighed the ability to track data from past years. Further, moving forward, both the findings from the 2012 survey as well as tracking changes from this new baseline, would provide ARD with an improved ability to influence ESA practice adoption among primary agriculture operators in Alberta.

ESA Adoption Score Calculation (ARD Performance Measure 2a)

A total of 41 ESA practices, that could be used to address soil conservation, water quality, grazing management, wildlife habitat conservation, energy and climate change (adaptation) manure management, agricultural waste management, as well as planning approaches regarding sustainable agriculture, were used to derive the result for this measure. An eligible ESA practice (or group) for the base calculation is based on farm type, farm site characteristics and operation practices.

For each respondent, the total number of eligible practices (i.e. appropriate to their operation) is determined, and then the percentage of these eligible practices currently adopted is calculated. For example, if an operator is eligible to adopt 20 of the 41 ESA practices, and has adopted 10 of the 20 practices, the producer’s individual adoption score would be 50%.

The percentage of eligible environmentally sustainable agricultural practices adopted by each respondent is multiplied by a weighting factor to generate a weighted adoption score for each respondent. The result of Performance Measure 2a is the average weighted adoption score of all respondents expressed as a percentage.

The adoption score for each of the 41 eligible practices, as well as the average adoption score within each focus area, was also calculated and results are presented throughout the report.
In addition to the 41 practices that serve as ESA performance measures, adoption of another 9 ESA practices are assessed – currently, these practices are not classified as performance measures. Non-performance measures are practices that are emerging as future practices to measure and could potentially be tracked as a performance measure for ARD. Currently there are limited direct resources allocated to these practices, however, tracking of adoption is important to inform future policy and program decisions.

All data, including the ESA Adoption Score calculation, has been third party verified by ARD.

*Further details of the 2012 methodology can be found in Appendix A of this report.*
Profile of Alberta Farms

Gross Farm Sales in Context

As discussed earlier, data were weighted to ensure the overall sample’s regional and gross farm sales composition reflects that of the actual distribution of farms in Alberta based on the 2006 Census of Agriculture. There is a strong argument to be made, however, that ARD’s focus should be on larger operations (i.e. with gross farm sales of $250,000 or more); it is these operations that manage the vast majority of livestock and land in the province. The chart below shows the percentage of total farms versus the percentage of total gross farm sales for Alberta farms based on the 2006 Census of Agriculture (note, the chart includes farms with gross farms sales of less than $10,000, while these were excluded from the survey sample).
Farm Operations and Operators Profile

The following charts show key variables by which the data were analyzed. As one can see, with regards to stage of operation, overall, about four-in-ten operations are scaling down or plan to sell, while the same proportion is in the maintenance stage. Among larger operations ($250K+ gross farm sales), however, half (50%) are in the maintenance stage while 30% are expanding (just 17% are winding down). Further, a significantly higher percentage or larger operations cite crops as their main source of revenue (55% vs. 39% overall), 33% have attended an agriculture-related degree or diploma program (vs. 24% overall) and 35% have farm conservation training (vs. 24% overall).

The only other farm operator profiling question asked was age. Overall, operators are 61 years of age on average with 42% aged 65 years or older. Respondents from larger operations, however, are significantly younger, with an average age of 57 years and 77% under the age of 65 years. Conversely, those with gross farm sales of less than $50K are 64 years of age on average with just 45% under the age of 65 years, and those with gross farm sales of $50K to less than $250K average 60 years of age and 60% are under the age of 65.
The following farm operations characteristics were used to determine eligible practices for each respondent.
Did you apply...? % Yes
Commercial fertilizers 63%
Solid manure 50%
Liquid manure 4%
Compost manure 15%
Crop protection products 67%

Did you store any...? % Yes
Solid manure 37%
Liquid manure 2%
Compost manure 20%

Did you have any...? % Yes
Beef cattle 64%
Dairy cattle 4%
Pigs 3%
Chickens or turkeys 11%
Sheep or lambs 6%
Horses 34%
Other 11%

Did you apply...?
Commercial fertilizers 63%
Solid manure 50%
Liquid manure 4%
Compost manure 15%
Crop protection products 67%

Yes 92%
No 8%

Yes 11%
No 89%

Yes 72%
No 28%

Yes 27%
No 73%
PERCEPTIONS OF ESA ISSUES

Respondents were asked to indicate their level of concern regarding 18 ESA issues as they pertain to their farm today. Among issues applicable to the majority of operations, disposal of agricultural waste and soil issues are the top concerns for Alberta farmers, while odour from manure spreading is at the bottom of the list. Although ‘water quantity adequate for irrigation’ garners the highest level of concern overall, only 12% of farms have irrigated land, thus, it is not a widely held concern.

Level of Concern with ESA Issues

On a scale of 1 to 7, where “1” means not at all concerned and “7” means very concerned, how concerned are you about the following on your farm today?

<table>
<thead>
<tr>
<th>Issue</th>
<th>Level of Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water quantity adequate for irrigation (Have irrigated cropland, pasture or forages or hay, n=63)</td>
<td>49%</td>
</tr>
<tr>
<td>Proper disposal of agricultural waste (e.g. used oil/filters, pesticide containers, veterinary medical supplies) (All respondents, n=500)</td>
<td>45%</td>
</tr>
<tr>
<td>Loss of soil fertility (All respondents, n=500)</td>
<td>34%</td>
</tr>
<tr>
<td>Soil erosion from wind and water (All respondents, n=500)</td>
<td>32%</td>
</tr>
<tr>
<td>Loss of wildlife habitat (All respondents, n=500)</td>
<td>23%</td>
</tr>
<tr>
<td>Loss of riparian areas (All respondents, n=500)</td>
<td>24%</td>
</tr>
<tr>
<td>Adapting to climate change on your farm (All respondents, n=500)</td>
<td>17%</td>
</tr>
<tr>
<td>Groundwater contamination due to runoff from commercial fertilizers/crop protection products (Applied commercial fertilizers or crop protection products, n=390)</td>
<td>22%</td>
</tr>
<tr>
<td>Surface water contamination due to runoff from commercial fertilizers/crop protection products (Applied commercial fertilizers or crop protection products, n=390)</td>
<td>22%</td>
</tr>
<tr>
<td>Groundwater contamination from manure storage (Stored manure, n=203)</td>
<td>23%</td>
</tr>
<tr>
<td>Surface water contamination from manure storage (Stored manure, n=203)</td>
<td>19%</td>
</tr>
<tr>
<td>Groundwater contamination from abandoned water wells (All respondents, n=500)</td>
<td>18%</td>
</tr>
<tr>
<td>Surface water contamination from manure spreading on land (Applied manure, n=256)</td>
<td>18%</td>
</tr>
<tr>
<td>Groundwater contamination from manure spreading on land (Applied manure, n=256)</td>
<td>15%</td>
</tr>
<tr>
<td>Bank erosion from livestock access (Have livestock, n=372)</td>
<td>12%</td>
</tr>
<tr>
<td>Greenhouse gas emissions on your farm (All respondents, n=500)</td>
<td>10%</td>
</tr>
<tr>
<td>Odour from manure storage (Stored manure, n=203)</td>
<td>9%</td>
</tr>
<tr>
<td>Odour from manure spreading on land (Applied manure, n=256)</td>
<td>7%</td>
</tr>
</tbody>
</table>
Overall, ‘proper disposal of agricultural waste’ (56% concerned) emerges as the top concern, followed by two soil related issues – ‘loss of soil fertility’ (49% concerned) and ‘soil erosion from wind and water’ (45% concerned). Levels of concern for most of the remaining issues fall between the 25% and 40% marks. Again looking at issues applicable to the majority of operations, the issues of least concern are ‘odour from manure spreading on land’ (16% concerned), ‘greenhouse gas emissions on your farm’ (21% concerned) and ‘bank erosion from livestock access’ (21% concerned).

**ESA ADOPITION SCORE (ARD PERFORMANCE MEASURE 2A)**

ARD Performance Measure 2a is defined as *the average percentage of improved environmentally sustainable agriculture practices adopted by producers*.

A total of 41 ESA practices, that could be used to address soil conservation, water quality, grazing management, wildlife habitat conservation, energy and climate change (adaptation) manure management, agricultural waste management, as well as planning approaches regarding sustainable agriculture, were used to derive the result for this measure. An eligible ESA practice (or group) for the base calculation is based on farm type, farm site characteristics and operation practices.

The percentage of eligible environmentally sustainable agricultural practices adopted by each respondent is multiplied by a weighting factor to generate a weighted adoption score for each respondent. The result of Performance Measure 2a is the average weighted adoption score of all respondents expressed as a percentage.

The 2012 adoption score – i.e. Performance Measure 2a – is 55%.

A number of significant differences in ESA adoption are seen when the data are analyzed by farm operations/operator characteristics. The overall ESA Adoption score is significantly higher on operations:

- With gross farm sales of $250K or more in 2011 (60%);
- Operations where the primary source of revenue is livestock or a mix of crops and livestock (both, 58%);
- Which are expanding (60%);
- Where the key decision maker has attended a degree or diploma program in an agriculturally related area (61%); and,
- Where the key decision maker has attended a farm conservation training program, workshop or seminar in the past two years (64%).

There are no significant regional differences, with adoption ranging from 53% to 57% across the five regions.
The majority (59%) of operations are classified as *medium* adopters – that is, they have adopted 50.1% to 80% of the practices for which they are eligible. Just over one-third (36%) are *low* adopters (have adopted 50% or less of eligible practices), while only 5% are *high* adopters (have adopted more than 80% of eligible practices). The graph below illustrates the distribution of adoption.

In the areas of both energy and climate change and soil conservation, the vast majority of operations are low adopters; general practices and agricultural waste management also see a significant percentage of low adopters. The adoption distribution within each practice area is as follows:

- Manure management: 14% low adopters, 42% medium adopters, 44% high adopters
- Water quality and quantity: 24% low adopters, 28% medium adopters, 48% high adopters
- Wildlife habitat conservation: 29% low adopters, 12% medium adopters, 59% high adopters
- Grazing management: 42% low adopters, 58% high adopters
- General practices: 68% low adopters, 18% medium adopters, 14% high adopters
- Agricultural waste management: 59% low adopters, 41% high adopters
- Energy and climate change: 91% low adopters, 6% medium adopters, 3% high adopters
- Soil conservation: 87% low adopters, 12% medium adopters, 1% high adopters
SOIL CONSERVATION PRACTICES

Soil conservation is a set of management strategies and practices for prevention of soil being eroded or chemically changed from nutrient depletion. Practices can include reduced tillage and/or the use of perennial forages, pulse crops and winter cereals in rotation.

Soil Conservation Practices ESA Adoption Score

The ESA adoption score for the three soil conservation performance measures stands at 20% – this is the lowest adoption rate of the eight practice areas assessed. Adoption of soil conservation practices is significantly higher in:

- Southern Alberta (27%) versus the Peace and Northwest regions;
- Operations where gross farm sales were $250K or more in 2011 (35%);
- Operations where the primary source of revenue is crops (27%) or a mix of crops and livestock (22%);
- Expanding operations (32%); and,
- Operations where the key decision maker has attended a farm conservation training program, workshop or seminar in the past two years (25%).

Soil Conservation Practices Adoption Score by Farm Operations Characteristics

The vast majority (87%) of operations are classified as low adopters – that is, they have adopted less than 50% of the practices for which they are eligible. Just over one-in-ten (12%) are medium adopters (have adopted 50.1% to 80% of eligible practices), while only 1% are high adopters (have adopted more than 80% of eligible practices).
Use Reduced Tillage

More than half (56%) of operators with crop acres report completing one or more tillage passes in addition to the seeding operation, while 36% say the seeding operation into the stubble of the previous crop was the only tillage pass completed. Among those who completed two or more tillage passes, the most frequent reason given was “to manage weed populations” (30%), followed by “to aerate the soil” (14%), “seeding equipment required a tillage pass for seed bed preparation” (14%) and “to manage excess moisture” (12%).

Excluding ‘don’t know’ and ‘not applicable’ responses, the adoption score for this practice is 39%. Adoption is significantly higher on operations:

- With gross farm sales of $250K or more (61%) versus those with sales in the $50K to <$250K range (34%) and less than $50K (29%);
- Where the primary source of revenue is crops (50%) or both crops and livestock (45%) versus livestock only (18%);
- Currently expanding (56%) or in the beginning or maintenance (43%) stages versus those that are reducing (26%).
Use of Perennial Forages, Pulse Crops and Winter Cereals in Rotation

Four-in-ten (42%) operators with crops report using perennial forages in their cropping rotation in 2011, while this drops to just 16% for pulse crops and 8% for winter cereals.

Use of Perennial Forages, Pulse Crops and Winter Cereals

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Don't know/Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perennial forages</td>
<td>42%</td>
<td>56%</td>
<td>3%</td>
</tr>
<tr>
<td>Pulse crops</td>
<td>16%</td>
<td>80%</td>
<td>4%</td>
</tr>
<tr>
<td>Winter cereals</td>
<td>8%</td>
<td>92%</td>
<td>1%</td>
</tr>
</tbody>
</table>

Adoption scores for using pulse crops and winter cereals in rotation are both extremely low at 16% and 7% respectively. Using perennial forages is not an ESA performance measure. When the data are analyzed further, a number of significant differences emerge.

In the case of perennial forages, usage is significantly higher on operations:

- Where the primary source of revenue is livestock (66%) versus a mix of crops and livestock (45%) or crops (25%) (the use of perennial forages on mixed operations is also significantly higher compared to those with primarily crops);
- In the reducing stage (53%) versus beginning or maintaining (35%); and,
- Where the key decision maker has an agriculture degree or diploma (55% vs. 37% does not) or has farm conservation training (55% vs. 36% does not).

With regards to pulse crops, adoption is significantly higher in:

- Southern Alberta (25%) versus the Northwest (8%);
- On operations with gross farm of $250K or more (30%) versus those with sales of $50K to <$250K (11%) and less than $50K (14%); and,
- On operations where the primary source of revenue is crops (24%) versus livestock (7%).
Adoption of using **winter cereals** is similar to pulse crops, and significantly **higher** in:

- Southern Alberta (24%) compared to all other regions (range of 1% to 7%);
- On operations with gross farm of $250K or more (16%) versus those with sales of $50K to <$250K (6%) and less than $50K (3%); and,
- Expanding (18%) versus beginning or maintaining (6%) or reducing (5%) operations.

**Soil Conservation Practices Summary**

The graph below summarizes the adoption of each practice that impacts water quality and/or quantity as well as the percentage of operations eligible for each practice. From an environmental perspective, increasing adoption of practices that currently have low levels of adoption — but high levels of eligibility — should have a strong impact. Additionally, increased adoption of these practices would have the greatest impact on ESA adoption scores. Of course, other factors such as degree of environmental benefit, understanding barriers to use, potential for increased adoption, ease of adoption and influence of ARD on practice adoption, should also be considered in prioritizing areas for focus.

Adoption of soil conservation practices is extremely low, with adoption of all three practices below the 50% mark. Eligibility, however, is relatively high with two-thirds or more farms eligible for each practice. All three practices should be areas of focus.

Given that ‘loss of soil fertility’ is a key issue of concern, operators should be open to learning about improvements they could make in the area of soil conservation. Increasing adoption of reduced tillage is perhaps the strongest opportunity, particularly given the benefit of carbon sequestering (i.e. less disturbance of the soil acts as a carbon sink). ARD may wish to explore and gain a stronger understanding of barriers to reduced tillage for Alberta farmers.
PRACTICES THAT IMPACT WATER QUALITY AND/OR QUANTITY

Practices that impact water quality and/or quantity are individual practices or a combination of practices that are effective and practicable means of improving water quality by preventing pollutants (which may be fertilizer, manure or pesticides) from entering wells, waterways, lakes, wetlands or ground water, and quantity by preventing runoff from irrigated fields.

Water Quality and/or Quantity Practices ESA Adoption Score

The ESA adoption score for the 12 water quality and quantity performance measures is high at 73% – a very close second to manure management among the eight practice areas assessed. Adoption of water quality and quantity practices is significantly higher on operations where:

- Gross farm sales were $250K or more in 2011 (77%);
- The key decision maker has an agriculture degree or diploma (82%); and,
- The key decision maker has attended a farm conservation training program, workshop or seminar in the past two years (83%).

