

Background Report

Agricultural Impacts Study for the St. Marys River Area of Concern



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Executive Summary

In 2002, the Stage 2 RAP for the St. Marys River AOC included remedial actions specific to *Action NPS-6: Control of Agricultural and other Non-point Sources of Pollution*. This action identified the need to study and monitor agricultural runoff which would help lead to appropriate controls and remediation (Environment Canada, et. al, 2002).

The purpose of this report is to summarize the current nature, density and scope of agricultural activities near the St. Marys River AOC, based on available information. This information was compared with the province of Ontario and the South Huron census subdivision, a non-AOC reference site within the Great Lakes Basin, to help assess the potential impact of agricultural activities in the St. Marys River AOC watershed in relation to other areas. This report will help determine the extent that agriculture activity is occurring and potentially impacting the St. Marys River AOC, and will inform future discussions as to whether Canada and Ontario need to take action regarding agricultural sources of pollution around the St. Marys River AOC.

In comparison with the South Huron census subdivision, St. Marys has significantly less agricultural activity, and therefore less potential to impact water quality. St. Marys has almost 50% fewer farms (141 farms) than South Huron (276 farms) and total acreage of farms was 33,408 acres in 2006, which is less than one third of the area reported for South Huron (95,443 acres). Total gross farm receipts reported for St. Marys was 7.2 million dollars, which comprises only 5% of gross farm receipts reported for South Huron (146 million dollars). St. Marys had the highest percentage of farms reporting natural land for pasture (43%), compared to South Huron (33%), and Ontario (30%). While the numbers of farms in St. Marys (58) reporting cattle and calves, pigs and hens and chickens was similar to South Huron (73), farms in South Huron reported a significantly higher number of animals (338,908) than St. Marys (6,272). As well, the total number of hens and chickens reported in St. Marys was only 2,018, compared to 248,038 South Huron. Only 26% of farms in St. Marys reported using fertilizer, whereas in Ontario, it was reported by 54% of farms. Fertilizer was used on 2,169 acres in St. Marys and 80,823 acres in South Huron. In both South Huron and Ontario, there have been huge increases in the amount spent on fertilizer and lime purchases between 2001 and 2011, whereas on St. Marys this amount has decreased. A lower percentage of farms in St. Marys reported using insecticides and fungicides than Ontario and South Huron. Herbicide use was reported by 14% of farms in St. Marys, 49% of farms in Ontario and 70% of farms in South Huron.

When comparing the 4 census subdivisions within the St. Marys AOC watershed, Laird and St. Joseph census subdivisions were found to have the highest amount of agricultural activity, followed by MacDonald and Sault Ste. Marie census subdivisions. However, agriculture in the St. Marys River AOC watershed appears to generally consist of smaller operations with few large farms. There is little field cropping. There have been drastic declines in the number of dairy farms, and there have also been declines in beef and hog operations (David Trivers, 2014). At the same time, there has been an increase in mixed animal and mixed crop farming. Although farms are producing and applying manure to fields, the majority is composted or solid manure, and very few farms produce or apply liquid manure. Overall,

impacts from agriculture in the St. Marys AOC watershed are low, especially if Best Management Practices are being followed.

Agricultural activity in the St. Marys AOC watershed is considered to be fairly low, especially when compared to South Huron and Ontario. Based on the data available and from descriptions of farms in the area, farms in the St. Marys area would appear to have minimal impact on water quality in the St. Marys River. It appears that farm trends in the area consist more of mixed farming (diversity of livestock and crops) as opposed to more intensive livestock farms that are reported for South Huron and Ontario. Any impact on water quality would be from individual farms as opposed to the area, as a whole. Potential impacts from individual farms would be based on where livestock had access to a shoreline or waterbody, if there was a shoreline buffer, manure and fertilizer management, manure storage location and other factors.

Contents

1.	Introduction.....	1
1.1.	Background and Purpose	1
1.2.	Approach	2
1.3.	Geographic Scope of Area - Census Subdivisions and Townships	3
2.	Overview of Current Regulations and Agreements	5
2.1.	Regulations.....	5
2.2.	Programs.....	6
3.	Summary of Agricultural Activities Around the St. Marys River	8
3.1.	Farm Characteristics.....	8
3.2.	Classification of Farms, According to NAICS	11
3.3.	Total Gross Receipts.....	17
3.4.	Farm Size	18
3.5.	Production Type	23
3.6.	Greenhouse Operations.....	29
3.7.	Field Crops.....	30
3.8.	Vegetable and Fruit Crops Grown.....	31
3.9.	Livestock.....	33
3.10.	Land Management	37
3.11.	Manure Management	42
3.12.	Tillage Practices.....	46
3.13.	Conservation Measures	48
4.	Comparison of Agricultural Activities Between St. Marys River, South Huron and Ontario.....	50
4.1.	Total Number of Farms	51
4.2.	Trend in the Number of Farms.....	51
4.3.	Total Area of All Farms.....	52
4.4.	Number of farms by Industry Type (NAICS)	53
4.5.	Total Amount of Gross Farm Sales.....	54
4.6.	Number of Farms by Production Type	55
4.7.	Total Acreage of Production Type.....	56
4.8.	Total Number of Greenhouse Operations	57
4.9.	Type and Acreage of Field Crops Grown	58
4.10.	Type of Livestock in 2011.....	60
4.11.	Number of Livestock Report 2011	61
4.12.	Total Farms Report Weed Control and Inputs	62
4.13.	Percentage of Farms Using Inputs	63
4.14.	Number of Acres Treated with Inputs	64
4.15.	Acreage of Fertilizer Use	65
4.16.	Percentage of and Trends in Farms Purchasing Inputs.....	66
4.17.	Manure Management	67
4.18.	Conservation Practices.....	70
4.19.	Best Management Practices	71
5.	Summary of Key Findings	73
5.1.	Comparison of Census Subdivisions within the St. Marys region.....	73
5.2.	Comparison of St. Marys, South Huron and Ontario	76
5.3.	Other Considerations	78
5.4.	Concluding Statement.....	79
	References	83
	Appendix 1 – Terminology	86
	Appendix 2 – Contacts	88

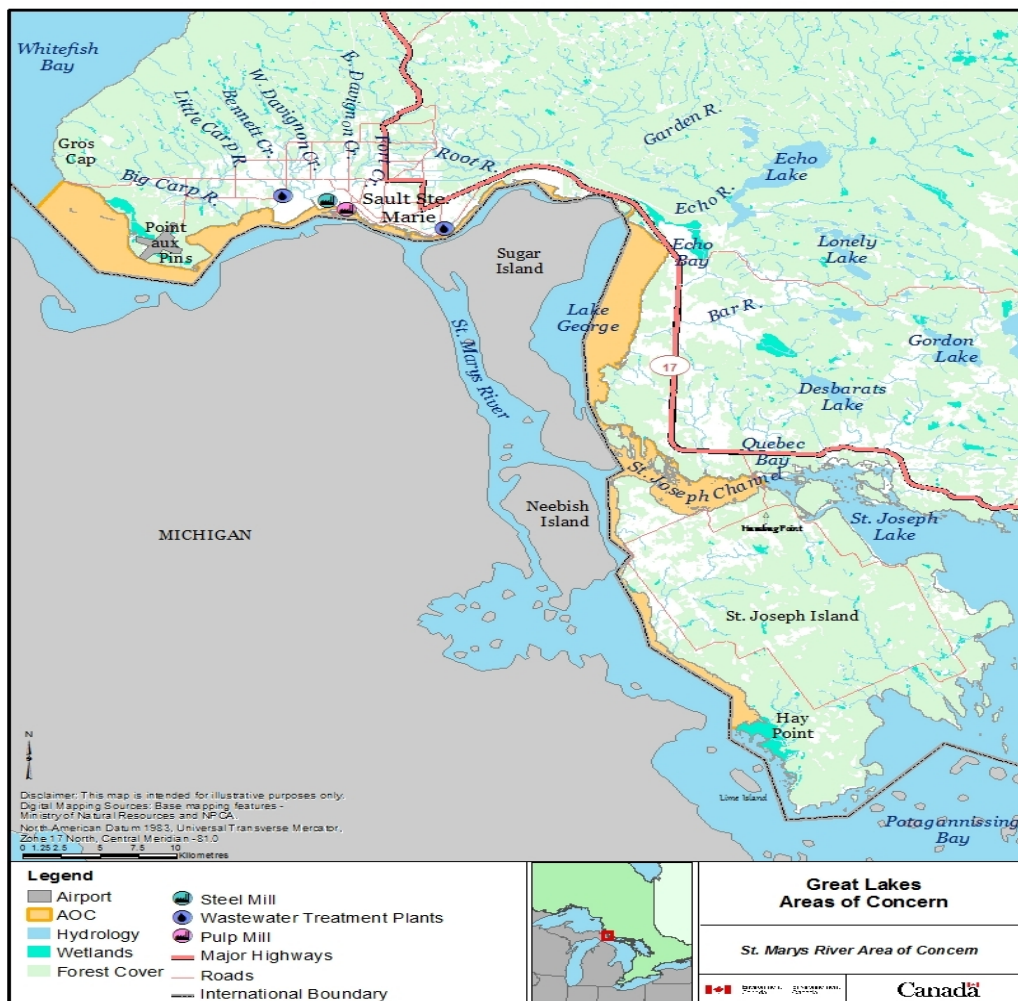
1. Introduction

1.1. Background and Purpose

Under Annex 2 of the Canada United States Great Lakes Water Quality Agreement, 43 Areas of Concern (areas that have experienced environmental degradation) were identified in the Great Lakes. Currently there remain 9 Areas of Concern in Canada, 25 Areas of Concern in the United States, and 5 additional Areas of Concern shared by both countries. Each Area of Concern has developed a Remedial Action Plan (RAP) that guides restoration and protection efforts. Remedial Action Plans focus on local impairments to beneficial use of the environment.

One of the identified Areas of Concern (AOC) is the St. Marys River, which begins in the west at Whitefish Bay, near Gros Cap and runs downstream to St. Joseph Island in the east (see Map 1). Restoration planning for the St. Marys River AOC began in the late 1980s, and when environmental impairments were evaluated in the early 1990s, the agricultural sector was identified as a factor. In 2002, the Stage 2 RAP for the St. Marys River AOC included remedial actions specific to *Action NPS-6: Control of Agricultural and other Non-point Sources of Pollution*. This action identified the need to study and monitor agricultural runoff which would help lead to appropriate controls and remediation (Environment Canada, et. al, 2002).

Map 1 - St. Marys River Area of Concern



The information used for the evaluation in the early 1990s is out of date, and at the time of evaluation, only 10 percent of the total land use within five kilometres of the St. Marys River was attributed to agricultural activities. Hay crops and livestock for dairy and meat products were the dominant agricultural endeavours (Environment Canada, et. al, 2002). Before moving forward with NPS-6, information on current agricultural activities is needed to assist in determining whether agriculture is having a significant impact on water quality in the St. Marys River AOC.

The purpose of this report is to summarize the current nature, density and scope of agricultural activities near the St. Marys River AOC, based on available information. This information will then be compared with South Huron, a non-AOC reference site, within the Great Lakes Basin, to help understand whether the potential impact of agricultural activities in the St. Marys River in relation to other areas. To help give greater context, these results will be compared with agricultural activities in Ontario overall. This will help determine to what extent agriculture activity is occurring and may be potentially impacting the St. Marys River AOC and inform future discussions as to whether Canada and Ontario need to take action regarding agricultural sources of pollution around the St. Marys River AOC. In addition, the report will include an overview of current regulations and programs that govern agricultural sources of water pollution.

1.2. Approach

To initiate the project, Mark Chambers from Environment Canada was contacted to confirm the project objectives and develop the framework and content for this Background Document. David Trivers from Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA)¹, provided agricultural data for the St. Marys River, South Huron and Ontario for 2001, 2006 and 2011. The first dataset provided by OMAFRA was 'Ag Stats', an internal OMAFRA tool that organized the agricultural Census data into census subdivisions. 'Ag Stats' was used for the evaluation and comparison of agricultural activities according to census subdivisions. This helped to identify the geographic areas around the St. Marys River AOC where agricultural activities were occurring and helped identify whether there were potential negative impacts. The second dataset provided by OMAFRA was EMSI Analyst data which incorporated Census data and Canadian Business Survey data. This dataset was a courser level and used as additional information for comparison.

Part of the Census data included data from the North American Industry Classification System (NAICS). This data was sourced from the Canadian Business Patterns in December 2012, and it classified farms according to industry type. The numbers were fairly similar to the Census data, although there were small differences in numbers.

In addition to data provided by OMAFRA, discussions with project contacts and an internet search was conducted to identify any regulations and programs pertaining to agricultural activities and water quality. This information was provided by OMAFRA and the Ontario Soil and Crop Improvement Association (OSCIA).

Other potential sources of information regarding agricultural activities around the St. Marys River AOC were contacted:

- Sault Ste. Marie Conservation Authority (SSMCA) Source Water Protection Plan, to investigate whether agricultural activities had been identified as a threat to source water.

¹ Note - OMAFRA was changed to the Ontario Ministry of Agriculture and Food (OMAF), under the current provincial government.

- Ministry of Environment, Sudbury to gather information on the number of farms that had a Nutrient Management Strategy in the St. Marys watershed; however, due to confidentiality issues, that information could not be shared.
- Peter Doris and Brian Bell from OMAFRA to gather further information on best management practices, other potential contacts and insight into any potential impacts from agricultural activities on water quality
- Township of MacDonald, Meredith and Aberdeen Additional to obtain information on two municipal drains in the township.
- Manitoulin Streams for potential mapping or restoration projects completed in the area.
- Land Information Ontario (Ontario Ministry of Natural Resources) to get percentages on percent of agricultural land versus forest and urban.