Water Quality and/or Quantity Practices Adoption Score by Farm Operations Characteristics

<table>
<thead>
<tr>
<th>Water Quality and Quantity</th>
<th>Region</th>
<th>Gross Farm Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>South</td>
</tr>
<tr>
<td>Water Quality Quantity</td>
<td>73%</td>
<td>74%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Water Quality and Quantity</th>
<th>Operation Type (main source of revenue)</th>
<th>Stage of Operation</th>
<th>Degree or Diploma</th>
<th>Conservation Training</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Crops</td>
<td>Livestock</td>
<td>Mixed</td>
<td>Beginning or Maintaining</td>
</tr>
<tr>
<td>Water Quality Quantity</td>
<td>73%</td>
<td>75%</td>
<td>73%</td>
<td>71%</td>
</tr>
</tbody>
</table>

Just under half (48%) of operations are classified as high adopters – that is, they have adopted more than 80% of the practices for which they are eligible, while 28% are medium adopters (have adopted 50.1% to 80% of eligible practices) and one-quarter (24%) are low adopters (have adopted 50% or less eligible practices).
Maintain Buffer Areas along Edge of Natural Water Bodies

More than three-quarters (77%) of operators with water bodies on their land said they maintained buffer areas of grass or trees along the edge of rivers, streams, sloughs, wetlands or ditches. The adoption score for this practice is high at 82%. It is noteworthy that adoption is significantly lower in Southern Alberta (63%) compared to Central (83%), Northwest (86%) and Northeast (89%) regions of the province.

Have Grassed Waterways

Six-in-ten (61%) operators with water bodies on their land indicated they had grassed waterways. Again it is notable that adoption of this practice is significantly lower in Southern Alberta (41%) compared to Central (68%), Northwest (62%) and Northeast (65%) regions of the province; perhaps reflective of less perceived need due to lower rainfall in the South. This practice is not an ESA performance measure.

Avoid Draining or Filling in Natural Wetlands or Sloughs

The vast majority (93%) of operators with water bodies on their land said they had not drained or filled in natural wetlands or sloughs. The adoption score for this practice is extremely high at 94%. Adoption is significantly higher on operations where the primary revenue is from livestock (98%) versus crops (91%) or a mix (88%), as well as those at the beginning or maintaining (95%) and reducing stages (96%) compared to expanding operations (80%). That being said, adoption is high across the board.
Apply Chemical Fertilizer at Recommended Rate Based on Soil or Tissue Test

More than half (56%) of operators who applied commercial fertilizer said they did so based on the results of a soil or tissue test. The adoption score of 56% is comparatively lower than other water related practices. Adoption is significantly higher on operations with gross farms sales of $250K or more (72%) compared to those with sales of $50K to <$250K (47%) and less than $50K (54%), as well as those who primarily derive revenue from crops (62%) versus livestock (42%).
Control Runoff from Manure Storage, Livestock Pens and Feeding Areas

Operators who have livestock and store manure were asked if they control runoff. Six-in-ten (61%) say they controlled all or some runoff from manure storage, while this drops to 54% with regard to livestock pens and 49% for feeding areas.

The adoption scores for controlling runoff are 66% in the case of manure storage, 64% in the case of livestock pens and 56% in the case of feeding areas – all moderate but lower than many water-related practices.

Controlling runoff from livestock pens and feeding areas is significantly lower on operations:

- With less than $50K in revenue – livestock pens (64% vs. 70% $250K+) / feeding areas (46% vs. 61% $50K to <$250K and 69% $250K+); and,
- In the reducing stage compared to those beginning or maintaining – livestock pens (53% vs. 71%) / feeding areas (47% vs. 63%).

Conversely adoption is significantly higher on operations where the key decision maker has an agriculture degree or diploma versus those who do not – manure storage (89% vs. 58%), livestock pens (82% vs. 58%) and feeding areas (72% vs. 52%). Controlling runoff from livestock pens is also significantly higher if the decision maker has farm conservation training (75% vs. 60%).
**Plug or Seal Abandoned Wells / Properly Seal and Maintain Active Wells**

Proper maintenance of abandoned water wells lags maintenance of active wells. Among the 30% of operators with abandoned water wells on their farm, roughly two-thirds (65%) say they have plugged, capped or sealed all (44%) or some (21%) of the wells. Comparatively, among the majority (84%) with active water wells, 75% say they have capped and maintained all or some of the wells with the reported incidence of capping all active water wells at 72%.

The adoption score for plug or seal abandoned wells is 68%, while the score for properly seal and maintain active wells is 79%. Significant differences in adoption are seen with regards to:

- **Stage of operation** – 95% of expanding operations have sealed and maintained active water wells, significantly higher than 78% of beginning or maintaining and 76% of reducing operations; and,
- **Farm conservation training** – In cases where the key decision maker has training, 83% have plugged or sealed abandoned wells (vs. 62% no training) and 88% have properly sealed and maintained active wells (vs. 77% no training).
Maintain a 10 Meter Buffer Area from Water Bodies / Water Wells when Applying Pesticides

The majority of operators protect water sources when applying crop protection products.

Three-quarters (74%) of operators with water bodies on their farm report maintaining a 10 meter buffer area when applying crop protection products – this goes up to 84% for water wells.

**Buffer Areas when Applying Crop Protection Products**

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Don't know/Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 meter buffer area from water bodies¹</td>
<td>74%</td>
<td>17%</td>
<td>9%</td>
</tr>
<tr>
<td>10 meter buffer area from water wells²</td>
<td>84%</td>
<td>8%</td>
<td>9%</td>
</tr>
</tbody>
</table>

¹Base: Applied Crop protection products and Have Natural Rivers/Streams/Wetlands/Sloughs On The Property (n=275)
²Base: Applied Crop protection products and Have Abandoned Water Wells/Active Water Wells On The Property (n=287)

Q25. In 2011, did you maintain at least a 10 meter buffer area from water bodies/water wells when applying crop protection products?

Adoption scores for both practices are very high – 81% for maintaining a 10 meter buffer from water bodies when applying pesticides and 91% for maintaining a 10 meter buffer from water wells. Adoption is significantly higher among operators with farm conservation training (93% vs. 76% no training) with regard to water bodies, and significantly higher among operators with an agriculture degree or diploma (99% vs. 89% no degree) with regard to water wells.
Prevent Runoff from Irrigated Fields

Operators who had irrigated cropland or pasture in 2011 were asked if they used three practices to prevent runoff from irrigated fields. The most used practice was managing irrigation with consideration for crop water demand and soil infiltration rates (70%), while less than half used variable rate water application (43%) and just 16% used reservoir tillage.

Prevent Runoff from Irrigated Fields

<table>
<thead>
<tr>
<th>Practice</th>
<th>Yes (%)</th>
<th>No (%)</th>
<th>Don't know/Not applicable (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manage irrigation with consideration for crop water demand and soil infiltration rates?</td>
<td>70</td>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td>Reservoir tillage (for example, dammer-diker)?</td>
<td>16</td>
<td>83</td>
<td>2</td>
</tr>
<tr>
<td>Variable rate water application?</td>
<td>43</td>
<td>52</td>
<td>5</td>
</tr>
</tbody>
</table>

Base: Irrigated Cropland/Pasture Last Year (n=63)
Q27. Do you typically use any of the following practices?

This practice is not an ESA performance measure, and due to very small sample sizes when the data are broken out further, there are no significant differences by farm operation/operator characteristics.
Manage Livestock Access to Water Bodies that are Used as a Water Source

Two thirds (66%) of operators who both graze livestock and have water bodies on their farm say they managed or controlled livestock access to water bodies that are used as water sources, while three-in-ten (30%) did not. By far the most common means of managing livestock access was fencing to prevent direct access (91%), followed by livestock movement tools (67%) – use of pasture water pipelines was limited to 21% of respondents.

The adoption score for managing livestock access to water bodies used as a water source is moderate at 69%. Adoption is significantly higher among operations in the Northwest (87%) and Northeast (77%) regions compared to those in Central Alberta (56%), and in cases where the key decision maker has farm conservation training (83% vs. 63% no training).

Choose Wintering Site to Avoid Manure Contamination

Eight-in-ten operators who both graze livestock and have water bodies on their farm say they locate all (57%) or some (22%) of their winter feeding and bedding sites to prevent runoff from manure entering natural water bodies.

The adoption score for this practice is high at 86%. Adoption is significantly higher on operations in the Northwest (96%) compared to those in the South (82%), those where the main source of revenue is crops (100%) versus livestock (85%) or a mix (79%), and where the key decision maker has an agriculture degree or diploma (95% vs. 83% no degree).
Water Quality and Quantity Practices Summary

The graph below summarizes the adoption of each practice that impacts water quality and/or quantity as well as the percentage of operations eligible for each practice. From an environmental perspective, increasing adoption of practices that currently have low levels of adoption – but high levels of eligibility – should have a strong impact. Additionally, increased adoption of these practices would have the greatest impact on ESA adoption scores. Of course, other factors such as degree of environmental benefit, understanding barriers to use, potential for increased adoption, ease of adoption and influence of ARD on practice adoption, should also be considered in prioritizing areas for focus.

Adoption of practices to protect and preserve water quality and quantity is high overall. Of the 12 specific practices, six have adoption levels of roughly 80% or higher, while adoption of the other six practices are comparatively lower but all top the 50% mark. Eligibility for the practices is also mixed – more than six-in-ten operations are eligible for six of the practices, while half or fewer are eligible for the remaining six. Three practices have relatively lower levels of adoption and relatively higher levels of eligibility – control runoff from livestock pens, control runoff from feeding areas and apply chemical fertilizer at recommended rate.
WILDLIFE HABITAT CONSERVATION PRACTICES

Wildlife habitat restoration management preserves natural habitat and wetland ecosystem and the plants and animals that thrive there. Wildlife habitat conservation practices include retention of bush and native grassland, managing grazing to encourage natural rejuvenation of understory in woodlands, manage grazing for wildlife habitat, restoring drained wetlands or sloughs.

Wildlife Habitat Conservation Practices ESA Adoption Score

The ESA adoption score for the three wildlife habitat conservation performance measures is strong at 72%, and just slightly trailing adoption of manure (75%) and water (73%) practices. Adoption of wildlife habitat conservation practices is significantly lower in:

- Southern Alberta (56%) compared to all other regions of the province; and,
- Expanding operations (62%) versus those in the beginning or maintenance stages.

Wildlife Habitat Conservation Practices Adoption Score by Farm Operations Characteristics

<table>
<thead>
<tr>
<th>Total</th>
<th>Region</th>
<th>Gross Farm Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>South</td>
<td>Central</td>
</tr>
<tr>
<td>Wildlife Habitat Conservation</td>
<td>72%</td>
<td>56%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total</th>
<th>Operation Type (main source of revenue)</th>
<th>Stage of Operation</th>
<th>Degree or Diploma</th>
<th>Conservation Training</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Crops</td>
<td>Livestock</td>
<td>Mixed</td>
<td>Beginning or Maintaining</td>
</tr>
<tr>
<td>Wildlife Habitat Conservation</td>
<td>72%</td>
<td>72%</td>
<td>72%</td>
<td>72%</td>
</tr>
</tbody>
</table>

The majority (59%) of operations are classified as high adopters – that is, they have adopted more than 80% of the practices for which they are eligible, while roughly one-in-ten (12%) are medium adopters (have adopted 50.1% to 80% of eligible practices), and a sizeable minority (29%) are low adopters (have adopted 50% or less eligible practices).
Wildlife Habitat Conservation Practices

The four wildlife habitat conservation practices are:

- *Retain bush or native grassland*;
- *Manage grazing to encourage natural rejuvenation of understory in woodlands*;
- *Manage grazing for wildlife habitat*; and,
- *Restore drained wetlands or sloughs* (not a performance measure).

Adoption scores for all three performance measures are moderate to strong, with a high of 83% for *retain bush or native grassland* and a low of 61% for *manage grazing for wildlife habitat* – adoption of *manage grazing to encourage natural rejuvenation of understory in woodlands* falls in the middle at 71%.

Though not a performance measure, adoption is very low for *restore drained wetlands or sloughs* with just one-quarter of operators indicating they have restored all (5%) or some (19%) of their drained wetlands or sloughs, while the majority (70%) say they have restored none.

When the data are analyzed further, notable differences emerge.

- *Retain bush or native grassland*: Adoption is significantly lower in the South (63%) compared to all other regions of the province (adoption ranges from 84% to 89%), on operations where the main source of revenue is crops (78% vs. 88% livestock), and on expanding operations (71% vs. 85% of those in the beginning, maintaining and reducing stages).
- *Manage grazing for wildlife habitat*: Adoption is also significantly lower on operations where the main source of revenue is crops (47% vs. 63% livestock).
Wildlife Habitat Conservation Practices Summary

The graph below summarizes the adoption of each wildlife habitat conservation practice as well as the percentage of operations eligible for each practice. From an environmental perspective, increasing adoption of practices that currently have low levels of adoption – but high levels of eligibility – should have a strong impact. Additionally, increased adoption of these practices would have the greatest impact on ESA adoption scores. Of course, other factors such as degree of environmental benefit, potential for increased adoption, understanding barriers to use, ease of adoption and influence of ARD on practice adoption, should also be considered in prioritizing areas for focus.

Adoption of wildlife habitat conservation practices is high overall. Of the three specific practices, one tops the 80% mark while the other two enjoy moderate adoption levels. Eligibility ranges from near universal to moderate.
GRAZING MANAGEMENT PRACTICES

The environmental benefits of well managed pasture and riparian areas (green vegetated areas adjacent to a creek, stream, or river), include reduced soil erosion; improved air and water quality; better plant diversity, vigour and production; and, improved fish and wildlife habitat.

Grazing Management Practices ESA Adoption Score

The grazing management ESA adoption score for the two grazing management performance measures is also in the top tier at 69%. Adoption of grazing management practices is significantly higher on operations where the key decision maker has farm conservation training (80%).

Grazing Management Practices Adoption Score by Farm Operations Characteristics

<table>
<thead>
<tr>
<th>Grazing Management</th>
<th>Total</th>
<th>Region</th>
<th>Gross Farm Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>South</td>
<td>Central</td>
</tr>
<tr>
<td>Grazing Management</td>
<td>69%</td>
<td>75%</td>
<td>65%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Grazing Management</th>
<th>Total</th>
<th>Operation Type (main source of revenue)</th>
<th>Stage of Operation</th>
<th>Degree or Diploma</th>
<th>Conservation Training</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Crops</td>
<td>Livestock</td>
<td>Mixed</td>
<td>Beginning or Maintaining</td>
</tr>
<tr>
<td>Grazing Management</td>
<td>69%</td>
<td>63%</td>
<td>70%</td>
<td>69%</td>
<td>71%</td>
</tr>
</tbody>
</table>

With only two grazing management performance measures, over half (58%) of operations are classified as high adopters – that is, they have adopted more than 80% of the practices for which they are eligible (in this case 100% of eligible practices). The remaining 42% are low adopters, having adopted 50% or less eligible practices.
Grazing Management Practices

The five grazing management practices are:

- **Rotation of pastures to prevent over use** (not a performance measure);
- **Adequate forage based on actual requirements** (not a performance measure);
- **Grazing native rangeland during vulnerable periods** (not a performance measure);
- **Protect riparian areas from grazing to prevent over use**: Move livestock away from riparian areas using tools and methods such as salt blocks, windbreaks and herding (not a performance measure);
- **Protect riparian areas from grazing to prevent over use**: Avoid or minimize grazing in riparian and/or bush areas in the late summer or autumn; and,
- **Time grazing to avoid vulnerable times of year for riparian areas**.

Adoption of several grazing management practices is quite high. Overall, 85% of operations that graze livestock indicate they rotate use of their pastures as part of their grazing management (i.e. rotation of pastures to prevent over use), 81% annually consider or adjust their stocking rate to balance livestock forage demand with the available forage supply (i.e. adequate forage based on actual requirements) and 90% of those what manage native rangelands say they time the grazing of native rangelands (i.e. grazing native rangeland during vulnerable periods). Adoption of all three practices is significantly higher on operations where the key decision maker has farm conservation training, though adoption remains high across the board.

Adoption of practices related to the protection of riparian areas is good but comparatively lower. Two-thirds (67%) say they move livestock away from riparian areas using tools and methods such as salt blocks, windbreaks and herding, while 61% say they avoid or minimize grazing in riparian and/or bush areas in the late summer or autumn (both of which pertain to the practice protect riparian areas from grazing to prevent over use) and 57% say they time the grazing of riparian areas (i.e. time grazing to avoid vulnerable times of year for riparian areas).
Adoption scores for the two performance measures related to riparian areas are good at 70% for time grazing to avoid vulnerable times of year for riparian areas and 68% for protect riparian areas from grazing to prevent over use (i.e. avoid or minimize grazing in riparian and/or bush areas in the late summer or autumn).