1.3. Geographic Scope of Area - Census Subdivisions and Townships

There are six municipalities that border the St. Marys River AOC (Map 2). From west to east, they include:

1. Sault Ste. Marie City
2. MacDonald, Meredith and Aberdeen Additional Township
3. Laird Township
4. Tarbutt and Tarbutt Additional Township
5. St. Joseph Township
6. Jocelyn Township

Map 2 -Census Subdivisions Around the St. Marys River Watershed



There are also two First Nation Reserves that border the St. Marys River AOC, Garden River First Nation and Rankin Location (Batchewana First Nation). There are no statistics for Garden River and Rankin Location; however, those areas appear to be forested with minimal cleared land for agricultural activity.

Garden River does have two major tributaries that flow into the St. Marys River, which are Garden River and Root River. There are two municipal drains in MacDonald, Meredith and Aberdeen Additional that drain into Lake George. It was noted that along the Tynkaluk Drain there is one farm that could potentially

impact water quality and there would be approximately two farms that would contribute to the Hedrick Drain. The other farms in the area are primarily for hay production (MacDonald, Meredith and Aberdeen Additional Township, 2014).

Within the four census subdivisions that were compared, there are a total of eight tributaries and two drains which outlet into the St. Marys River and Lake George. Laird census subdivision has two tributaries, the Bar River in Laird Township and Shoefelt Creek in Tarbutt and Tarbutt Additional Township. Sault Ste. Marie has seven tributaries, the Big Carp River, Little Carp River, Bennett Creek, Fort Creek, and East and West Davignon Creeks. St. Joseph has one tributary, the Two Tree River. MacDonald, Meredith and Aberdeen Additional Township has two drains, the Tynkaluk and Hedrick Drains which outlet into Lake George. Although no location was disclosed with the Ag Stats data, it is important to keep in mind where the tributaries are located when discussing impacts from each Census Subdivision.

OMAFRA has provided the data from their internal program 'Ag Stats', which takes Agricultural Census data (Federal) and organizes it into "Census consolidated subdivisions". Six of the seven Townships are incorporated into the four census subdivisions as indicted in Table 1.1 below. Data from the other three townships (Tarbutt and Tarbutt Additional and Jocelyn) is included in the four boundaries listed below:

- Census Subdivision # 123 - Sault Ste. Marie Township
- Census Subdivision # 124 - MacDonald, Meredith and Aberdeen Additional Township
- Census Subdivision #125 - Laird Township (includes Tarbutt and Tarbutt Additional)
- Census Subdivision #126 - St. Joseph Township (includes Jocelyn Township)

The following is a brief summary to highlight the main general characteristics of each township:

Table 1.1 - Background Information on Townships in St. Marys River AOC

Census Subdivision	Municipality	Population (2011)	Square Kms	Historical Industry/ Activities	Current Industry/ Activities	Tributaries to the St. Marys River
123	City of Sault Ste. Marie	75, 141	223.26	<ul style="list-style-type: none"> • Fur trading • Hydroelectric power • Forestry • Pulp and paper • Mining 	<ul style="list-style-type: none"> • Steel production • Alternative energy • Information technology • Forestry 	<ul style="list-style-type: none"> • Big Carp River • Little Carp River • Bennett Creek • Fort Creek • East Davignon Creek • West Davignon Creek
124	MacDonald, Meredith and Aberdeen Additional TP	1,464	-	<ul style="list-style-type: none"> • Mineral exploration • Forestry, • Agriculture 	<ul style="list-style-type: none"> • Agriculture • Tourism • Lake George has 2nd largest wetland on St. Marys River 	<ul style="list-style-type: none"> • Tynkaluk Drain • Hedrick Drain
125	Laird TP	1,057	85.18	<ul style="list-style-type: none"> • Logging, • Agriculture 	<ul style="list-style-type: none"> • Agriculture 	<ul style="list-style-type: none"> • Bar River
125	Tarbutt and Tarbutt Additional TP	450	-	<ul style="list-style-type: none"> • Agriculture 	<ul style="list-style-type: none"> • Tourism • Agriculture 	<ul style="list-style-type: none"> • Shoefelt Creek
126	St. Joseph TP (inc. Hilton)	1,200	-		<ul style="list-style-type: none"> • Tourism 	<ul style="list-style-type: none"> • Two Tree River
126	Jocelyn TP	237	133		<ul style="list-style-type: none"> • Maple syrup 	

Sources

- Laird Township, <http://www.lairdtownship.ca>
- Sault Ste. Marie Township, <http://www.ssmcdc.com/view.php?page=macdonald>
- MacDonald, Meredith and Aberdeen Additional Township, 2013, <http://www.echobay.ca/information>
- Tarbutt and Tarbutt Additional Township, 2013, <http://www.tarbutttownship.com>
- Johnson Township, <http://www.johnsontwp.ca/index.aspx>
- St. Joseph Township, 2013, <http://www.stjosephtownship.com/index.php>
- Jocelyn Township, <http://jocelyntownship.com>
- Statistics Canada, 2012

2. Overview of Current Regulations and Agreements

This section provides an overview of applicable regulations for agricultural management pertaining to potential impacts of agriculture on water quality in the St. Marys River watershed. In addition, there are programs listed below that farmers use to plan and implement best management practices (BMPs) which would help to lessen the impacts of agricultural activity.

2.1. Regulations

Clean Water Act, 2006

The *Clean Water Act* was created to protect sources of drinking water, both existing and future. If an agricultural activity is deemed to be a “significant drinking water threat”, the local Source Protection Plan will outline the specific actions that farm operators will need to undertake in order to ensure it will mitigate those impacts (OMAFRA a, 2013).

Environmental Protection Act, 1990

The goal of the *Environmental Protection Act* is to protect and conserve the natural environment in regards to discharge and spills of contaminants into the natural environment. The Act applies to farms that store large quantities of fuel and other substances that could result in spill (Service Ontario, 2010).

Nutrient Management Act, 2002

The *Nutrient Management Act* was created to help sustain agricultural activities and rural development while ensuring protection of the natural environment. Any farm with over five beef cattle or four dairy cows that require a building permit for keeping animals or managing manure (storage or treatment), must create a Nutrient Management Plan (NMP) or a Nutrient Management Strategy (NMS). The NMP will be dependent on the number of animals and the location of the building. Manure management in “earthen storage” will not require a building permit; however, a NMP or NMS is still required (OMAFRA a, 2013).

A NMS must be approved prior to the approval of the building permit. The NMS includes details on the number and type of livestock, livestock housing, manure storage and manure storage requirements, amount of manure that is produced, amount of available land or agreements (land leases off farm, etc.) for manure application, any sensitive areas (watercourses, wells, wetlands, etc.) in relation to manure storage and livestock housing and municipal well locations. The NMS is valid for five years, after which the farm operator needs to update it every five years (OMAFRA a, 2013).

Ontario Water Resources Act, 1990

The goal of the *Ontario Water Resources Act* is to protect, manage and conserve surface water and groundwater. The Act prohibits discharging any substance that may negatively affect water quality into a watercourse. This law deals mainly with sewage, and for farmers, this would likely only be applicable with taking water or creating wells (Service Ontario, 2011).

Pesticides Act, 1990

The goal of the *Pesticides Act* is to lessen potential negative impacts on human health and the natural environment. The Act requires specific handling, storage, labelling, transport and disposal of pesticides to help mitigate any negative impacts, greater than the proper use of the pesticide itself (OMAFRA a, 2013).