Adoption scores for both practices are significantly higher in cases where the key decision maker has farm conservation training versus no training – 87% vs. 64% for timed grazing and 79% vs. 64% for preventing over use. Adoption of protect riparian areas from grazing to prevent over use is also significantly higher among operations in the South (82%) compared to those in Central Alberta (58%).
Grazing Management Practices Summary

The graph below summarizes the adoption of each grazing management practice as well as the percentage of operations eligible for each practice. From an environmental perspective, increasing adoption of practices that currently have low levels of adoption – but high levels of eligibility – should have a strong impact. Additionally, increased adoption of these practices would have the greatest impact on ESA adoption scores. Of course, other factors such as degree of environmental benefit, potential for increased adoption, understanding barriers to use, ease of adoption and influence of ARD on practice adoption, should also be considered in prioritizing areas for focus.

Adoption levels of the two grazing management practices are good, both at the 70% mark, while eligibility levels are moderate. Given moderate levels of concern regarding the ‘loss of riparian areas,’ gains could be seen in practice adoption.
MANURE MANAGEMENT PRACTICES

Manure management practices involve handling manure in the most efficient and environmentally sound means possible. Most of these practices involve managing manure from the source to the end use – typically utilization by crops.

Manure Management Practices ESA Adoption Score

The ESA adoption score for the 12 manure management performance measures is very high at 75% - the highest score among the eight practice areas assessed. Adoption of manure management practices is significantly higher on:

- Larger operations with gross farm sales of $250K or more (83%); and,
- In cases where the key decision maker has farm conservation training (84%).

Manure Management Practices Adoption Score by Farm Operations Characteristics

Near equal proportions of operations are classified as high adopters (44% have adopted more than 80% of eligible practices) and medium adopters (42% have adopted 50.1% to 80% of eligible practices). The remaining 14% are low adopters, having adopted 50% or less eligible practices.
Avoid Applying Manure or Compost on Frozen or Snow Covered Ground

Incidence of applying manure or compost on snow covered ground is low.

Among those who applied liquid or solid manure in 2011, just one-in-ten (10%) said they typically need to apply manure on frozen or snow covered ground while among those who applied compost, two-in-ten (19%) say they typically need to apply compost on frozen or snow covered ground.

The most frequent reasons for doing so – among the 28 operators asked – were simply “always done that way” (90%) and “reduced costs – only need to move manure once” (77%).

Applying Manure or Compost on Frozen or Snow Covered Ground

Adoption scores are quite high at 90% for avoid applying manure on frozen or snow covered ground and 80% for avoid applying compost on frozen or snow covered ground.
**Avoid Storing Manure near Water Wells**

Few operators report storing manure near water wells.

On operations with active water wells, less than one-in-five (16%) respondents said they stored manure within 100 meters the wells and on operations with abandoned water wells that have not been plugged, capped or sealed, just 7% said they stored manure within 100 meters of the wells.

Adoption of the practice *avoid storing manure near abandoned water wells* is extremely high at 92% while adoption of the practice *avoid storing manure near active water wells* is also high at 84%.

**Frequency of Application**

The practice of applying manure more frequently than once every two years is limited to less than one-in-ten operators who applied manure in 2011.

The adoption score for this practice stands at 92%. Though still strong, adoption is lowest in the Northwest region (84%) – significantly lower than the Northeast (98%).
Incorporate Manure after Applying

Most operators do not incorporate manure within the optimal timeframe.

Roughly half of operators who applied solid (48%) or compost (53%) manure to their land in 2011 said they typically incorporate manure after applying. Among those, however, just 43% report incorporating solid manure within 24 or 48 hours, while it is slightly higher (57%) in the case of compost manure.

The adoption score for incorporate manure after applying (i.e. solid manure) is low at 48%.
Applying Liquid Manure

Just 4% of operations applied liquid manure to their land in 2011. Among them, less than half indicated that they typically broadcast with incorporation within 24 hours or 48 hours after application. Excluding ‘not applicable’ responses, the adoption score for applying liquid manure is 53%. One should note, however, that just 3% of operations were eligible for this practice.

Applying Liquid Manure

- Inject - that is, shank or disc - the manure into the ground: 24%
- Broadcast the liquid manure with no incorporation: 14%
- Broadcast with incorporation within 24 hours after application: 18%
- Broadcast with incorporation within 48 hours after application: 24%
- Not applicable: 20%

Base: Applied liquid manure to land in 2011 (n=20*)
Q43. Thinking of liquid manure, do you typically...?

*Caution: Extremely small base
Avoid Applying Manure Close to Waterways to Minimize Increased Nutrients Runoff

Roughly two-thirds of operators who applied manure to their land in 2011 indicated they typically consider the distance between manure and waterways (67%), the application method (67%) and/or the slope of land (64%) when applying either solid or liquid manure.

Avoid Applying Manure Close to Waterways

<table>
<thead>
<tr>
<th>Factor</th>
<th>Yes</th>
<th>No</th>
<th>Don't know/Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance between manure and waterways – that is, low lying paths where surface water collects and flows</td>
<td>67%</td>
<td>20%</td>
<td>14%</td>
</tr>
<tr>
<td>Application method</td>
<td>67%</td>
<td>24%</td>
<td>8%</td>
</tr>
<tr>
<td>Slope of land</td>
<td>64%</td>
<td>26%</td>
<td>11%</td>
</tr>
</tbody>
</table>

The adoption score for *avoid applying manure close to waterways to minimize increased nutrients runoff* (i.e. considering at least one of the three factors when applying manure) is **strong at 77%**. Adoption is significantly *higher* in cases where the key decision maker has farm conservation training (98% vs. 86% no training).
Sampling and Analyzing the Manure for Nutrient Content

It is important to note that inadvertently respondents were not provided with the option of responding ‘none of the above’ to this question – given the large percentage of ‘don’t know’ responses, they have been used as a proxy in the calculation of the adoption score. Also, although provided as an option for both manure and compost, ARD does not provide book values for compost.

Sampling and analyzing manure for nutrient content lags other manure management practices in adoption.

Less than half of operators who applied liquid or solid manure in 2011 said they typically apply manure based on a soil or tissue test (16%), manure nutrient test (6%) or book values (23%). Similar findings are observed for sampling and analyzing compost for nutrient content. The adoption score for sampling and analyzing manure for nutrient content is 48% (sampling and analyzing compost is not a performance measure). Adoption is significantly lower in the Northeast (31%) compared to the South (60%) and Northwest (53%) regions of the province.

**Manure Application Based on P or N&P**

Incidence of applying manure based on crop phosphorous or crop nitrogen requirements is extremely low.

Among operators who applied liquid, solid or compost manure in 2011, roughly one-quarter say they typically base their manure application rates on crop nitrogen (22%) or crop phosphorus (3%) requirements. The adoption score for manure application based on P or N&P is 28%. Adoption is, however, significantly higher on operations:

- With gross farm sales of $250K or more (54%);
- That are expanding (46%) versus reducing (19%); and,
- Where the key decision maker has farm conservation training (43% vs. 23% no training).
Applying Manure when Crop Requires It

The majority of operators do not apply manure at the optimal time.

When asked when they typically time manure application, more than six-in-ten (62%) say ‘after crop removal/harvest’, while relatively few use the preferred practices of ‘into an established crop or forage stand’ (15%) or ‘within one month of seeding a crop’ (15%). This practice is not an ESA performance measure.

Keeping Manure Records

Two-in-ten operators who applied manure in 2011 indicated they typically manage more than 500 tonnes of manure per year. Among them, two-thirds say they typically keep records detailing the amount and field location where the manure is spread for all (40%) or some (26%) of their fields. The adoption score for keeping manure records is moderate at 68%.
**Extend the Grazing Season**

The vast majority of operations take steps to extend the grazing season.

Housing livestock outside during the winter is near universal (96%), and among those who do, adoption of the practice *extend the grazing season* stands at 91%. Bales hauled to field and unrolled or feed in feeders (75%), stockpiled forages (50%) and portable windbreaks (44%) are common means of managing livestock that are housed outside during the winter.

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**Base: Have livestock (n=289)**

**Q51. Do you typically house livestock outside during the winter?**

- **Yes** 96%
- **No** 3%
- **Don’t know** 1%

**Means of managing Livestock Housed Outside During the Winter**

- **Bales hauled to field and unrolled or feed in feeders**: 75% Yes, 24% No, 1% Don’t know
- **Stockpiled forages**: 50% Yes, 48% No, 2% Don’t know
- **Portable windbreaks**: 44% Yes, 55% No, 1% Don’t know
- **Bales moved to other field and fed using electric fence**: 17% Yes, 82% No, 1% Don’t know
- **Graze bales left in field**: 16% Yes, 81% No, 3% Don’t know
- **Corn graze**: 4% Yes, 95% No, 1% Don’t know
- **In corrals or feed pens**: 62% Yes, 35% No, 3% Don’t know
- **One field site all season**: 35% Yes, 63% No, 3% Don’t know
- **Loafing pens (temporary daytime housing)**: 27% Yes, 70% No, 3% Don’t know

**Base: Typically house livestock outside during the winter (n=278)**

**Q51B. Thinking about livestock that are housed outside during the winter, how do you typically manage them?**
Managing Odour and Dust

Operators who stored manure on their farm in 2011 were asked if they used any of eight specific practices to manage odour or dust. None of the practices evaluated was adopted by more than half of respondents. The most common practices adopted were the use of shelterbelts (45%), frequent manure removal from feedlot pens and barns (38%) and reduce manure moisture levels (30%).

<table>
<thead>
<tr>
<th>Practice</th>
<th>Yes</th>
<th>No</th>
<th>Don’t know/Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shelterbelts</td>
<td>45%</td>
<td>44%</td>
<td>11%</td>
</tr>
<tr>
<td>Frequent manure removal from feedlot pens and barns</td>
<td>38%</td>
<td>38%</td>
<td>24%</td>
</tr>
<tr>
<td>Reduce manure moisture levels</td>
<td>30%</td>
<td>46%</td>
<td>24%</td>
</tr>
<tr>
<td>Manure injection or band spreading or broadcasting followed by immediate incorporation</td>
<td>21%</td>
<td>61%</td>
<td>19%</td>
</tr>
<tr>
<td>Kept neighbours informed about your farming activities</td>
<td>21%</td>
<td>62%</td>
<td>16%</td>
</tr>
<tr>
<td>Dust control materials applied on gravel roadways and feedlots</td>
<td>5%</td>
<td>75%</td>
<td>20%</td>
</tr>
<tr>
<td>Bottom loading manure storage facilities</td>
<td>5%</td>
<td>69%</td>
<td>28%</td>
</tr>
<tr>
<td>Manure storage covers</td>
<td>2%</td>
<td>70%</td>
<td>29%</td>
</tr>
</tbody>
</table>

Base: Stored manure on farm in 2011 (n=203)

Q50. In 2011, did you use any of the following practices to manage odour or dust from your farm?
Manure Management Practices Summary

The graph below summarizes the adoption of each manure management practice as well as the percentage of operations eligible for each practice. From an environmental perspective, increasing adoption of practices that currently have low levels of adoption – but high levels of eligibility – should have a strong impact. Additionally, increased adoption of these practices would have the greatest impact on ESA adoption scores. Of course, other factors such as degree of environmental benefit, potential for increased adoption, understanding barriers to use, ease of adoption and influence of ARD on practice adoption, should also be considered in prioritizing areas for focus.

Adoption levels of several manure management practices are extremely high while others lag. Adoption of four manure management practices is over 90% while adoption levels of another three sit around the 80% mark. Comparatively, incorporation of both liquid and solid manure within an optimal timeframe as well as nutrient testing practices have low levels of adoption – basing manure application on either phosphorous requirements or both phosphorous and nitrogen requirements is particularly low. Eligibility for both nutrient testing practices is moderate. ARD may wish to further explore barriers to adopting these practices – in particular, are they practical to do, and what are the time and cost/benefit implications.
AGRICULTURAL WASTE MANAGEMENT PRACTICES

Agricultural waste in this study is defined as pesticide containers, veterinary medical waste (syringes or expired medicines) and agricultural plastics (baler twine, feed bags, silage wraps and/or bale wraps). Waste management practices involve recycling these materials.

The three agricultural waste management practices are:

- **Recycle agricultural plastics** – i.e. recycle plastics such as baler twine, feed bags, silage wraps and/or bale wraps;
- **Recycle pesticide containers** (not a performance measure); and,
- **Properly dispose of veterinary medical waste** (not a performance measure).

The adoption score for *recycle agricultural plastics* is low at 41% (eligibility is moderate at 67%). There are no significant differences with respect to farm operations/operator characteristics.

Adoption of the two other agricultural waste management practices is quite high. Eighty-five percent of operators who apply crop protection products said they *recycled pesticide containers* in 2011. Adoption of this practice is significantly higher in the South (94%) compared to the Northwest (82%) and Northeast (80%) regions of Alberta, as well as on larger operations with $250K or more in gross farm sales versus those with less than $50K (93% vs. 78%).

Eight-in-ten (82%) operators who have livestock said they *properly disposed of veterinary medical waste* in 2011. Adoption is significantly higher on operations where the main source of revenue is both livestock and crops (93%) or livestock (82%) versus those with revenue primarily from crops (71%).

### Agricultural Waste Management Practices

<table>
<thead>
<tr>
<th>Practice Description</th>
<th>Yes (%)</th>
<th>No (%)</th>
<th>Don't Know/Not Applicable (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recycle your crop protection product containers(^1)</td>
<td>85</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Properly dispose of veterinary medical supplies such as syringes or expired medicines(^1)</td>
<td>82</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Recycle plastics such as baler twine, feed bags, silage wraps and/or bale wraps(^1)</td>
<td>36</td>
<td>54</td>
<td>10</td>
</tr>
</tbody>
</table>

\(^1\)Base: Have livestock (n=373) / \(^2\)Base: Apply crop protection products (n=363)

Q52. Please indicate if you did each of the following on your farm in 2011.

Given that ‘proper disposal of agricultural waste’ garners the highest level of concern among the commonly applicable environmental issues evaluated, operators should be open to learning about how they can improve their disposal of agricultural plastic waste.
ENERGY AND CLIMATE CHANGE PRACTICES

For this study, energy and climate change practices involved looking at the production and use of renewable energy (solar, wind, biogas, wood, biomass), energy management practices such as the usage of sub-meters and participation in the Alberta Carbon offset market.

Energy and Climate Change Practices ESA Adoption Score

The ESA adoption score for the three energy and climate change performance measures is 21% – this is the second lowest adoption rate of the eight practice areas assessed, virtually tied with soil conservation (20%) for last place. Adoption of energy and climate change practices is low across the board, though significantly higher in:

- The Peace region (28%) versus Central (19%) and Northwest (17%) Alberta;
- Operations where gross farm sales were $250K or more in 2011 (26%);
- Expanding operations (28%);
- Operations where the key decision maker has an agriculture degree or diploma (26%); and,
- Operations where the key decision maker has attended a farm conservation training program, workshop or seminar in the past two years (28%).

Energy and Climate Change Practices Adoption Score by Farm Operations Characteristics

<table>
<thead>
<tr>
<th>Energy and Climate Change</th>
<th>Region</th>
<th>Gross Farm Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>South</td>
</tr>
<tr>
<td></td>
<td>21%</td>
<td>22%</td>
</tr>
</tbody>
</table>

The vast majority (91%) of operations are classified as low adopters – that is, they have adopted 50% or less of the practices for which they are eligible, while 6% are medium adopters (have adopted 50.1% to 80% of eligible practices) and merely 3% are high adopters (adopted more than 80% of eligible practices).
Energy Saving Practices and Renewable Power

Adoption of energy saving practices is defined as operations that have one or more sub-meters in addition to the main utility meter that shows the total electricity for your entire property, have. Adoption of energy saving practices is extremely low at 10%. It is notable, however, that adoption is significantly higher:

- In the South (19%) compared to the Northeast (9%), Central (8%) and Northwest (6%) regions;
- On farms that are expanding versus reducing (17% vs. 6%); and,
- When the key decision maker has farm conservation training (16% vs. 9% no training).

Adoption of the renewable power practice is also low but comparably higher at 32%. Adoption is based on using one of seven renewable energy methods to produce grid-connected electricity or heat. Producing heat from wood combustion (28%) is by far the most adopted practice. Adoption is significantly higher:

- In the Peace region (43%) compared to the South;
- On smaller farms with gross farm sales of less than $250K (35% vs. 21% $250K+);
- On operations where the primary source of revenue is from livestock (41%) rather than crops (24%); and,
- When the key decision maker has farm conservation training (41% vs. 29% no training).

Energy Saving Practices and Renewable Power

<table>
<thead>
<tr>
<th>Description</th>
<th>Yes (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other than the main utility meter that shows the total electricity usage for your entire property, do you have any sub-meters?</td>
<td>10%</td>
</tr>
<tr>
<td>Do you produce grid-connected electricity?</td>
<td>4%</td>
</tr>
<tr>
<td>...using solar panels (not for water pumping or electric fencing)</td>
<td>0%</td>
</tr>
<tr>
<td>...using wind turbine generator or tower</td>
<td>7%</td>
</tr>
<tr>
<td>...using biogas generator using farm waste</td>
<td>0%</td>
</tr>
<tr>
<td>Produce heat from solar thermal water heating</td>
<td>2%</td>
</tr>
<tr>
<td>Produce heat from solar thermal air heating incorporated into farm building walls</td>
<td>1%</td>
</tr>
<tr>
<td>Produce heat from wood combustion (whole, pellets or chips)</td>
<td>28%</td>
</tr>
<tr>
<td>Produce heat from combustion of any other biomass (straw bales, straw pellets, grain)</td>
<td>1%</td>
</tr>
</tbody>
</table>

1Base: All respondents (n=500)  
2Base: Produce grid-connected electricity (n=21*)  
*Caution: Extremely small base
Participate in Carbon Credit Trading

While more than three-quarters (77%) of operators are aware that there is an Alberta Carbon offset market, just 22% of those aware are currently participating in it and another 2% have participated in it in the past. The adoption score for participate in Carbon Credit trading is low at 22%.

There are, however, numerous significant differences by farm operations/operator characteristics. Adoption is significantly higher on operations:

- In the Northeast and Peace regions (both 32%) compared to Northwest Alberta (14%);
- With gross farm sales of $250K or more (49% vs. 18% $50K to <$250K and 9% less than $50K);
- Where the main source of revenue is crops (34%) or a mix of crops and livestock (28%) versus livestock (9%);
- That are expanding (42%) versus beginning or maintaining (22%) and reducing (15%);
- When the key decision maker has an agriculture degree or diploma (32% vs. 18% no degree); and,
- When the key decision maker has farm conservation training (31% vs. 19%).
Energy and Climate Change Practices Summary

The graph below summarizes the adoption of each energy and climate change practice as well as the percentage of operations eligible for each practice. From an environmental perspective, increasing adoption of practices that currently have low levels of adoption – but high levels of eligibility – should have a strong impact. Additionally, increased adoption of these practices would have the greatest impact on ESA adoption scores. Of course, other factors such as degree of environmental benefit, potential for increased adoption, understanding barriers to use, ease of adoption and influence of ARD on practice adoption, should also be considered in prioritizing areas for focus.

Adoption of both energy saving practices as well as carbon credit trading are very low, with the utilization of sub-meters at only 10%. Eligibility for all three practices is very high, with the potential to adopt the two energy saving practices universal.

Increasing adoption of energy saving practices perhaps has the greatest potential given the dual benefits of cost savings as well as a positive impact on the environment.

Increasing adoption of carbon credit trading may be challenging. While the majority of operators (77%) are aware of the Alberta Carbon Offset market, for some, their farming practices may not allow them to meet some qualifying criteria (e.g. minimum till or zero till), while others may question the return on investment (i.e. does the reward offset the cost).
**GENERAL PRACTICES**

For this study, general environmentally sustainable practices involved the use of variable rate technology, completing the Environment Farm Plan process, soil sampling, and, planting and removing trees.

**General Practices ESA Adoption Score**

The ESA adoption score for the five general practices performance measures is 44% – putting it in the second tier of the eight practice areas assessed. Overall adoption of general practices is significantly higher in:

- The South (56%) versus all other regions of Alberta;
- Larger operations where gross farm sales were $250K or more (56%) or fell in the $50K to <$250K range (46%) versus smaller operations (36%) [the difference between large and mid-size operation is also significant];
- Operations where the main source of revenue is crops (48%) or a mix of crops and livestock (51%);
- Expanding operations (55%);
- Operations where the key decision maker has an agriculture degree or diploma (51%); and,
- Operations where the key decision maker has attended a farm conservation training program, workshop or seminar in the past two years (61%).

**General Practices Adoption Score by Farm Operations Characteristics**

<table>
<thead>
<tr>
<th>General Practices Adoption Score by Farm Operations Characteristics</th>
<th>Total</th>
<th>Region</th>
<th>Gross Farm Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>South</td>
<td>Central</td>
</tr>
<tr>
<td>General Practices</td>
<td>44%</td>
<td>56%</td>
<td>40%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operation Type (main source of revenue)</th>
<th>Stage of Operation</th>
<th>Degree or Diploma</th>
<th>Conservation Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crops</td>
<td>Livestock</td>
<td>Mixed</td>
<td>Beginning or Maintaining</td>
</tr>
<tr>
<td>General Practices</td>
<td>44%</td>
<td>48%</td>
<td>38%</td>
</tr>
</tbody>
</table>

Two-thirds (68%) of operations are classified as low adopters – that is, they have adopted less than 50% of the practices for which they are eligible, while 18% are medium adopters (have adopted 50.1% to 80% of eligible practices) and just 14% are high adopters (have adopted more than 80% of eligible practices).


**Precision Farming: Variable Rate Technology**

Use of variable rate technology is low, particularly in the application of commercial fertilizer.

Among those who applied crop protection products just under half (47%) say they utilized variable rate technology – this drops to 25% for the application of commercial fertilizer.

The adoption score for *precision farming – variable rate technology: crop protection products* is 50% while the score for *precision farming – variable rate technology: commercial fertilizer* is 25%.

Adoption of the use of variable rate technology in the application of crop protection products is significantly *higher* on operations where the main source of revenue is a mix of crops and livestock (65%) versus crops (49%) or livestock (43%), as well as on expanding operations (62% vs. 42% reducing). Adoption of the use of variable rate technology in the application of commercial fertilizer is significantly *higher* when the key decision maker has farm conservation training (39% vs. 21% no training).

---

1 Base: Applied crop protection products (n=363)
2 Base: Applied commercial fertilizer (n=356)

Q59. Last year, did you utilize Variable Rate Technology in the application of...?
**Environmental Farm Plan**

Completion of the Environmental Farm Plan process is low – key barriers to completion are lack of knowledge/lack of information and lack of time.

One-third (33%) of operators say they have completed the Environmental Farm Plan process, while 64% have not and 3% don’t know.

Among those who have not completed the Environmental Farm Plan process, the most frequent reasons given are “not sure what it is” (39%) and “don’t have time” (33%), followed by “don’t know where to find information about it” (14%) and “no interest/no need” (12%). Responses of “not sure what it is” are highest among respondents in the Northwest (47%), those with gross farm sales of less than $50K (48%), on operations where the main source of revenue is livestock (46%) and those who have not participated in farm conservation training (43%).

The adoption score for this practice is 34%. Adoption varies significantly by a number of farm operations/operator characteristics, with higher adoption in:

- The South (54%) versus all other regions of Alberta;
- Larger operations – in fact, adoption increases significantly with gross farm sales, from 19% for sales of less than $50K to 37% for sales of $50K to less than $250K to 61% among operations with sales of $250K or more;
- Operations where the main source of revenue is a mix of crops and livestock (46% vs.
30% livestock);

- Expanding operations (53%) versus those in the beginning or maintaining (38%) and reducing (23% stages) [the difference between beginning or maintain and reducing is also significant];

- Operations where the key decision maker has an agriculture degree or diploma (50% vs. 29% no degree); and,

- Operations where the key decision maker has attended a farm conservation training program, workshop or seminar in the past two years (58% vs. 26% no training).
Soil Sampling Fields at Least Once Every Three Years

On operations that soil sample their fields, the majority do so at least once every three years.

Among operators with land used for crops, forages or hay, or improved land for pasture or grazing, roughly half say they typically soil sample all (17%) or some (34%) of their fields, while 47% say they sample none. Incidence of sampling none of their fields is significantly higher among those:

- With gross farm sales of less than $50K (57%) or $50K to less than $250K (50%) versus those in the $250K+ category (20%);
- With livestock as the primary source of revenue (66%) versus crops (30%) or a mix (40%);
- Those in the reducing stage (57%) versus beginning or maintaining (43%) or expanding (32%); and,
- With a key decision maker who does not have farm conservation training (53%).

Three quarters (76%) of those who soil sample all or some of their fields report doing so yearly (31%) or at least once every three years (45%). Taken as a percentage of all operators with land used for crops, forages or hay, or improved land for pasture or grazing, 39% soil sample their fields at the desired frequency.

Adoption of soil sampling fields at least once every three years is based on operators who soil sample all or some of their fields, thus, the adoption score is 76%. Adoption is significantly higher on operations where the main source of revenue is crops (85%) versus livestock (59%).
Trees for Agriculture Purposes

One-third (35%) of operators report having planted trees on their farm in the past two years, and among these, 80% have done so for agriculture purposes – by far the most common purpose is shelterbelts or windbreaks (78%). The adoption score for trees for agriculture purposes is high at 80%.

One-quarter (26%) of operators say they have removed trees in the past two years with the most common purpose being removal of dead trees (41%).
General Practices Summary

The graph below summarizes the adoption of each general practice as well as the percentage of operations eligible for each practice. From an environmental perspective, increasing adoption of practices that currently have low levels of adoption – but high levels of eligibility – should have a strong impact. Additionally, increased adoption of these practices would have the greatest impact on ESA adoption scores. Of course, other factors such as degree of environmental benefit, potential for increased adoption, understanding barriers to use, ease of adoption and influence of ARD on practice adoption, should also be considered in prioritizing areas for focus.

Adoption levels of the five practices included in ‘general practices’ is variable – planting trees for agricultural practices and soil sampling fields are both high, while using variable rate technology in the application of crop protection products is at the 50% mark, and environmental farm planning and the use of variable rate technology in the application of commercial fertilizer are both very low. Eligibility for environmental farm planning is extremely high while eligibility for precision farming is roughly 60%.

Considering a key barrier to having an environmental farm plan is lack of knowledge/lack of information, there exists the potential for significant gains in this area – particularly given the impact of education and training. Since lack of time also emerges as a barrier, ARD may wish to explore how the process could be streamlined or made easier for farmers to complete.

With regards to precision farming, it is important to recognize that is a relatively new technology, viewed by some as expensive to adopt – ARD may wish to explore the degree to which cost versus perceived benefits is a barrier to adoption. Despite the initial financial investment, the benefits in terms of potential cost savings can be considerable given that it can result in the optimal use of crop inputs – that is, input costs can be reduced, productivity or yields are optimized, and consequently, profitability increases. Given the concrete benefits of precision farming, training or education in this area could accelerate the adoption of these practices.
INFORMATION CHANNELS

Hardcopy materials and face-to-face interactions are the preferred channels for getting information on environmental stewardship; online channels are the least preferred.

Operators were asked to indicate their preference for 11 specific information channels that could be used to get information on environmental stewardship. The highest preference goes to ‘paper such as newsletters, newspapers, magazines, pamphlets or workbooks’ (69% prefer), followed by ‘advice from a specialist’ (56%) and ‘informally through other farmers’ (54%). In the next tier are ‘demonstrations and field days’ (47%), ‘radio’ (44%) and ‘workshops, courses or conferences’ (43%). The least preferred channels are ‘webinars’ (17%) and ‘electronic media such as blogs, Facebook, Twitter, YouTube and apps’ (12%).

Preferred Channels for Getting Information on Environmental Stewardship

<table>
<thead>
<tr>
<th>Channel</th>
<th>7 (Strongly Preferred)</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper such as newsletters, newspapers, magazines, pamphlets or workbooks</td>
<td>42%</td>
<td>27%</td>
<td>69%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advice from an expert or specialist</td>
<td>31%</td>
<td>25%</td>
<td>56%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Informally through other farmers</td>
<td>29%</td>
<td>25%</td>
<td>54%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demonstrations and field days</td>
<td>24%</td>
<td>23%</td>
<td>47%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radio</td>
<td>22%</td>
<td>23%</td>
<td>44%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workshops, courses or conferences</td>
<td>22%</td>
<td>21%</td>
<td>43%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TV</td>
<td>18%</td>
<td>19%</td>
<td>37%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Email</td>
<td>21%</td>
<td>13%</td>
<td>34%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internet other than social media websites</td>
<td>20%</td>
<td>13%</td>
<td>33%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Webinars</td>
<td>10%</td>
<td>7%</td>
<td>17%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electronic methods such as blogs, Facebook, Twitter, YouTube and apps</td>
<td>6%</td>
<td>6%</td>
<td>12%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Base: All respondents (n=500)

Q68. On a scale of 1 to 7, where ‘1’ means not at all preferred and ‘7’ means strongly preferred, please indicate your preference for each of the following methods for getting information on environmental farm stewardship.
Since adoption of ESA practices tends to vary by gross farm sales as well as education and training, it is of interest to look at the optimal channels for reaching various audiences.

As one can see in the table below, there are a number of significant differences. For example:

- Smaller operations have a stronger preference for traditional media;
- Larger operations ($250K+ gross farm sales) – the ones that manage the vast majority of land and livestock – have a stronger preference for face-to-face interactions such as advice from an expert or specialist and workshops, courses or conferences, as well as a much stronger preference for email (44%), the Internet (44%) and social media (19%); and,
- Operators with a degree or training also have a stronger preference for face-to-face interactions and training as well as email and Internet.

### Preferred Information Channels by Farm Operations Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Gross Farm Sales</th>
<th>Degree or Diploma</th>
<th>Conservation Training</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;$50K</td>
<td>$50K to &lt;$250K</td>
<td>$250K+</td>
</tr>
<tr>
<td>Paper such as newsletters, newspapers, magazines, pamphlets or workbooks</td>
<td>71%</td>
<td>68%</td>
<td>69%</td>
</tr>
<tr>
<td>Advice from an expert or specialist</td>
<td>50%</td>
<td>57%</td>
<td>66%</td>
</tr>
<tr>
<td>Informally through other farmers</td>
<td>56%</td>
<td>52%</td>
<td>53%</td>
</tr>
<tr>
<td>Demonstrations and field days</td>
<td>44%</td>
<td>49%</td>
<td>52%</td>
</tr>
<tr>
<td>Radio</td>
<td>52%</td>
<td>43%</td>
<td>31%</td>
</tr>
<tr>
<td>Workshops, courses or conferences</td>
<td>35%</td>
<td>46%</td>
<td>53%</td>
</tr>
<tr>
<td>TV</td>
<td>43%</td>
<td>40%</td>
<td>19%</td>
</tr>
<tr>
<td>Email</td>
<td>30%</td>
<td>34%</td>
<td>44%</td>
</tr>
<tr>
<td>Internet other than social media websites</td>
<td>26%</td>
<td>35%</td>
<td>44%</td>
</tr>
<tr>
<td>Webinars</td>
<td>17%</td>
<td>14%</td>
<td>23%</td>
</tr>
<tr>
<td>Electronic methods such as blogs, Facebook, Twitter, YouTube and apps</td>
<td>12%</td>
<td>9%</td>
<td>19%</td>
</tr>
</tbody>
</table>
KEY TAKEAWAYS AND RECOMMENDATIONS FOR MOVING FORWARD

What follows is a summary of key takeaways and recommendations based on the research findings as well as publicly available information on the agriculture sector in Alberta. One should note that these recommendations have been put forth by Ipsos and may not align with ARD’s perspective on the issues and/or ARD’s policies and programs.

- From an environmental perspective, increasing adoption of practices that currently have low levels of adoption – but high levels of eligibility – should have a strong impact. Additionally, increased adoption of these practices would have the greatest impact on ESA adoption scores. Of course, other factors such as degree of environmental benefit, potential for increased adoption, understanding barriers to use, ease of adoption and influence of ARD on practice adoption, should also be considered in prioritizing areas for focus.

- While the overall weighted sample’s gross farm sales composition reflects that of the actual distribution of farms in Alberta based on the 2006 Census of Agriculture, there is a strong argument to be made that ARD’s focus should be on larger operations (i.e. with gross farm sales of $250,000 or more). It is these operations that manage the vast majority of livestock and land in the province; while they account for only 15% of total farms in Alberta, they account for 76% of total gross farm sales in Alberta.

- Adoption of many ESA practices is quite high – particularly in the areas of manure management and preserving water quality and quantity. Understanding why adoption of some practices has been highly successful is critical; is it due to regulation, grants, education, perceived return on investment, or other aspects? Identifying key success factors for certain practices may allow ARD to apply them in other areas.