2.2. Programs

Environmental Farm Plan

The Environmental Farm Plan (EFP) is a program organized by the Ontario Soil and Crop Improvement Association (OSCIA). It was started in 1993 and has had over 35,000 participants in Ontario since that time. The program helps farmers evaluate potential risks from their farm from different areas, such as nutrient run-off, pest management, fuel storage and many more (OSCIA, April, 2013). Farmers participate in a two-day workshop where they identify any potential risks and create solutions for minimizing those risks through implementation of Best Management Practices (BMPs). That action plan is then peer-reviewed. The program is free, confidential and on a voluntary basis. Since the launch of the program, over 70% of farmers in Ontario have participated in the course. After completion of an EFP, farmers can then be eligible for cost-share funding to implement their action plans (OSCIA, March, 2012).

Growing Forward 2

Growing Forward 2 is a funding initiative from the federal, provincial and territorial governments, delivered by the Ontario Soil and Crop Improvement Association (OSCIA). The goal of the program is to foster innovation, market opportunity and competitiveness in the agricultural and related sectors. Applicants have to create an action plan through participation in the OSCIA's Environmental Farm Plan or 'Growing Your Farm Profits' workshops. After completion of the action plan, they can then apply for cost-share funding under "Capacity Building" or "Implementation". 'Capacity Building' is the first stage of funding which focuses on helping producers identify potential opportunities and risks and funds training and skill development, evaluation and planning. 'Implementation' funding is the final stage of potential cost-share funds for producers, in which projects are evaluated for overall effectiveness. One of the six areas of focus for implementation includes "Environmental and Climate Change". This category includes action items concentrated on the following (OSCIA, October, 2013):

- Manure composting and improvements with application, storage and handling;
- Runoff control from livestock facilities;
- Improving water efficiency, nutrient recovery from wastewater and water well management;
- Soil improvements, such as cover cropping and structural erosion control;
- Improvement of fuel storage;
- Species at risk; and,
- Decreasing risk of damage from weather.

Source Water Protection Plan

Under the *Clean Water Act*, the Sault Ste. Marie Source Water Protection Plan was finalized in 2012 (Sault Ste. Marie Region Source Protection Authority, 2012). The scope of the plan includes the Sault

Ste. Marie Census District (Map 3) and its purpose was to identify and address drinking water threats to six wellheads and one source water intake (Sault Ste. Marie Region Source Protection Authority, 2011). From the assessments completed, it was determined that agriculture was not a significant risk to source water within the protection area.

Map 3 – Map of the Sault Ste. Marie Source Protection Region



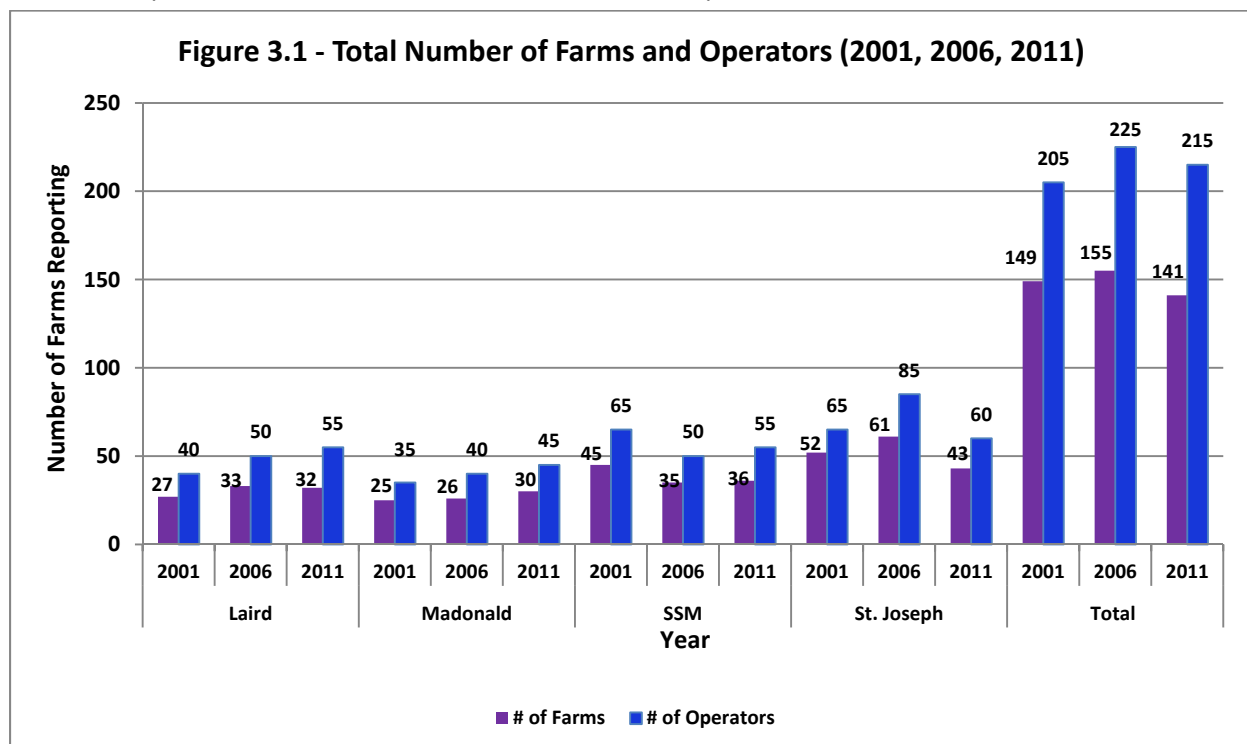
3. Summary of Agricultural Activities Around the St. Marys River

3.1. Farm Characteristics

a. Total Number of Farms and Operators

Figure 3.1 illustrates the number of farms and operators for the time periods of 2001, 2006 and 2011 located in the St. Marys River AOC by census subdivisions. The number of operators recorded for a farm can include spouses, family, neighbours, and other arrangements (Statistics Canada a, May 23, 2012). According to David Trivers of OMAFRA, fluctuations of farm numbers and operations on the St. Joseph Island are common (2013). Some of the key findings include:

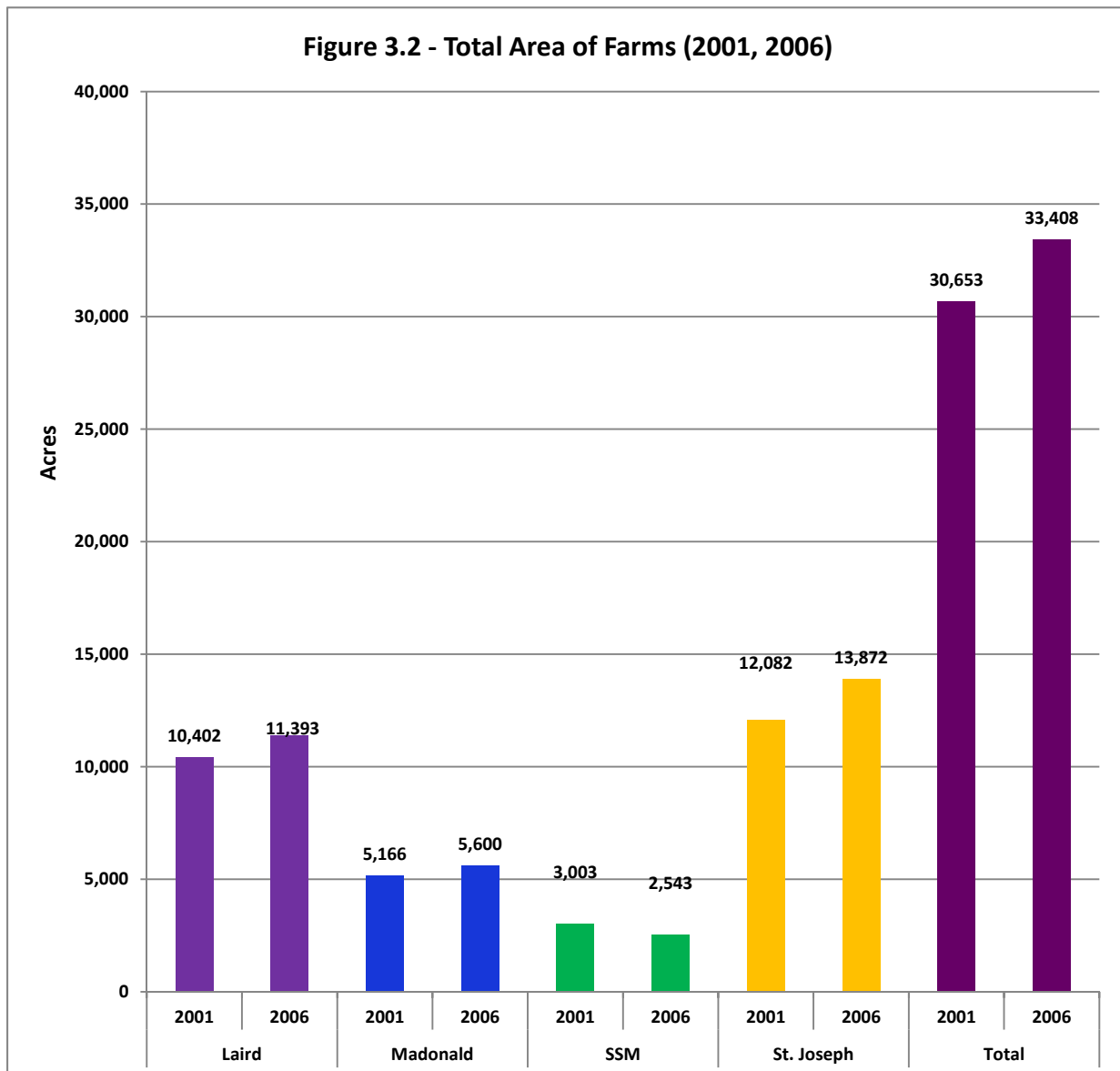
- The total number of farms in all census subdivisions in 2001 was 149, which increased 2006 to 155 and decreased to 141 in 2011:
 - St. Joseph (which includes Hilton) reported the highest number of farms each Census year, despite the fluctuations. Sault had the second highest number of farms, followed by Laird and then MacDonald.
 - MacDonald increased by small increments each Census period and is the only census subdivision that did not experience any decline in the number of farms.
- The total number of operators in 2001 was 205, which increased to 225 in 2006, and decreased to 215 in 2011.
- For all census subdivisions, there are more operators each year than farms. For both Laird and MacDonald, the number of operators increased each Census period, and Sault Ste. Marie and St. Joseph, there were fluctuations in the number of operators.



b. Total Farm Area

Figure 3.2 illustrates the number of farms and operators for the time periods of 2001 and 2006, located in the St. Marys River AOC by census subdivisions. Total farm area was not available for the 2011 Census period, and therefore, only 2001 and 2006 can be compared. Some of the key findings include:

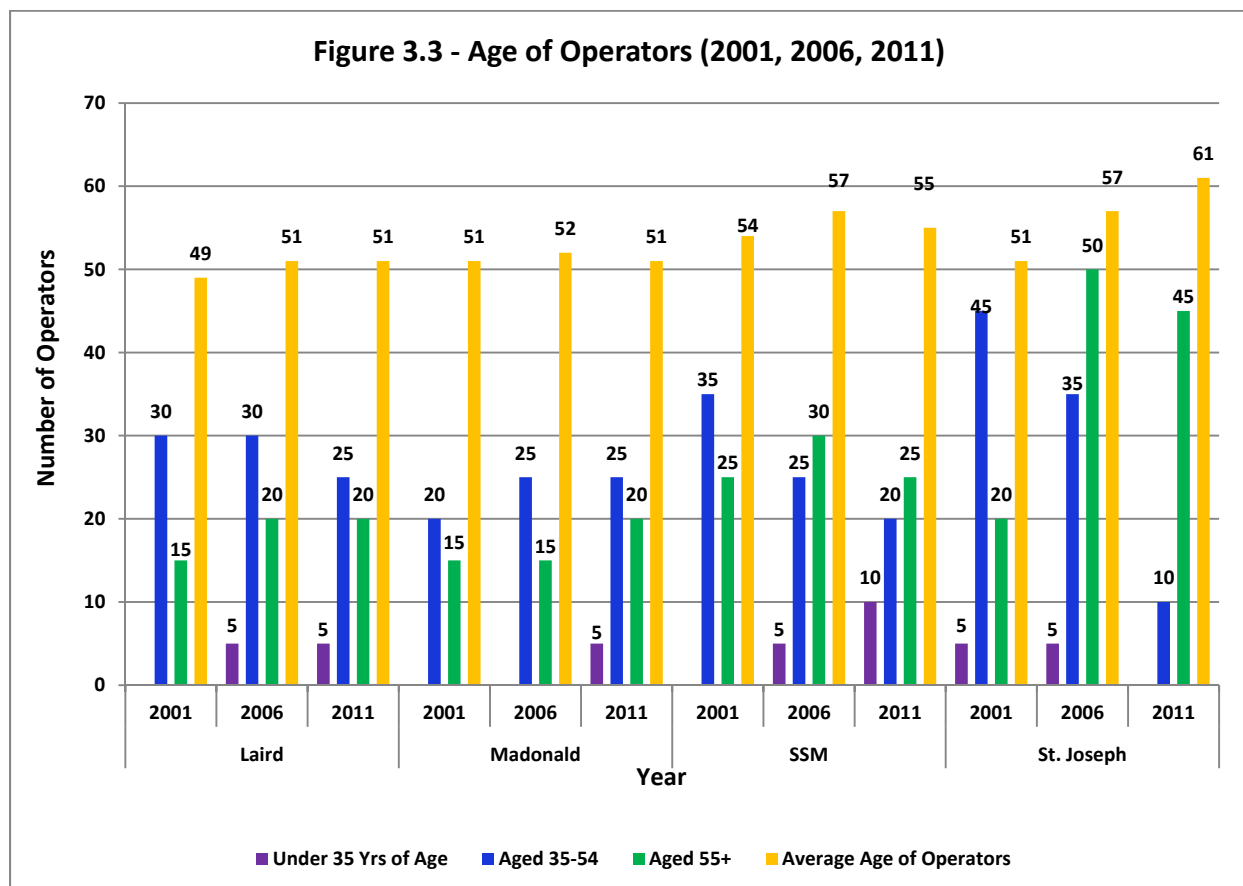
- Between 2001 and 2006, the total farm area for all census subdivisions increased from 30,653 acres to 33,408 acres.
- Overall, St. Joseph had the greatest increase of total farm area during that time period (1,790 acres), followed by Laird (991 acres), and in MacDonald (434 acres). This corresponds with an increase in the number of farms between 2001 and 2006 in those Census areas (Figure 3.1).
- Total area of farms decreased in Sault Ste. Marie by 460 acres, which corresponds with a decrease in the number of farms during that time.