- Larger operations have higher levels of adoption of many ESA practices. Since they have the biggest impact on the environment, this finding is encouraging and decidedly positive. Clearly understanding why they have higher adoption levels may also provide insights that will help increase adoption among smaller farms.

- Of course, understanding barriers to adoption and developing strategies to address key barriers is also essential. In many cases, we know a key barrier is cost, particularly when farmers cannot pass on the cost to consumers; emphasizing the benefits of adoption and convincing them there is a valid payback may be challenging.

- In the area of manure management, adoption levels for incorporation of both liquid and solid manure within an optimal timeframe as well as nutrient testing practices lag. ARD may wish to further explore barriers to adopting these practices – in particular, are they practical to do, and what are the time and cost implications.

- Adoption of practices related to energy and climate change are very low. Increasing adoption of energy saving practices might have the greatest potential given the dual
benefits of cost savings as well as a positive impact on the environment. Conversely, increasing adoption of carbon credit trading may be challenging. While the majority of operators (77%) are aware of the Alberta Carbon Offset market, for some, their farming practices may not allow them to meet some qualifying criteria (e.g. minimum till or zero till), while others may question the return on investment (i.e. does the reward offset the cost).

- Adoption levels of all three soil conservation practices are very low. Increasing adoption of reduced tillage is perhaps the strongest opportunity, particularly given the benefit of carbon sequestering (i.e. less disturbance of the soil acts as a carbon sink). ARD may wish to explore and gain a stronger understanding of barriers to reduced tillage for Alberta farmers. Since soil fertility is a key issue of concern for farmers, they should be open to learning about improvements they could make in the area of soil conservation.

- In the area of waste management, recycling agricultural plastics is quite low despite the finding that concern regarding the disposal of agricultural waste is relatively high. Gaining a stronger understanding of barriers to recycling agricultural plastics should be a priority as use of grain storage bags is increasing and farmers should be open to learning about how they can improve their practices – there exists the potential for considerable gains in this area.

- Within the General Practices area, adoption of precision farming is low while eligibility is moderate. As we recognize that this is a relatively new technology, viewed by some as expensive to adopt – ARD may wish to explore the degree to which cost versus perceived benefits is a barrier to adoption. Despite the initial financial investment, the benefits in terms of potential cost savings are considerable given that it can result in the optimal use of crop inputs – that is, input costs can be reduced, productivity or yields are optimized, and consequently, profitability increases. Given the concrete benefits of precision farming, training or education in this area could accelerate the adoption of these practices.

- While completion of an Environmental Farm Plan has a low level of adoption, many stated barriers to completion can be addressed. Education and training should deal with the issues of lack of knowledge or information, while streamlining the process could address the matter of time constraints. Still, further examining why adoption is low may be warranted, as well as exploring incentives to adopt among those who have completed a Plan.

- Education emerges as a major factor contributing to ESA adoption. Farmer education – specifically, attending a farm conservation training program, workshop or seminar – has a strong relationship with adoption of most ESA practices. Participation in farm conservation training should be encouraged and such training should be easy to access as well as financially feasible.

- Given the impact of education, ARD may need to spend more on communications. Using the preferred communications tools to create awareness and knowledge will be
critical. With learning ‘informally through other farmers’ a preferred channel, ARD may wish to consider creating clubs or forums. It is also important to keep in mind that while the preference for electronic media and email is low overall, larger operations – the ones that manage the vast majority of land and livestock – show a much stronger preference for both channels.

- The 2012 data were weighted based on the 2006 Census of Agriculture. Both the regional and gross farm sales composition of farms in Alberta has changed significantly over the past six years. Statistics Canada data indicates that farm cash receipts in Alberta increased by 15% from 2010 to 2011 alone. Since Performance Measure 2a and other ESA adoption scores in the 2012 ESATS survey will be tracked and reported bi-annually, we strongly recommend that ARD weights the 2012 data based on 2011 Census of Agriculture statistics when they become available. If there are significant differences in adoption scores using the 2006 versus 2011 weights, the scores weighted to the 2011 Census should be used for reporting and tracking going forward.
APPENDIX A: METHODOLOGY

Ipsos Reid conducted a telephone survey with a random and representative sample of 500 Alberta agricultural producers between January 18\textsuperscript{th} and February 1\textsuperscript{st}, 2012. A telephone methodology was selected to be consistent with previous ESA tracking surveys. The average interview length was 20.5 minutes.

Interviews were stratified by five Alberta regions and quotas were established to ensure a reliable sample size within each region for regional analysis. The final data were weighted to ensure the overall sample’s regional and gross farm sales composition reflects that of the actual distribution of farms in Alberta based on the 2006 Census of Agriculture.

With a sample of 500, results are considered accurate to within ±4.4 percentage points, 19 times out of 20, of what they would have been had the entire population of Alberta farms been surveyed. The margin of error is larger within regions and for other sub-groupings of the survey population.

Sampling Report

Target Population

The target population for this survey was primary agricultural operators in Alberta who had gross farm sales of at least $10,000 in 2011, and were most involved in making decisions about the practices and operations used on their farm.

The sample was drawn from Ipsos’ proprietary provincially representative database of over 30,000 unique Alberta agricultural producers. Key characteristics of the database are as follows:

- Contact information per record varies from a telephone number and Census Division only, through to a detailed set of information about type of operation, crops grown, total acres, farm sales and Internet access. All information gathered is done so with the agreement of the producer and is used for the purposes of identifying the appropriate individuals to include in a study.
- The database is updated and purged of non-responders on a regular basis.
- Producers in the Ipsos database that have been selected to participate in producer studies are, on average, contacted less than two times per year, with the vast majority (just under 60%) being contacted only once. The statistics that we currently have compiled indicate that less than 1% of producers contacted have been called more than five times in the past 12 months.
- Each contact with a producer is recorded on the database, including the results of that contact – complete, stop, refusal, disqualification or no longer farming.
• Once a producer has been placed on a contact list for a study, their information is "locked down" and is not used for other studies at the same time. Even once a study has been completed, it is Ipsos procedure to place a producer on a ‘no-call list’ for the period of 4 weeks, during which time they cannot be contacted to take part in other Ipsos studies.

• Ipsos maintains a list of all individuals who have requested not to take part in survey research. The survey sample for every project that is conducted using Ipsos Reid's call centres is compared against this list prior to starting the interview process, and contacts are removed where appropriate.

• No interviews are conducted with producers on Sundays unless a callback is scheduled.

• All specific call back appointments are met.

• Interviewing is restricted to after 6:00 p.m. unless a callback is otherwise scheduled.

In 2010, the sample was drawn primarily from a purchased subscription list of commercial farmers maintained by Farm Business Communications (FBC), publishers of such farm periodicals as GrainNews, Cattlemen Magazine, the Canola Guide, The Alberta Express, and Country Guide. The list was updated periodically by FBC and included 6,319 names available for calling in 2010.

While both the 2010 and 2012 surveys were conducted with a random sample of agricultural producers (i.e. from the FBC and Ipsos lists), it is possible that magazine subscribers’ knowledge, awareness and behaviours regarding sustainable agriculture may differ from the Ipsos database and/or the broader population of primary agricultural operators in Alberta.
Sampling Framework

In previous years, the sample was stratified by five ARD regions. For the 2012 survey, the **sampling frame was updated** to align with 2006 Alberta Census Agricultural Regions and Census Divisions. This change was made to allow for a better comparison of survey results with Census of Agriculture data.

The five regions were defined by Census Division as follows:

- South = CDs 1, 2 and 3
- Central = CDs 4, 5, 6, 7, 8, 9 and 15
- Northeast = CDs 10 and 12
- Northwest = CDs 11, 13 and 14
- Peace = CDs 17, 18 and 19

In cases where the Census Division was not known from database statistics, each region was defined by County or Municipal District (that is, the respondent was asked in which County or MD their farm was located). The table on the following page outlines these region definitions.
Regionally, a disproportionate sampling plan was used in order to allow for a reliable sample size within each region for analysis. Target quotas by CD (within each region) were proportionate to 2006 Census of Agriculture data.

In addition to regional quotas, target quotas were also established for gross farm sales within each of the five regions based on 2006 Census of Agriculture data. While no hard quotas were set, targets were monitored throughout data collection. Respondents were asked to indicate their 2011 gross farm sales at the beginning of the survey, and those with gross farm sales of less than $10K in 2011 were not interviewed.
The table below summarizes the number of interviews conducted by region as well as the corresponding margins of error.

<table>
<thead>
<tr>
<th>Region</th>
<th>% of 2006 Census Farms in Alberta with $10K+ in gross farm sales (39,640)</th>
<th>Number of Interviews</th>
<th>Maximum margin of error</th>
</tr>
</thead>
<tbody>
<tr>
<td>South</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>14.5%</td>
<td>100</td>
<td>±9.8%</td>
</tr>
<tr>
<td>CD 1</td>
<td>3.4%</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>CD 2</td>
<td>7.2%</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>CD 3</td>
<td>3.9%</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Central</td>
<td>36%</td>
<td>100</td>
<td>±9.8%</td>
</tr>
<tr>
<td>CD 4</td>
<td>3.0%</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>CD 5</td>
<td>6.1%</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>CD 6</td>
<td>8.9%</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>CD 7</td>
<td>6.7%</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>CD 8</td>
<td>8.8%</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>CD 9</td>
<td>2.3%</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>CD 15</td>
<td>0.2%</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>North East</td>
<td>15.9%</td>
<td>100</td>
<td>±9.8%</td>
</tr>
<tr>
<td>CD 10</td>
<td>11.1%</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>CD 12</td>
<td>4.8%</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>North West</td>
<td>20.9%</td>
<td>100</td>
<td>±9.8%</td>
</tr>
<tr>
<td>CD 11</td>
<td>10.9%</td>
<td>52</td>
<td></td>
</tr>
<tr>
<td>CD 13</td>
<td>8.7%</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td>CD 14</td>
<td>1.3%</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Peace</td>
<td>12.5%</td>
<td>100</td>
<td>±9.7%</td>
</tr>
<tr>
<td>CD 17</td>
<td>4.8%</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td>CD 18</td>
<td>1.3%</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>CD 19</td>
<td>6.4%</td>
<td>52</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>500</td>
<td>±4.4%</td>
</tr>
</tbody>
</table>
Response Rate

The call disposition and response rate for the 2012 ESA Survey is provided in the table below.

<table>
<thead>
<tr>
<th>CODES</th>
<th>Measures 2.a - ESA Survey 2011-12</th>
<th>In-scope call disposition</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Completed interviews</td>
<td>500</td>
</tr>
<tr>
<td>B</td>
<td>Refused</td>
<td>2886</td>
</tr>
<tr>
<td>C</td>
<td>Terminated/respondent unavailable for duration</td>
<td>28</td>
</tr>
<tr>
<td>D</td>
<td>No answer/busy/answering machine</td>
<td>7218</td>
</tr>
<tr>
<td>E</td>
<td>Call back later</td>
<td>951</td>
</tr>
<tr>
<td>F</td>
<td>Language barrier</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Number not in service/wrong number/business</td>
<td>3502</td>
</tr>
<tr>
<td>G</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>Respondent not qualified</td>
<td>174</td>
</tr>
<tr>
<td>I</td>
<td>Total numbers dialled at least once</td>
<td>15273</td>
</tr>
<tr>
<td>J</td>
<td>Effective denominator [I-C-D-F-G-H]</td>
<td>4337</td>
</tr>
</tbody>
</table>

Response rate (A/J) 11.5%
Questionnaire Design

The 2010 ESA Survey underwent a thorough review. In February, 2011 an “Environmentally Sustainable Agriculture Tracking Survey Team” formed to oversee the development and delivery of the “2012 ESAT Survey”. The Team’s task was to:

- Review and build on the recommendations made in the 2010 ESAT survey report related to suggested modifications to the ESA practice questions for inclusion in the next survey;
- Develop a set of criteria to help specialist teams and the ESAT Survey Team determine which key environmentally sustainable agriculture practices are included in adoption score calculation for inclusion in the ARD Goal 2a performance measure and for tracking purposes;
- Determine key focus areas for the 2012 survey; and,
- Ensure the final list of identified practices are aligned with Ministry priorities and programming focus.

Based on recommendations from the ESAT team, and in close collaboration with the ARD project team, Ipsos Reid revised the 2012 ESA questionnaire. Key changes were made to the focus areas as well as the ESA practices.

- **Focus Areas:** A new section on *Grazing Management* was added while the *Planning* section was deleted. That being said, two of the four practices from the *Planning* section were retained – the ‘Environmental Farm Plan’ practice was moved to the *General Practices* section, while the practice of ‘timing grazing to avoid vulnerable times of the year for riparian areas’ was included in the new *Grazing Management* section.

- **ESA Practices:** 1) The total number of practices to be included in the Goal 2a Performance Measure was reduced to 41 from 67; 2) 29 of the 2010 practices were deleted; 3) A number of new practices were added; 4) The wording of most of the practice questions was changed (some minor and some major); and, 5) Where applicable, screening questions were added to ensure each practice question was only asked of producers qualified to adopt the practice (i.e. in order to decrease ‘not applicable’ responses and shorten the length of the questionnaire).
Data Analysis

Weighting

As was the case with previous surveys, the final data were weighted to ensure the overall sample’s regional and gross farm sales composition reflects that of the actual distribution of farms in Alberta based on 2006 Census of Agriculture statistics. The table below shows the actual distribution of respondents along with the weights applied to the data.

<table>
<thead>
<tr>
<th>Region and Gross Farm Sales</th>
<th># of 2006 Census Farms with $10K+ in Gross Farm Sales</th>
<th>2006 Census Distribution (Weights)</th>
<th>Survey Count Unweighted</th>
<th>Survey Distribution Unweighted</th>
<th>Weighting Factor</th>
<th>Survey Count Weighted</th>
</tr>
</thead>
<tbody>
<tr>
<td>South $10K to &lt;$25K</td>
<td>827</td>
<td>0.02</td>
<td>9</td>
<td>0.02</td>
<td>1.16</td>
<td>10</td>
</tr>
<tr>
<td>South $25K to &lt;$50K</td>
<td>792</td>
<td>0.02</td>
<td>9</td>
<td>0.02</td>
<td>1.11</td>
<td>10</td>
</tr>
<tr>
<td>South $50K to &lt;$100K</td>
<td>953</td>
<td>0.02</td>
<td>10</td>
<td>0.02</td>
<td>1.20</td>
<td>12</td>
</tr>
<tr>
<td>South $100K to &lt;$250K</td>
<td>1,504</td>
<td>0.04</td>
<td>17</td>
<td>0.03</td>
<td>1.12</td>
<td>19</td>
</tr>
<tr>
<td>South $250K to &lt;$500K</td>
<td>840</td>
<td>0.02</td>
<td>21</td>
<td>0.04</td>
<td>0.50</td>
<td>11</td>
</tr>
<tr>
<td>South $500K or more</td>
<td>847</td>
<td>0.02</td>
<td>34</td>
<td>0.07</td>
<td>0.31</td>
<td>11</td>
</tr>
<tr>
<td><strong>Total South</strong></td>
<td><strong>5,763</strong></td>
<td><strong>0.145</strong></td>
<td><strong>100</strong></td>
<td><strong>0.20</strong></td>
<td><strong>0.73</strong></td>
<td><strong>73</strong></td>
</tr>
<tr>
<td>Central $10K to &lt;$25K</td>
<td>2,861</td>
<td>0.07</td>
<td>8</td>
<td>0.02</td>
<td>4.51</td>
<td>36</td>
</tr>
<tr>
<td>Central $25K to &lt;$50K</td>
<td>2,422</td>
<td>0.06</td>
<td>16</td>
<td>0.03</td>
<td>1.91</td>
<td>31</td>
</tr>
<tr>
<td>Central $50K to &lt;$100K</td>
<td>2,588</td>
<td>0.07</td>
<td>21</td>
<td>0.04</td>
<td>1.55</td>
<td>33</td>
</tr>
<tr>
<td>Central $100K to &lt;$250K</td>
<td>3,299</td>
<td>0.08</td>
<td>27</td>
<td>0.05</td>
<td>1.54</td>
<td>42</td>
</tr>
<tr>
<td>Central $250K to &lt;$500K</td>
<td>1,826</td>
<td>0.05</td>
<td>15</td>
<td>0.03</td>
<td>1.54</td>
<td>23</td>
</tr>
<tr>
<td>Central $500K or more</td>
<td>1,293</td>
<td>0.03</td>
<td>13</td>
<td>0.03</td>
<td>1.25</td>
<td>16</td>
</tr>
<tr>
<td><strong>Total Central</strong></td>
<td><strong>14,289</strong></td>
<td><strong>0.360</strong></td>
<td><strong>100</strong></td>
<td><strong>0.20</strong></td>
<td><strong>1.80</strong></td>
<td><strong>180</strong></td>
</tr>
<tr>
<td>Northeast $10K to &lt;$25K</td>
<td>1,469</td>
<td>0.04</td>
<td>9</td>
<td>0.02</td>
<td>2.06</td>
<td>19</td>
</tr>
<tr>
<td>Northeast $25K to &lt;$50K</td>
<td>1,156</td>
<td>0.03</td>
<td>19</td>
<td>0.04</td>
<td>0.77</td>
<td>15</td>
</tr>
<tr>
<td>Northeast $50K to &lt;$100K</td>
<td>1,231</td>
<td>0.03</td>
<td>16</td>
<td>0.03</td>
<td>0.97</td>
<td>16</td>
</tr>
<tr>
<td>Northeast $100K to &lt;$250K</td>
<td>1,472</td>
<td>0.04</td>
<td>25</td>
<td>0.05</td>
<td>0.74</td>
<td>19</td>
</tr>
<tr>
<td>Northeast $250K to &lt;$500K</td>
<td>637</td>
<td>0.02</td>
<td>18</td>
<td>0.04</td>
<td>0.45</td>
<td>8</td>
</tr>
<tr>
<td>Northeast $500K or more</td>
<td>348</td>
<td>0.01</td>
<td>13</td>
<td>0.03</td>
<td>0.34</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total Northeast</strong></td>
<td><strong>6,313</strong></td>
<td><strong>0.159</strong></td>
<td><strong>100</strong></td>
<td><strong>0.20</strong></td>
<td><strong>0.80</strong></td>
<td><strong>80</strong></td>
</tr>
<tr>
<td>Northwest $10K to &lt;$25K</td>
<td>2,325</td>
<td>0.06</td>
<td>17</td>
<td>0.03</td>
<td>1.73</td>
<td>29</td>
</tr>
<tr>
<td>Northwest $25K to &lt;$50K</td>
<td>1,800</td>
<td>0.05</td>
<td>21</td>
<td>0.04</td>
<td>1.08</td>
<td>23</td>
</tr>
<tr>
<td>Northwest $50K to &lt;$100K</td>
<td>1,677</td>
<td>0.04</td>
<td>21</td>
<td>0.04</td>
<td>1.01</td>
<td>21</td>
</tr>
<tr>
<td>Northwest $100K to &lt;$250K</td>
<td>1,469</td>
<td>0.04</td>
<td>19</td>
<td>0.04</td>
<td>0.98</td>
<td>19</td>
</tr>
<tr>
<td>Northwest $250K to &lt;$500K</td>
<td>594</td>
<td>0.01</td>
<td>15</td>
<td>0.03</td>
<td>0.50</td>
<td>7</td>
</tr>
<tr>
<td>Northwest $500K or more</td>
<td>438</td>
<td>0.01</td>
<td>7</td>
<td>0.01</td>
<td>0.79</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total Northwest</strong></td>
<td><strong>8,303</strong></td>
<td><strong>0.209</strong></td>
<td><strong>100</strong></td>
<td><strong>0.20</strong></td>
<td><strong>1.05</strong></td>
<td><strong>105</strong></td>
</tr>
<tr>
<td>Peace $10K to &lt;$25K</td>
<td>1,238</td>
<td>0.03</td>
<td>12</td>
<td>0.02</td>
<td>1.30</td>
<td>16</td>
</tr>
<tr>
<td>Peace $25K to &lt;$50K</td>
<td>1,000</td>
<td>0.03</td>
<td>16</td>
<td>0.03</td>
<td>0.79</td>
<td>13</td>
</tr>
<tr>
<td>Peace $50K to &lt;$100K</td>
<td>999</td>
<td>0.03</td>
<td>11</td>
<td>0.02</td>
<td>1.15</td>
<td>13</td>
</tr>
<tr>
<td>Peace $100K to &lt;$250K</td>
<td>1,061</td>
<td>0.03</td>
<td>25</td>
<td>0.05</td>
<td>0.54</td>
<td>13</td>
</tr>
<tr>
<td>Peace $250K to &lt;$500K</td>
<td>436</td>
<td>0.01</td>
<td>18</td>
<td>0.04</td>
<td>0.31</td>
<td>5</td>
</tr>
<tr>
<td>Peace $500K or more</td>
<td>238</td>
<td>0.01</td>
<td>18</td>
<td>0.04</td>
<td>0.17</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Peace</strong></td>
<td><strong>4,972</strong></td>
<td><strong>0.125</strong></td>
<td><strong>100</strong></td>
<td><strong>0.20</strong></td>
<td><strong>0.63</strong></td>
<td><strong>63</strong></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>39,640</strong></td>
<td><strong>1.00</strong></td>
<td><strong>500</strong></td>
<td><strong>1.00</strong></td>
<td><strong>500</strong></td>
<td><strong>500</strong></td>
</tr>
</tbody>
</table>
Data Analysis

Survey results are presented for the overall weighted sample of primary agricultural operators in Alberta with gross farm sales of $10K or more. Further, significant differences – by region as well as farm and operator characteristics – are highlighted throughout the report.

We refer to ‘significantly’ different results when statistically meaningful differences occur. In simple terms, statistical significance means that two (or more) numbers are different from one another for reasons other than by chance. In statistical terms, it means that a null hypothesis is rejected and that the same result will occur, given similar circumstances, within a set of specified limits (19 times out of 20). Significance tests allow researchers to say, with a specified degree of certainty, that two numbers are different.

The simplest measure of significance is the confidence level given to a percentage in the survey. Most surveys contain a qualifying statement, such as, “the results of this survey have a margin of error of ±4.4 percentage points, 19 times out of 20.” This number reflects the window or spread of values expected across different survey samples. As well, we use propmean t-tests, which are t-tests run on column means and column proportions.

Data tables were created (in MSExcel format) that show the Total results for each question and also allow for analysis by the following categories:

- Region: South, Central, Northeast, Northwest, Peace
- Gross Farm Sales: <$50K, $50K to <$250K, $250K+
- Main Source of Gross Farm Revenue: Crops, Livestock, Mixed (i.e. equal mix of both)
- Stage of Operation: Beginning or maintaining, Expanding, Reducing
- Agriculture Degree or Diploma: Yes, No
- Farm Conservation Training: Yes, No

Given the changes to the sample source and sample stratification in 2012, as well as the substantive changes made to the questionnaire, it is not possible to track data from previous years. There was consensus among the ESAT Survey Team that the benefits realized from these changes outweighed the ability to track data from past years. Further, moving forward, both the findings from the 2012 survey as well as tracking changes from this new baseline, would provide Alberta Agriculture and Rural Development (ARD) with an improved ability to influence ESA practice adoption among primary agriculture operators in Alberta.
ESA Adoption Score Calculation

ARD Performance Measure 2a

ARD Performance Measure 2a is defined as ‘the average percentage of improved environmentally sustainable agriculture practices adopted by producers’. This measure tracks primary producers’ success in addressing a broad range of environmental issues relating to soil conservation, water quality, grazing management, wildlife habitat conservation, energy and climate change (adaptation), manure management and agricultural waste management, as well as planning approaches regarding sustainable agriculture. Specifically, this measure tracks the level of adoption of environmentally sustainable agriculture practices by primary producers seeking to improve environmental stewardship on their farm operations.

The 2012 measure is an average of adoption scores of ESA practices by primary producers to improve environmental stewardship on their farm operations. The adoption score for each survey respondent is weighted to reflect the distribution of gross farm sales across the five regions, based on the 2006 Census of Agriculture.

A total of 41 ESA practices, that could be used to address soil conservation, water quality, grazing management, wildlife habitat conservation, energy and climate change (adaptation) manure management, agricultural waste management, as well as planning approaches regarding sustainable agriculture, were used to derive the result for this measure. An eligible ESA practice (or group) for the base calculation is based on farm type, farm site characteristics and operation practices.

For each respondent, the total number of eligible practices (i.e. appropriate to their operation) is determined, and then the percentage of these eligible practices currently adopted is calculated. For example, if an operator is eligible to adopt 20 of the 41 ESA practices, and has adopted 10 of the 20 practices, the producer’s individual adoption score would be 50%.

The percentage of eligible environmentally sustainable agricultural practices adopted by each respondent is multiplied by a weighting factor to generate a weighted adoption score for each respondent. The result of Performance Measure 2a is the average weighted adoption score of all respondents expressed as a percentage.

Practice Adoption

An eligible practice for the base calculation was one where the respondent was asked the question, it was applicable to their operation, and was answered. Responses of “not applicable” or “don’t know” were excluded from the base calculation.

For example, the 2012 survey had 12 water quality/quantity practices that were included in the overall ESA adoption score, one of which was ‘Maintain buffer areas along edge of natural water
All respondents (n=500) were asked: *Are there any natural rivers, streams wetlands or sloughs on the property that you farm?*
- 359 responded “Yes” while 141 responded “No”.

Those who said “Yes” (n=359) were asked the following question to measure adoption of ‘Maintain buffer areas along edge of natural water bodies’: *Did you maintain buffer areas of grass and/or trees along the edge of rivers, streams, sloughs, wetlands or ditches?*
- 278 responded “Yes”, 62 responded “No”, 18 responded “not applicable” and 1 responded “don’t know”.
- Adoption of the practice was defined as those who said “Yes” (n=278).
- Eligible respondents were defined as all those asked the question excluding “not applicable” and “don’t know” responses (359 – 18 – 1 = 340).

Thus, the percentage adopting the practice is 278/340 = 82%

Adoption of each of the 41 ESA practices included in Performance Measure 2a was calculated, along with the average adoption of practices in each area (e.g. soil conservation, grazing management). In all cases but one, the eligible base was defined as those respondents asked the question excluding "not applicable" and "don't know" responses. The one exception to this was ‘Sampling and analyzing the manure for nutrient content’ within the Manure Management section. The question used to assess this practice area was: *Do you typically apply Manure – either, solid or liquid based on a soil or tissue test, manure nutrient test or book values?*
Possible responses were “a soil or tissue test”, “a manure nutrient test”, “book values”, “not applicable” and “don’t know” – a “none of the above” option was inadvertently left off the response list. Therefore, in this case only, “not applicable” was used as a proxy for “none of the above” and respondents who said “not applicable” were included in the eligible base.

The tables that follow summarize the 41 ESA practices, the question(s) used to measure each practice, and how adoption of each practice was defined.
# 2012 Environmentally Sustainable Agriculture Survey
## Final Report

### Appendix A

<table>
<thead>
<tr>
<th>ESA Practice</th>
<th>Question</th>
<th>Adoption</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Soil Conservation - 3 practices</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use reduced tillage</td>
<td>13. Please indicate which of the following best describes how you seeded the majority of your crop acres in 2011.</td>
<td></td>
</tr>
<tr>
<td>Use legumes in rotation</td>
<td>15. Did you use pulse crops in your cropping rotation in 2011?</td>
<td>Yes</td>
</tr>
<tr>
<td>Use winter cereals in rotation</td>
<td>15. Did you use winter cereals in your cropping rotation in 2011?</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Water Quality/ Quantity - 12 practices</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintain buffer areas along edge of natural water bodies</td>
<td>16. Did you maintain buffer areas of grass and/or trees along the edge of rivers, streams, sloughs, wetlands or ditches?</td>
<td>Yes</td>
</tr>
<tr>
<td>Avoid draining or filling in natural wetlands/sloughs</td>
<td>18. Did you drain or fill in natural wetlands or sloughs?</td>
<td>No</td>
</tr>
<tr>
<td>Apply chemical fertilizer at recommended rate</td>
<td>19. Did you apply commercial fertilizer based on the results of a soil or tissue test?</td>
<td>Yes</td>
</tr>
<tr>
<td>Control runoff from manure storage</td>
<td>20. Did you control runoff from all, some or none of your manure storage?</td>
<td>All or Some</td>
</tr>
<tr>
<td>Control runoff from livestock pens</td>
<td>20. Did you control runoff from all, some or none of your livestock pens?</td>
<td>All or Some</td>
</tr>
<tr>
<td>Control runoff from feeding areas</td>
<td>20. Did you control runoff from all, some or none of your feeding areas?</td>
<td>All or Some</td>
</tr>
<tr>
<td>Plug or seal abandoned wells</td>
<td>22. Have you plugged, capped or sealed all, some or none of your abandoned water wells?</td>
<td>All or Some</td>
</tr>
<tr>
<td>Properly seal and maintain active wells</td>
<td>24. Have you capped and maintained all, some or none of your active water wells?</td>
<td>All or Some</td>
</tr>
<tr>
<td>Maintain a 10 meter buffer area from water bodies when applying pesticides</td>
<td>25. In 2011, did you maintain at least a 10 meter buffer area from water bodies when applying crop protection products?</td>
<td>Yes</td>
</tr>
<tr>
<td>Maintain a 10 meter buffer area from water wells when applying pesticides</td>
<td>25. In 2011, did you maintain at least a 10 meter buffer area from water wells when applying crop protection products?</td>
<td>Yes</td>
</tr>
<tr>
<td>Manage livestock access to water bodies that are used as a water source</td>
<td>28. In 2011, did you manage or control livestock access to water bodies that are used as a water source?</td>
<td>Yes</td>
</tr>
<tr>
<td>Choose wintering site to avoid manure contamination</td>
<td>30. Did you locate all, some or none of your winter feeding and bedding sites to prevent runoff from manure entering natural water bodies?</td>
<td>All or Some</td>
</tr>
<tr>
<td><strong>Grazing Management -2 practices</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protect riparian areas from grazing to prevent over use</td>
<td>31. Which of the following do you typically do on your farm? Avoid or minimize grazing in riparian and/or bush areas in the late summer or autumn</td>
<td>Yes</td>
</tr>
<tr>
<td>Time grazing to avoid vulnerable times of the year for riparian areas</td>
<td>31. Which of the following do you typically do on your farm? Time the grazing of riparian areas</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*Soil Conservation - 3 practices
Water Quality/ Quantity - 12 practices
Grazing Management -2 practices
<table>
<thead>
<tr>
<th>ESA Practice</th>
<th>Question</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Wildlife Habitat Conservation - 3 practices</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retain bush or native grassland</td>
<td>32. Do you retain woodlands, bush or native grassland?</td>
<td>Yes</td>
</tr>
<tr>
<td>Manage grazing for wildlife habitat</td>
<td>33. In 2011, did you manage your livestock grazing to provide habitat for wildlife?</td>
<td>Yes</td>
</tr>
<tr>
<td>Manage grazing to encourage natural rejuvenation of understory in woodlands</td>
<td>35. In 2011, did you manage grazing to encourage natural growth of understory in woodlands? Understory may include small trees, shrubs, forbes and grasses</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Manure Management - 12 practices</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avoid applying manure or compost on frozen or snow covered ground</td>
<td>37. Do you typically need to apply Manure on frozen or snow covered ground?</td>
<td>No</td>
</tr>
<tr>
<td>Avoid storing manure near water wells</td>
<td>39. Did you store manure within 100 metres of Active water wells?</td>
<td>No</td>
</tr>
<tr>
<td>Frequency of application</td>
<td>40. On the fields that you have manure applied, how frequently do these fields typically receive manure?</td>
<td>Once every two years, three years or less</td>
</tr>
<tr>
<td>Incorporate manure after applying</td>
<td>42. Do you typically incorporate Solid manure within 24 hours, 48 hours or greater than 48</td>
<td>Within 24 or 48 hours</td>
</tr>
<tr>
<td>Applying liquid manure</td>
<td>43. Thinking about liquid manure, do you typically...?</td>
<td>Broadcast with incorporation within 24 or 48 hours after application</td>
</tr>
<tr>
<td>Avoid applying close to waterways to minimize increased nutrients runoff</td>
<td>44. Do you typically take into account any of the following factors when applying either solid or liquid manure? Distance between manure application and waterways – that is, low lying paths where surface water collects and flows, Slope of land , Application method</td>
<td>Yes to any item</td>
</tr>
<tr>
<td>Sampling and analyzing the manure for nutrient content</td>
<td>45. Do you typically apply Manure – either, solid or liquid based on a soil or tissue test, manure</td>
<td>Yes to soil or tissue test OR manure nutrient test OR book values</td>
</tr>
<tr>
<td>Manure application based on P or N&amp;P</td>
<td>46. Are your manure application rates typically based on crop nitrogen requirements, crop phosphorous requirements or neither?</td>
<td>Crop nitrogen or phosphorus requirements</td>
</tr>
<tr>
<td>Keeping manure records</td>
<td>49. Do you typically keep records detailing the amount and field location of where the manure is spread for all, some or none of your fields?</td>
<td>All or Some</td>
</tr>
<tr>
<td>Extend the grazing season</td>
<td>51. B. Thinking about livestock that are housed outside during the winter, how do you typically manage them? (INTERVIEWER NOTE: includes cattle, sheep, goats, horses etc.)</td>
<td>Yes to: Corn graze, Graze bales left in field, Bales moved to other field and fed using electric fence, Bales hauled to field and unrolled or feed in feeders, Stockpiled forages, Portable windbreaks</td>
</tr>
<tr>
<td>ESA Practice</td>
<td>Question</td>
<td>Adoption</td>
</tr>
<tr>
<td>--------------</td>
<td>----------</td>
<td>----------</td>
</tr>
<tr>
<td><strong>Agricultural Waste Management - 1 practice</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recycle oil, rubber plastics</td>
<td>52. Please indicate if you did each of the following on your farm in 2011. Recycle plastics such as bale twine, feed bags, silage wraps and/or bale wraps</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Energy and Climate Change - 3 practices</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy saving practices</td>
<td>53. Other than the main utility meter that shows the total electricity usage for your entire property, do you have any sub-meters – that is, extra electricity meters – that allow you to know the separate electricity usage of different areas of the farm – for example, the house, workshop, barn?</td>
<td>Yes</td>
</tr>
<tr>
<td>Renewable power</td>
<td>55. Do you produce grid-connected electricity using any of the following Renewable Energy methods? Solar panels, not counting for water pumping or electric fencing, Wind turbine generator on a tower, Biogas generator using farm waste / 56. Do you produce heat from any of the following Renewable Energy methods? Solar thermal water heating, Solar thermal air heating incorporated into farm building walls, Wood combustion (whole, pellets or chips), Combustion of any other biomass (straw bales, straw pellets, grain)</td>
<td>Yes to any item in Q55 OR Q56</td>
</tr>
<tr>
<td>Participate in Carbon Credit Trading</td>
<td>58. Are you currently participating in it? (i.e. the Alberta Carbon offset market)</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>General Practices - 5 practices</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Precision farming - Variable rate technology</td>
<td>59. Last year, did you utilize Variable Rate Technology in the application of Commercial fertilizer?</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>59. Last year, did you utilize Variable Rate Technology in the application of Crop protection products such as herbicides, insecticides and fungicides</td>
<td>Yes</td>
</tr>
<tr>
<td>Environmental Farm Plan</td>
<td>60. Have you completed the Environmental Farm Plan process?</td>
<td>Yes</td>
</tr>
<tr>
<td>Soil sampling fields at least once every three years</td>
<td>63. Do you typically soil sample your fields yearly, at least once every three years or less than once every three years?</td>
<td>Yearly OR at least once every three years to Q63</td>
</tr>
<tr>
<td>Trees for agriculture purposes</td>
<td>65. For what purpose have you planted trees? Any other reasons?</td>
<td>Yes to: Shelterbelts or Windbreaks, Soil Conservation, Wildlife Habitat, Bioenergy, Timber production, Riparian area restoration, Carbon capture, Air quality, Other agricultural practice</td>
</tr>
</tbody>
</table>
APPENDIX B: QUESTIONNAIRE