c. Age of Operators

Figure 3.3 illustrates the number of farm operators in each age category for the time periods of 2001, 2006 and 2011, in addition to the average age of operators. Changes in numbers between age categories were likely a combination of operators changing age categories between the Census time periods and farm operations starting up and shutting down, including farmers that may have retired. Age can help provide insight into changing farm numbers. As farmers age and retire, those farms may cease to be productive if there are no younger farmers taking over or creating their own farms. Some of the key findings include:

- The average age of operators in 2011 was 61 in St. Joseph, 55 in Sault Ste. Marie, and 51 in both Laird and MacDonald.
- For all census subdivisions, there were very few operators aged 35 and under:
 - In MacDonald and Sault Ste. Marie, the numbers of operators aged 35 and under increased in 2011.
 - In Laird, the number of operators aged 35 remained the same, and in St. Joseph, the number of operators aged 35 fell to zero.
- In Laird and MacDonald, most operators were aged 35 to 54, followed by 55 and older. In Sault Ste. Marie and St. Joseph, aside from 2001, there were more operators aged 55 and over, followed by those aged 35 to 55.



3.2. Classification of Farms, According to NAICS

The North American Industry Classification System (NAICS) data is from a different dataset, sourced from the Canadian Business Patterns in December 2012. The numbers are supposed to be the same as those in Statistics Canada; however, there may be some small differences. The NAICS survey is taken at different years than Census questionnaires (2007, 2012). According to the NAICS, the definition of:

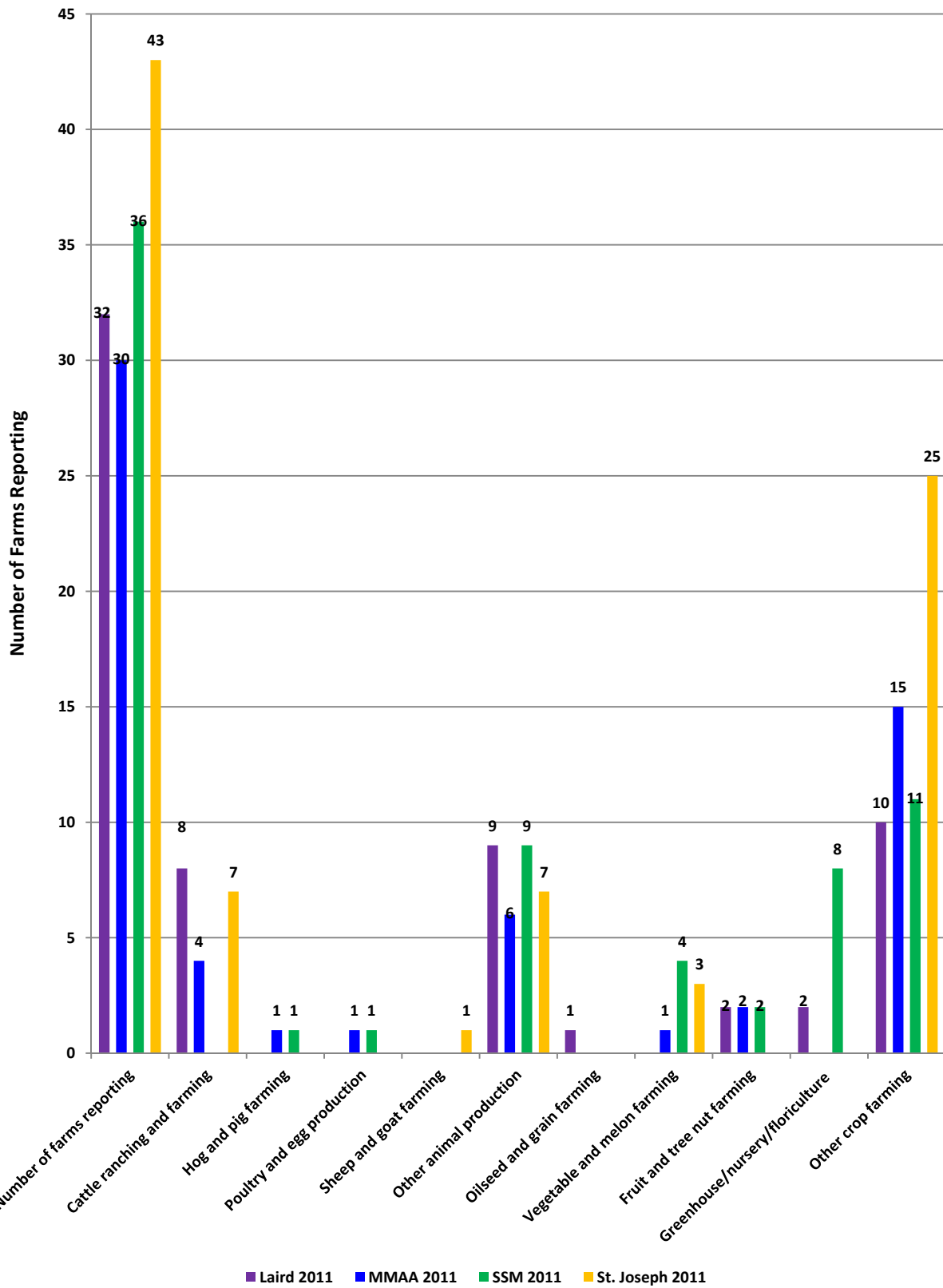
- 'Other crop farming' includes tobacco, cotton, sugar cane, hay, peanuts, sugar beets, agave, hay and grass seeds, herbs and spices, hops, algae, vegetable and fruit combination farming and gathering tea and maple sap.
- 'Other animal production' includes apiculture, horse and other equine production, fur-bearing animal and rabbit production, combination farming with no dominant animals and other animals, such as deer, worms, crickets, lab animals and companion animals (dogs, cats, pet birds, etc.) (Statistics Canada, June 19, 2012).

a. Farm Production in All Census Subdivisions

Figure 3.4 illustrates the type of farm production in each census subdivision for 2011. Some of the key findings include:

- When comparing each census subdivision, 'other' crop farming was the highest reported industry in all four census subdivisions, followed by 'other' animal production.
- Cattle ranching and farming was the third highest reported industry in Laird and MacDonald and was equivalent to 'other' animal production in St. Joseph. By 2011, there was no cattle ranching and farming reported in Sault Ste. Marie.
- In St. Joseph, the third highest reported industry was vegetable and melon farming, and the third highest reported industry in Sault Ste. Marie was greenhouse, nursery and floriculture production. Aside from greenhouse, nursery and floriculture production in Sault Ste. Marie and cattle ranching and farming in Laird and St. Joseph, all other categories of farming were reported by fewer than five farms.
- Laird was the only census subdivision reporting oilseed or grain farming in 2011, and St. Joseph was the only census subdivision reporting sheep and goat farming in 2011. Despite differences in the number of farms, fruit and tree nut farming was reported by the same number of farms (2) in Laird, MacDonald and Sault Ste. Marie, but none were reported in St. Joseph in 2011. Laird did not have any farms reporting pig and hog farming or poultry and egg production during any time period. Laird and St. Joseph did not have any farms reporting pig and hog farming or poultry and egg production. There was no greenhouse, nursery or floriculture production reported in MacDonald during any time period and none reported for St. Joseph in 2011.