Agriculture and Rural Development:
2012 Environmentally Sustainable Agriculture Survey
Final Questionnaire: January 25, 2012

INTRODUCTION

Hello, my name is (FIRST NAME) and I’m calling from Ipsos Forward Research. Alberta Agriculture and Rural Development has commissioned Ipsos Forward Research to conduct a survey with agricultural operations in Alberta.

This is an important initiative on sustainable agriculture and a summary of results will be posted on Alberta Agriculture’s website, Ropin’ the Web.

The survey will take approximately 20 minutes and all your responses will be kept completely confidential.

For the purposes of this study, I need to speak to the person in your household who is most involved in making decisions about the practices and operations used on your farm. May I please speak to that person?

Yes, speaking
Yes, I’ll get them
No, not available

[IF YES SPEAKING, CONTINUE]
[IF YES, I’LL GET THEM, REINTRODUCE]
[IF NO, NOT AVAILABLE, SCHEDULE CALLBACK]

Any personal information you may provide during this survey will be used to better understand environmentally sustainable practices in the agriculture industry. No individual information will be shared, rather, only aggregate results will be provided to ARD. All personal information is collected under the authority of, and is subject to the privacy provisions of the Freedom of Information and Privacy Act.

(IF RESPONDENT WISHES TO VERIFY SURVEY LEGITIMACY THEY MAY CONTACT: Laura Ung at Alberta Agriculture and Rural Development – Edmonton: 780-980-4200 OR Toll Free: 310-0000 (no area code) then enter 780-980-4200)
SCREENING

S1. Do you currently own or rent your farm land or both?

Own land only
Rented land only
Both own and rented land
No
Don’t know

[IF NO, DK/NS OR REF THANK & TERMINATE]

S2. What was your gross farm revenue in 2011? Please stop me when I reach your category. (READ LIST)

Under $10,000
$10,000 to under $25,000
$25,000 to under $50,000
$50,000 to under $100,000
$100,000 to under $250,000
$250,000 to under $500,000
$500,000 to under $1,000,000
$1,000,000 to under $2,000,000
$2,000,000 or more
Don’t know

[THANK & TERMINATE IF UNDER $10,000, DK/NS OR REF]

[ASK S4 ONLY IF CENSUS DIVISION IS NOT PROVIDED IN THE SAMPLE FILE]

S4. In order to ensure we have representation from all regions of Alberta, could you please tell me in which County or Municipal District your farm is located (IF NECESSARY: I assure you that this information will remain completely confidential. We will only use it for classification purposes.)

Acadia, M.D. of
Athabasca County
Barrhead, County of
Beaver County
Big Lakes, M.D. of
Bighorn, M.D. of
Birch Hills County
Bonnyville, M.D. of
Brazeau County
Camrose County
Calgary
Cardston County
Clear Hills County
Clearwater County
Consort
Cypress County
Edmonton
Fairview, M.D. of
Flagstaff County
Foothills, M.D. of
Fort McMurray
Forty Mile, County of
Grande Prairie, County of
Greenview, M.D. of
Hanna
Kneehill County
Lac La Biche County
Lac Ste. Anne County
Lacombe County
Lamont County
Leduc County
Lesser Slave River, M.D. of
Lethbridge, County of
MacKenzie, M.D. of
Medicine Hat
Minburn, County of
Mountain View County
Newell, County of
Northern Lights, County of
Northern Sunrise County
Opportunity, M.D. of
Paintearth, County of
Parkland County
Peace, M.D. of / Peace River
Pincher Creek, M.D. of
Ponoka County
Provost, M.D. of
Ranchland, M.D. of
Red Deer County
Rocky View County
Saddle Hills County
Smoky Lake County
Smoky River, M.D. of
Spirit River, M.D. of
St. Paul, County of
Starland County
Stettler, County of
Strathcona County
Sturgeon County
Taber, M.D. of
Thorhild, County of
Two Hills, County of
SECTION 1: FARM OPERATIONS

I’d like to start by asking a few questions about your operation.

1. In 2011 did the area you farmed – that is owned or rented from someone else – include acres in...? (READ LIST)

Crop production
Summerfallow
Forages or hay
Improved land used for pasture or grazing
Unimproved wetlands
Unimproved land in bush, native grasses, etc.
Anything else (please specify)

Yes
No
Don’t know

[IF DK/REF TO ANY ITEM OTHER THAN ‘ANYTHING ELSE’ IN Q1, THANK & TERMINATE]

[ASK Q1B IF YES TO CROP PRODUCTION IN Q1A]

1B. Did you have any irrigated cropland last year?

Yes
No
Don’t Know

[IF DK/REF TO Q1B, THANK & TERMINATE]
1C. Did you have any irrigated pasture or forages or hay last year?

Yes
No
Don’t Know

2. Has the percentage of acres in summerfallow on your farm increased, decreased or remained the same in the past two years?

Increased
Remained the same/ had none
Decreased
Don’t know

3. By unimproved land, we mean land not under production, excluding summerfallow. Thinking about your total farm area, has the percentage of acres in unimproved land increased, decreased or remained the same in the past two years?

Increased
Remained the same/ had none
Decreased
Don’t know

4. In 2011, did you have any…? (READ LIST)

Beef cattle
Dairy cattle
Pigs
Chickens or turkeys
Sheep or lambs
Horses
Any other livestock (please specify)

Yes
No
Don’t know

[IF DK/REF TO ALL, THANK & TERMINATE]
5. Do you graze any livestock on your land?

Yes
No
Don’t know

[THANK & TERMINATE IF DK/REF]

6. Do you operate a feedlot?

Yes
No
Don’t know

[THANK & TERMINATE IF DK/REF]

[ASK Q6B IF YES TO CROP PRODUCTION OR YES TO FORAGES OR HAY IN Q1A AND YES TO ANY ITEM IN Q4.]

[IF YES TO CROP PRODUCTION OR YES TO FORAGES AND HAY IN Q1A AND NO TO ALL ITEMS IN Q4, AUTOFILL CROPS. IF NO TO CROP PRODUCTION AND NO TO FORAGES AND HAY AT Q1A, AND YES TO ANY ITEM IN Q4, AUTOFILL LIVESTOCK.]

6B. Was the main source of your gross farm revenue in 2011 – crops, livestock or an equal mix of both? (PROBE TO CLARIFY IF REQUIRED)

Crops
Livestock
Equal mix of both
Don’t know

7. In 2011, which of the following was applied to your land? (READ LIST)

Commercial fertilizers
Solid manure
Liquid manure
Compost manure – that is, manure that is actively managed, not manure that has been piled and left
Crop protection products such as herbicides, insecticides and fungicides

Yes
No
Don’t know

[IF DK/REF TO ALL, THANK & TERMINATE]
8. Did you have any manure custom applied in 2011?
- Yes
- No
- Don’t know

9. Did you store any solid manure on your farm last year? How about liquid manure? How about compost manure?
- Solid manure
- Liquid manure
- Compost manure
- Yes
- No
- Don’t know

[THANK & TERMINATE IF DK/REF]

10. Are there any natural rivers, streams, wetlands or sloughs on the property that you farm?
- Yes
- No
- Don’t know

[THANK & TERMINATE IF DK/REF]

[ASK Q11 IF YES TO Q10]

11. Do you have any drained wetlands or sloughs?
- Yes
- No
- Don’t know
- Not applicable
SECTION 2: PERCEPTIONS OF ESA ISSUES

12. On a scale of 1 to 7, where “1” means not at all concerned and “7” means very concerned, how concerned are you about the following on your farm today? If the statement does not apply to you, please say so. How concerned are you about [INSERT FIRST ITEM]? How about [INSERT NEXT ITEM]?

[RANDOMIZE ORDER]
Loss of soil fertility
Soil erosion from wind and water

[INSERT NEXT 2 STATEMENTS IF YES TO COMMERCIAL FERTILIZERS OR CROP PROTECTION PRODUCTS IN Q7]
Groundwater contamination due to runoff from commercial fertilizers or crop protection products
Surface water contamination due to runoff from commercial fertilizers or crop protection products

[INSERT NEXT 3 STATEMENTS IF YES TO SOLID OR LIQUID OR COMPOST MANURE IN Q7]
Groundwater contamination from manure spreading on land
Surface water contamination from manure spreading on land
Odour from manure spreading on land

[INSERT NEXT 3 STATEMENTS IF YES TO SOLID OR LIQUID OR COMPOST MANURE IN Q9]
Groundwater contamination from manure storage
Surface water contamination from manure storage
Odour from manure storage

[INSERT IF YES TO IRRIGATED CROPLAND IN Q1B OR IRRIGATED PASTURE IN Q1C] Water quantity adequate for irrigation
[INSERT IF YES TO BEEF CATTLE, DAIRY CATTLE, SHEEP OR LAMBS, HORSES OR ANY OTHER LIVESTOCK AT Q4] Bank erosion from livestock access
[ASK ALL]
Groundwater contamination from abandoned water wells
Loss of riparian areas – that is, the lands adjacent to streams, rivers, lakes and wetlands where the vegetation and soils are strongly influenced by the presence of water
Loss of wildlife habitat
Proper disposal of agricultural waste like used oil, oil filters, pesticide containers, veterinary medical supplies, etc.
Adapting to climate change on your farm
Greenhouse gas emissions on your farm

[1-7 scale]
Don’t know
Not applicable
SECTION 3: SOIL CONSERVATION PRACTICES

[ASK SECTION 3 IF YES TO CROP PRODUCTION IN Q1A, ELSE SKIP TO NEXT SECTION]

This set of questions address crop production.

13. Please indicate which of the following best describes how you seeded the majority of your crop acres in 2011. (READ LIST)

The seeding operation into the stubble of the previous crop was the only tillage pass completed – this may have included the use of harrows prior to seeding. In addition to the seeding operation, one tillage pass was completed either in the spring or fall prior to seeding – tillage practices include disc or cultivator. In addition to the seeding operation, two or more tillage passes were completed either in the spring or fall prior to seeding. (DO NOT READ) Don’t know. (DO NOT READ) Not applicable.

[ASK Q14 IF 3rd ITEM SELECTED IN Q13, ELSE SKIP TO Q15]

14. What are the main reasons you completed two or more tillage passes prior to seeding? (DO NOT READ LIST) [ACCEPT MULTIPLE RESPONSES]

Seeding equipment required a tillage pass for seed bed preparation. To incorporate manure. To manage excess straw. To manage excess moisture. To manage weed populations. No additional passes are made. Other (please specify). Don’t know. Not applicable.

15. Did you use [INSERT FIRST ITEM] in your cropping rotation in 2011? How about [INSERT NEXT ITEM]?


Yes. No. Don’t know. Not applicable.
SECTION 4: PRACTICES THAT IMPACT WATER QUALITY / QUANTITY

This set of questions address water issues. Please answer the questions thinking about your farm in 2011 unless otherwise instructed.

[ASK Q16 IF YES TO Q10, ELSE SKIP TO INSTRUCTION BEFORE Q19]

16. Did you maintain buffer areas of grass and/or trees along the edge of rivers, streams, sloughs, wetlands or ditches?

Yes
No
Don’t know
Not applicable

17. Did you have any grassed waterways – that is, a broad, shallow channel with a permanent grass cover, which is designed to carry surface water from the land?

Yes
No
Don’t know
Not applicable

18. Did you drain or fill in natural wetlands or sloughs?

Yes
No
Don’t know
Not applicable

[ASK Q19 IF YES TO COMMERCIAL FERTILIZERS AT Q7, ELSE SKIP TO INSTRUCTION BEFORE Q20]

19. Did you apply commercial fertilizer based on the results of a soil or tissue test?

Yes
No
Don’t know
Not applicable
[ASK Q20 IF YES TO ANY ITEM IN Q4 OR Q9, ELSE SKIP TO Q21]

20. Did you control runoff from all, some or none of your [INSERT FIRST ITEM]? How about [INSERT NEXT ITEM]? (REPEAT SCALE AS NECESSARY)

[ASK IF YES TO ANY ITEM IN Q9] Manure storage
[ASK IF YES TO ANY ITEM IN Q4] Livestock pens
[ASK IF YES TO ANY ITEM IN Q4] Feeding areas

All
Some
None
Don’t know
Not applicable

21. Do you have any abandoned water wells on your farm? That is, a well that is no longer being used or maintained for future use.

Yes
No
Don’t know
Not applicable

[ASK Q22 IF YES AT Q21]

22. Have you plugged, capped or sealed all, some or none of your abandoned water wells?

All
Some
None
Don’t know
Not applicable

23. Do you have any active water wells on your farm?

Yes
No
Don’t know
Not applicable

[ASK Q24 IF YES AT Q23]

24. Have you capped and maintained all, some or none of your active water wells?

All
Some
None
Don’t know
Not applicable
25. In 2011, did you maintain at least a 10 meter buffer area from [INSERT FIRST ITEM] when applying crop protection products? How about [INSERT NEXT ITEM]? (IF NECESSARY: Did you maintain at least a 10 meter buffer area from...when applying crop protection products?)

[INSERT IF YES TO Q10] Water bodies
[INSERT IF YES TO Q21 OR Q23] Water wells

Yes
No
Don’t know
Not applicable

26. [DELETED QUESTION]

27. Do you typically use any of the following practices? (READ LIST)

Manage irrigation with consideration for crop water demand and soil infiltration rates
Reservoir tillage (for example, dammer-diker)
Variable rate water application

Yes
No
Don’t know
Not applicable

28. In 2011, did you manage or control livestock access to water bodies that are used as a water source?

Yes
No
Don’t know
Not applicable
[ASK Q29 IF YES TO Q28, ELSE SKIP TO Q30]
29. Which of the following methods did you use? (READ LIST)

Fencing to prevent direct access – this includes temporary and permanent fencing
Off stream watering
Livestock movement tools such as salt blocks, windbreaks and herding to distribute livestock away from water bodies.
Pasture water pipelines

Yes
No
Don’t know
Not applicable

[ASK Q30 IF YES TO Q5 AND YES TO Q10]
30. Did you locate all, some or none of your winter feeding and bedding sites to prevent runoff from manure entering natural water bodies

All
Some
None
Don’t know
Not applicable

SECTION 6: GRAZING MANAGEMENT PRACTICES

[ASK SECTION 6 IF YES TO Q5, ELSE SKIP TO NEXT SECTION]
31. Which of the following do you typically do on your farm? (READ ITEMS) [DO NOT RANDOMIZE]

Annually consider or adjust your stocking rate to balance livestock forage demand with the available forage supply
Rotate use of your pastures as part of your grazing management
Avoid or minimize grazing in riparian and/or bush areas in the late summer or autumn
Move livestock away from riparian areas using tools and methods such as salt blocks, windbreaks and herding
Time the grazing of riparian areas
Manage native rangelands – that is, those lands on which the vegetation is mostly native grasses, grass-like plants, forbs, or shrubs suitable for grazing or browsing use that are not introduced or tame cultivated varieties

[INSERT ONLY IF YES TO MANAGE NATIVE RANGELANDS] Time the grazing of native rangelands

Yes
No
Don’t know
Not applicable
SECTION 5: WILDLIFE HABITAT CONSERVATION PRACTICES

The next set of questions address wildlife habitat issues.

32. Do you retain woodlands, bush or native grassland?
   Yes
   No
   Don’t know
   Not applicable

[ASK Q33 IF YES TO Q5, ELSE SKIP TO Q34]

33. In 2011, did you manage your livestock grazing to provide habitat for wildlife?
   Yes
   No
   Don’t know
   Not applicable

34. Do you have woodlands or bush on your operation?
   Yes
   No
   Don’t know
   Not applicable

[ASK Q35 IF YES TO Q34 AND YES TO Q5, ELSE SKIP TO INSTRUCTION BEFORE Q36]

35. In 2011, did you manage grazing to encourage natural growth of understory in woodlands?
   Understory may include small trees, shrubs, forbes and grasses
   Yes
   No
   Don’t know
   Not applicable

[ASK Q36 IF YES TO Q11, ELSE SKIP TO SECTION 7]

36. Have you restored all, some or none of your drained wetlands or sloughs? By restore, we mean
    restoring naturally occurring water levels – for example, by plugging the ditch of a drained wetland
    with an earthen plug.
   All
   Some
   None
   Don’t know
   Not applicable
SECTION 7: MANURE MANAGEMENT PRACTICES

[ASK SECTION 7 IF YES TO LIQUID, SOLID OR COMPOST MANURE IN Q7 OR YES TO LIQUID, SOLID OR COMPOST MANURE IN Q9, ELSE SKIP TO NEXT SECTION]

The next set of questions address manure management.

[ASK Q37 IF YES TO LIQUID, SOLID OR COMPOST MANURE IN Q7, ELSE SKIP INSTRUCTION BEFORE Q39]

37. Do you typically need to apply [INSERT FIRST ITEM] on frozen or snow covered ground? How about [INSERT NEXT ITEM]?

Manure [INSERT IF YES TO LIQUID OR SOLID MANURE IN Q7]
Compost [INSERT IF YES TO COMPOST IN Q7]

Yes
No
Don’t know
Not applicable

[ASK Q38 IF YES TO ANY ITEM IN Q37]

38. Did you apply it on frozen or snow covered ground because of? (READ LIST)

Insufficient manure storage
Reduced costs – only need to move manure once
Availability of contract spreaders
For emergency wind erosion control
To avoid compaction
Always done it that way
Another reason (please specify)

Yes
No
Don’t know
Not applicable

[ASK Q39 IF YES TO LIQUID, SOLID OR COMPOST MANURE IN Q9 AND YES TO Q21 AND/OR Q23]

39. Did you store manure within 100 metres of [INSERT FIRST ITEM]? How about [INSERT NEXT ITEM]?

Active water wells [INSERT IF YES TO Q23]
Abandoned water wells that have not been plugged, capped or sealed [INSERT IF YES TO Q21 AND SOME, NONE OR DK TO Q22]

Yes
No
Don’t know
Not applicable
40. On the fields that you have manure applied, how frequently do these fields typically receive manure? (READ LIST)

One or more times a year
Once every two years
Once every three years
Less frequently than once every three years
Don’t know
Not applicable

41. On annually cropped fields that are not direct seeded, do you typically incorporate [INSERT FIRST ITEM]? How about [INSERT NEXT ITEM]?

Solid manure [INSERT IF YES TO SOLID MANURE IN Q7]
Compost manure [INSERT IF YES TO COMPOST MANURE IN Q7]

Yes
No
Don’t know
Not applicable

42. Do you typically incorporate [INSERT FIRST ITEM] within 24 hours, 48 hours or greater than 48 hours? How about [INSERT NEXT ITEM]?

Solid manure [INSERT IF YES TO SOLID MANURE IN Q41]
Compost manure [INSERT IF YES TO COMPOST MANURE IN Q41]

Within 24 hours
Within 48 hours
Greater than 48 hours
Don’t know
Not applicable

43. Thinking about liquid manure, do you typically...? (READ LIST) [ACCEPT ONE RESPONSE ONLY]

Inject – that is, shank or disc – the manure into the ground
Broadcast the liquid manure with no incorporation – incorporation means cultivation, discing or harrowed after application
Broadcast with incorporation within 24 hours after application
Broadcast with incorporation within 48 hours after application
Broadcast with incorporation greater than 48 hours after application, OR
Broadcast the liquid manure with no incorporation
[ASK Q44 IF YES TO COMPOST MANURE SOLID MANURE OR LIQUID MANURE IN Q7]

44. Do you typically take into account any of the following factors when applying either solid or liquid manure? (READ LIST)

- Distance between manure application and waterways – that is, low lying paths where surface water collects and flows
- Slope of land
- Application method

  Yes
  No
  Don’t know
  Not applicable

[ASK Q45 IF YES TO COMPOST, SOLID MANURE OR LIQUID MANURE IN Q7]

45. Do you typically apply [INSERT FIRST ITEM] based on a soil or tissue test, manure nutrient test or book values? How about [INSERT NEXT ITEM]? (REPEAT RESPONSE CATEGORIES IF NECESSARY)

- Compost [INSERT IF YES TO COMPOST IN Q7]
- Manure – either, solid or liquid [INSERT IF YES TO SOLID OR LIQUID MANURE IN Q7]

  Soil or tissue test
  Manure nutrient test
  Book values
  Don’t know
  Not applicable

[ASK Q46, Q47 & Q48 IF YES TO SOLID MANURE OR LIQUID MANURE OR COMPOST MANURE IN Q7, ELSE SKIP TO INSTRUCTION BEFORE Q50]

46. Are your manure application rates typically based on crop nitrogen requirements, crop phosphorus requirements or neither? (ACCEPT ONE RESPONSE ONLY) (IF RESPONDENT SAYS BOTH, RECORD DK)

- Crop nitrogen requirements
- Crop phosphorus requirements
- Neither
- Don’t know
- Not applicable

47. Do you typically time manure application within one month of seeding a crop, into an established crop or forage stand or after crop removal or harvest? (ACCEPT MULTIPLE RESPONSES)

- Within one month of seeding a crop
- Into an established crop or forage stand
- After crop removal/harvest
- Don’t know
- Not applicable
48. Do you typically manage – that is, receive or produce – more than 500 tonnes of manure per year?

[IF NECESSARY – FOR FIELDING INSTRUCTIONS: 500 tonnes of manure is: 35 head of hogs farrow to finish; 102 head of hogs farrow to wean; 22 head of milking cows; 227 head of beef animal >900 lbs; 357 head beef animals <900 lbs; 455 head of cows – cow/calf operation, 6 months on pasture; 682 head of cows; cow/calf operation 8 months on pasture;19,230 birds, poultry breeders; 31,250 bird of poultry layers; 50,000 birds of poultry broilers]

Yes
No
Don’t know
Not applicable

[ASK Q49 IF YES TO Q48]

49. Do you typically keep records detailing the amount and field location of where the manure is spread for all, some or none of your fields?

All
Some
None
Don’t know
Not applicable

[ASK Q50 IF YES TO ANY ITEM IN Q9]

50. In 2011, did you use any of the following practices to manage odour or dust from your farm? If the practice does not apply to you, please say so. (READ LIST)

Manure storage covers
Shelterbelts
Frequent manure removal from feedlot pens and barns
Reduce manure moisture levels
Dust control materials applied on gravel roadways and feedlots – for example, water mulches and salts
Bottom loading manure storage facilities
Manure injection or band spreading or broadcasting followed by immediate incorporation
Kept neighbours informed about your farming activities – for example, manure application schedule

Yes
No
Don’t know
Not applicable
[ASK Q51 IF YES TO BEEF CATTLE, DAIRY CATTLE, SHEEP OR LAMBS, HORSES OR ANY OTHER LIVESTOCK AT Q4]
51. Do you typically house livestock outside during the winter?

Yes
No
Don’t Know

[AKS Q51B IF YES IN Q51]
51. B. Thinking about livestock that are housed outside during the winter, how do you typically manage them? (READ LIST) (INTERVIEWER NOTE: includes cattle, sheep, goats, horses etc.)

In corrals or feed pens
Loafing pens – that is, temporary daytime housing
One field site all season
Corn graze
Graze bales left in field
Bales moved to other field and fed using electric fence
Bales hauled to field and unrolled or feed in feeders
Stockpiled forages
Portable windbreaks

Yes
No
Don’t know
Not applicable
SECTION 8: AGRICULTURAL WASTE MANAGEMENT PRACTICES

[ASK SECTION 8 IF YES TO ANY ITEM IN Q4 OR YES TO CROP PROTECTION PRODUCTS IN Q7, ELSE SKIP TO SECTION 9]

Another agricultural issue that farmers must deal with is agricultural waste management. This is not waste or garbage that comes from the home.

52. Please indicate if you did each of the following on your farm in 2011. If the practice does not apply to your farm, please say so. Did you... (READ LIST)

[INSERT IF YES TO ANY ITEM IN Q4] Recycle plastics such as baler twine, feed bags, silage wraps and/or bale wraps
[INSERT IF YES TO CROP PROTECTION PRODUCTS IN Q7] Recycle your crop protection product containers
[INSERT IF YES TO ANY ITEM IN Q4] Properly dispose of veterinary medical supplies such as syringes or expired medicines?

Yes
No
Don’t know
Not applicable
SECTION 9: ENERGY AND CLIMATE CHANGE PRACTICES

The next topic is energy and climate change.

53. Other than the main utility meter that shows the total electricity usage for your entire property, do you have any sub-meters – that is, extra electricity meters – that allow you to know the separate electricity usage of different areas of the farm – for example, the house, workshop, barn?

Yes
No
Don’t know
Not applicable

54. Do you produce grid-connected electricity?

Yes
No
Don’t know
Not applicable

[ASK Q55 IF YES TO Q54]

55. Do you produce grid-connected electricity using any of the following Renewable Energy methods? (READ LIST)

Solar panels, not counting for water pumping or electric fencing
Wind turbine generator on a tower
Biogas generator using farm waste

Yes
No
Don’t know
Not applicable

56. Do you produce heat from any of the following Renewable Energy methods? (READ LIST)

Solar thermal water heating
Solar thermal air heating incorporated into farm building walls
Wood combustion (whole, pellets or chips)
Combustion of any other biomass (straw bales, straw pellets, grain)

Yes
No
Don’t know
Not applicable
57. Are you aware that there is an Alberta Carbon offset market?

Yes
No
Don’t know
Not applicable

[ASK Q58 IF YES TO Q57]
58. Are you currently participating in it?

Yes
No
Don’t know
Not applicable

[ASK Q58B IF NO TO Q58]
58B. Have you ever participated in it?

Yes
No
Don’t know
Not applicable
SECTION 10: GENERAL PRACTICES

The next set of questions covers a few different topics.

[ASK Q59 IF YES TO COMMERCIAL FERTILIZERS OR CROP PROTECTION PRODUCTS AT Q7]
59. Last year, did you utilize Variable Rate Technology in the application of...? (READ LIST)

Commercial fertilizer [INSERT IF YES TO COMMERCIAL FERTILIZER AT Q7]
Crop protection products such as herbicides, insecticides and fungicides [INSERT IF YES TO CROP PROTECTION PRODUCTS AT Q7]

Yes
No
Don’t know
Not applicable

60. Have you completed the Environmental Farm Plan process?

Yes
No
Don’t know
Not applicable

[ASK Q61 IF NO OR DON’T KNOW TO Q60]
61. Have you not completed the Environmental Farm Plan process because...? (READ LIST) (MULTIPLE RESPONSES)

Not sure what it is
Don’t know where to find information about it
Didn’t have time
Another reason (please specify)
(DO NOT READ) Don’t know

[ASK Q62 IF YES TO CROP PRODUCTION, FORAGES OR HAY OR IMPROVED LAND USED FOR PASTURE OR GRAZING AT Q1A, ELSE SKIP TO Q64]
62. Do you typically soil sample all, some or none of your fields?

All
Some
None
Don’t know
Not applicable
[ASK Q63 IF ALL OR SOME IN Q62]

63. Do you typically soil sample your fields yearly, at least once every three years or less than once every three years?

Yearly
At least once every three years
Less than once every three years
Don’t know
Not applicable

64. Have you planted trees on your farm in the past two years?

Yes
No
Don’t know
Not applicable

[ASK Q65 IF YES TO Q64]

65. For what purpose have you planted trees? Any other reasons? (DO NOT READ LIST. ACCEPT MULTIPLE RESPONSES.)

Shelterbelts or Windbreaks
Soil Conservation
Wildlife Habitat
Bioenergy
Timber production
Riparian area restoration
Carbon capture
Air quality
Recreation
Other (please specify)
Don’t know

66. Have you removed trees on your farm in the past two years?

Yes
No
Don’t know
Not applicable

[ASK Q67 IF YES TO Q66]

67. For what purpose have you removed trees? (DO NOT READ LIST. ACCEPT MULTIPLE RESPONSES.)

Improved field efficiency
Removal of dead trees
Fence construction or maintenance
Other (please specify)
Don’t know
SECTION 11: RESPONDENT PROFILE

I just have a few final questions about you and your farm. Your responses will be used for classification purposes only and only aggregate results will be used for reporting purposes.

68. On a scale of 1 to 7, where “1” means not at all preferred and “7” means strongly preferred, please indicate your preference for each of the following methods for getting information on environmental farm stewardship. [INSERT FIRST ITEM]? [INSERT NEXT ITEM]? (REPEAT SCALE AS NECESSARY)

[RANDOMIZE ORDER]
Paper such as newsletters, newspapers, magazines, pamphlets or workbooks
Email
TV
Radio
Advice from an expert or specialist
Demonstrations and field days
Workshops, courses or conferences
Informally through other farmers
Webinars
[ALWAYS SECOND LAST ITEM] Electronic methods such as blogs, Facebook, Twitter, YouTube and apps
[ALWAYS LAST ITEM] Internet other than social media websites

[1-7 scale]
Don’t know

68B. Are there any other ways you would like to get information on environmental farm stewardship? (ACCEPT ALL RESPONSES. DO NOT PROBE.)

Yes (specify)
No
Don’t know

69. Have you attended a degree or diploma program, specifically in an agriculturally-related area? (DO NOT READ LIST)

Yes
No
Maybe/Perhaps
Don’t know

70. Have you attended any farm conservation training programs, workshops, or seminars in the past two years? (DO NOT READ LIST)

Yes
No
Maybe/Perhaps
Don’t know
71. Which of the following best describes the current state of your farm operation? (READ LIST) [ACCEPT ONE RESPONSE ONLY]

I am just getting my farming operation established
I am maintaining my farming operation at a steady level
I am expanding my farming operation
I have started to reduce or scale down my farming operation
I plan to sell my farming operation in the near future
(DO NOT READ) Don’t know

72. And finally, in what year were you born?

NUMERIC FIELD [RANGE: 1900 TO 1996]
Decline to respond