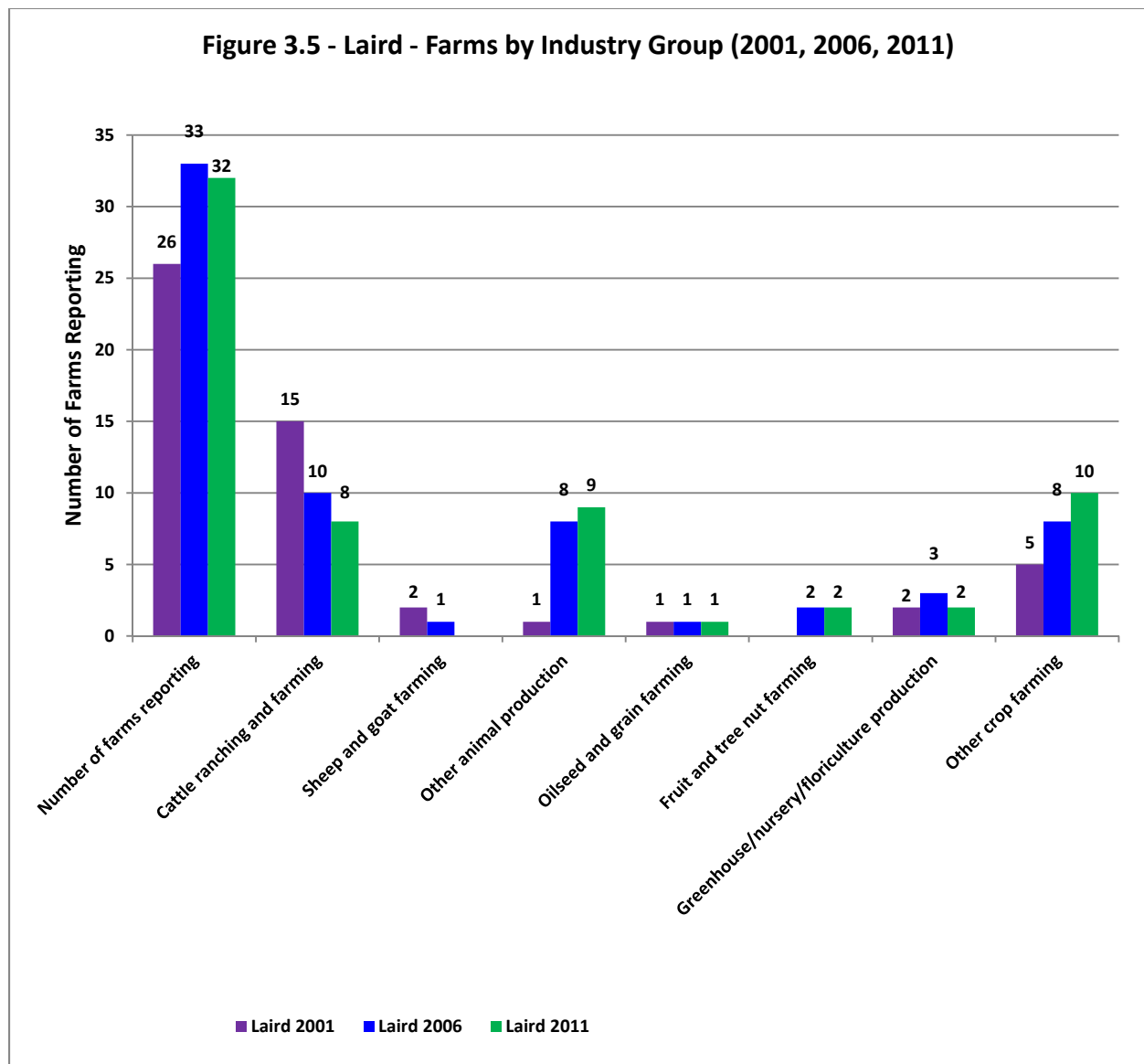
Figure 3.4 - Comparison of Farm Industry by Group (2011)



b. Farms by Industry Group in Laird

Figure 3.5 illustrates farms by industry group in Laird for the Census periods of 2001, 2006 and 2011. Some of the key findings include:

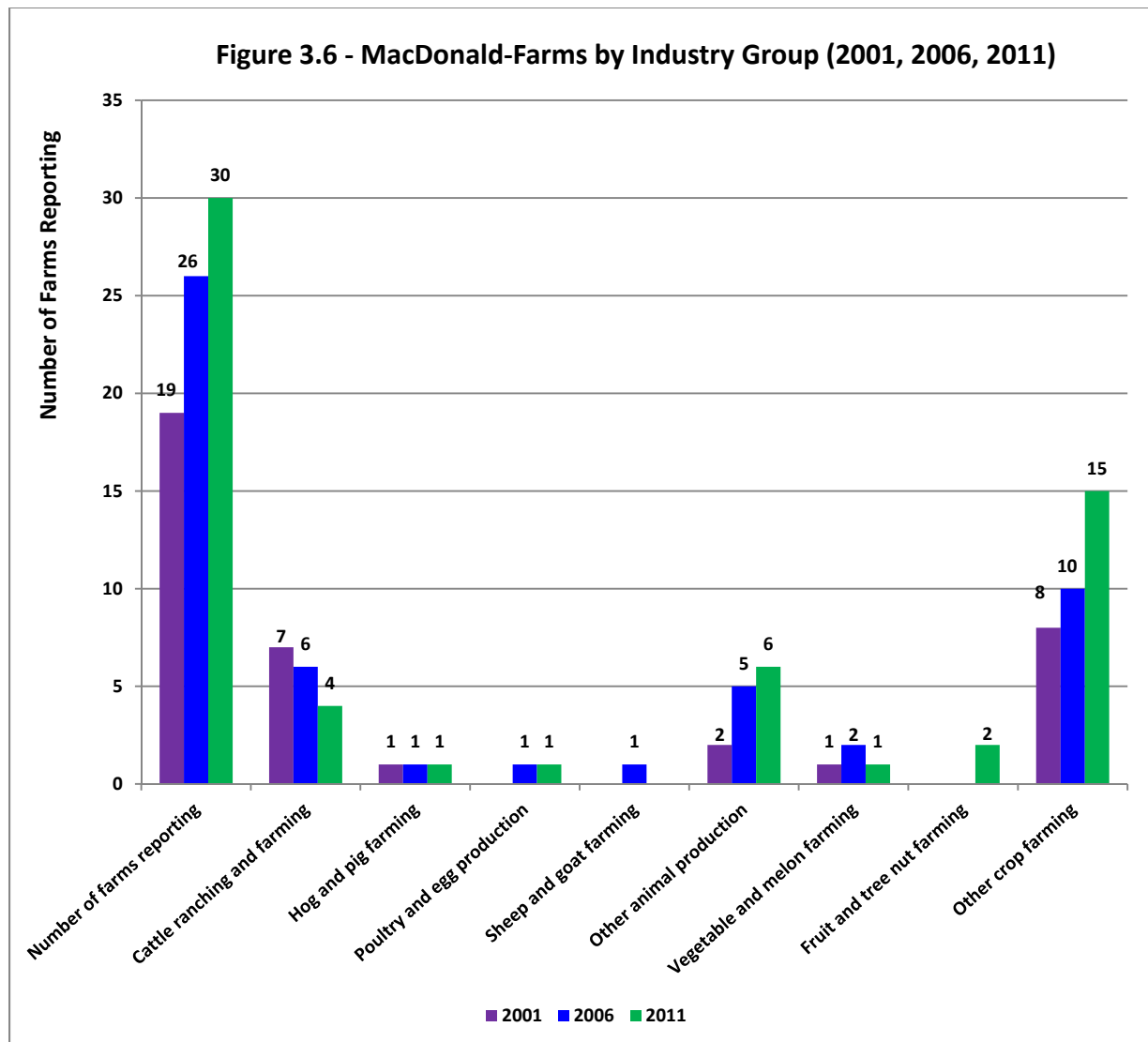
- The highest number of farms were classified as cattle ranching and farming in 2001 and 2006, but that decreased in 2011.
- 'Other crop farming' increased each year and became the highest classification of farms in 2011.
- 'Other animal production' increased from 2001 to 2011.
- Sheep and goat farming decreased each Census period, from two in 2001 to none in 2011.
- All other classifications (oilseed and grain farming, fruit and tree nut farming, greenhouse, nursery and floriculture production) remained relatively the same from 2001 to 2011, ranging from one to three operations. There were no farms reporting hog and pig production or poultry and egg production during any of the Census periods.



c. Farms by Industry Group in MacDonald

Figure 3.6 illustrates farms by industry group in MacDonald for the Census periods of 2001, 2006 and 2011. Some of the key findings include:

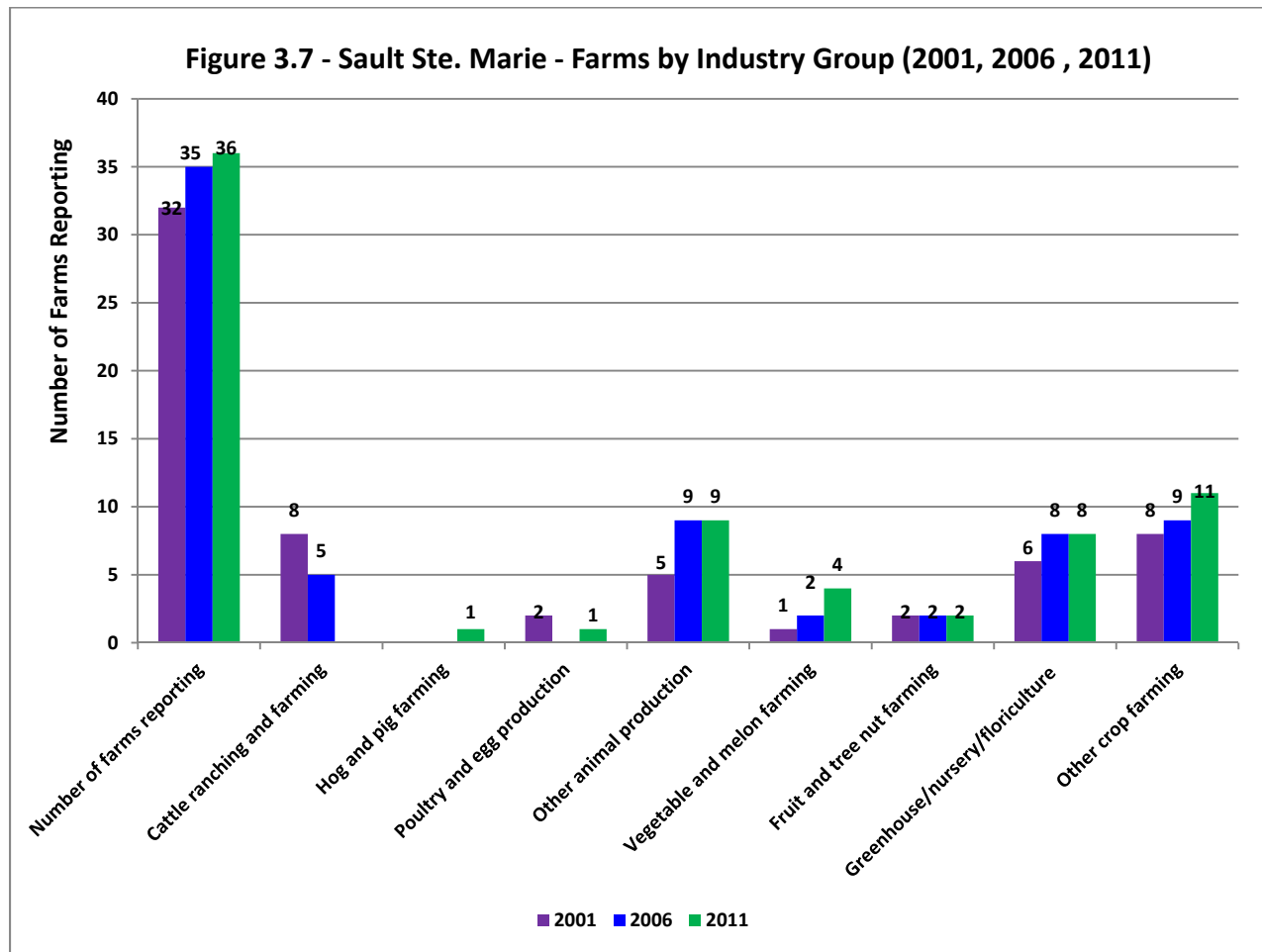
- The highest number of farms were classified as 'other crop farming' in each Census period.
- Similar to Laird, cattle ranching decreased each Census period, while 'other animal production' and 'other crop farming' operations increased.
- The other categories of farming ranged between one and two farms.
- There were no fruit and tree nut farms in 2001 or 2006, but this increased to two in 2011.
- In 2011, there were no farms reporting sheep and goat production.
- There were no farms reporting as oilseed and grain farms or greenhouse, nursery and floriculture over any of the time periods.
- One hog and pig operation existed throughout the entire time period.



d. Farms by Industry Group in Sault Ste. Marie

Figure 3.7 illustrates farms by industry group in Sault Ste. Marie for the Census periods of 2001, 2006 and 2011. Some of the key findings include:

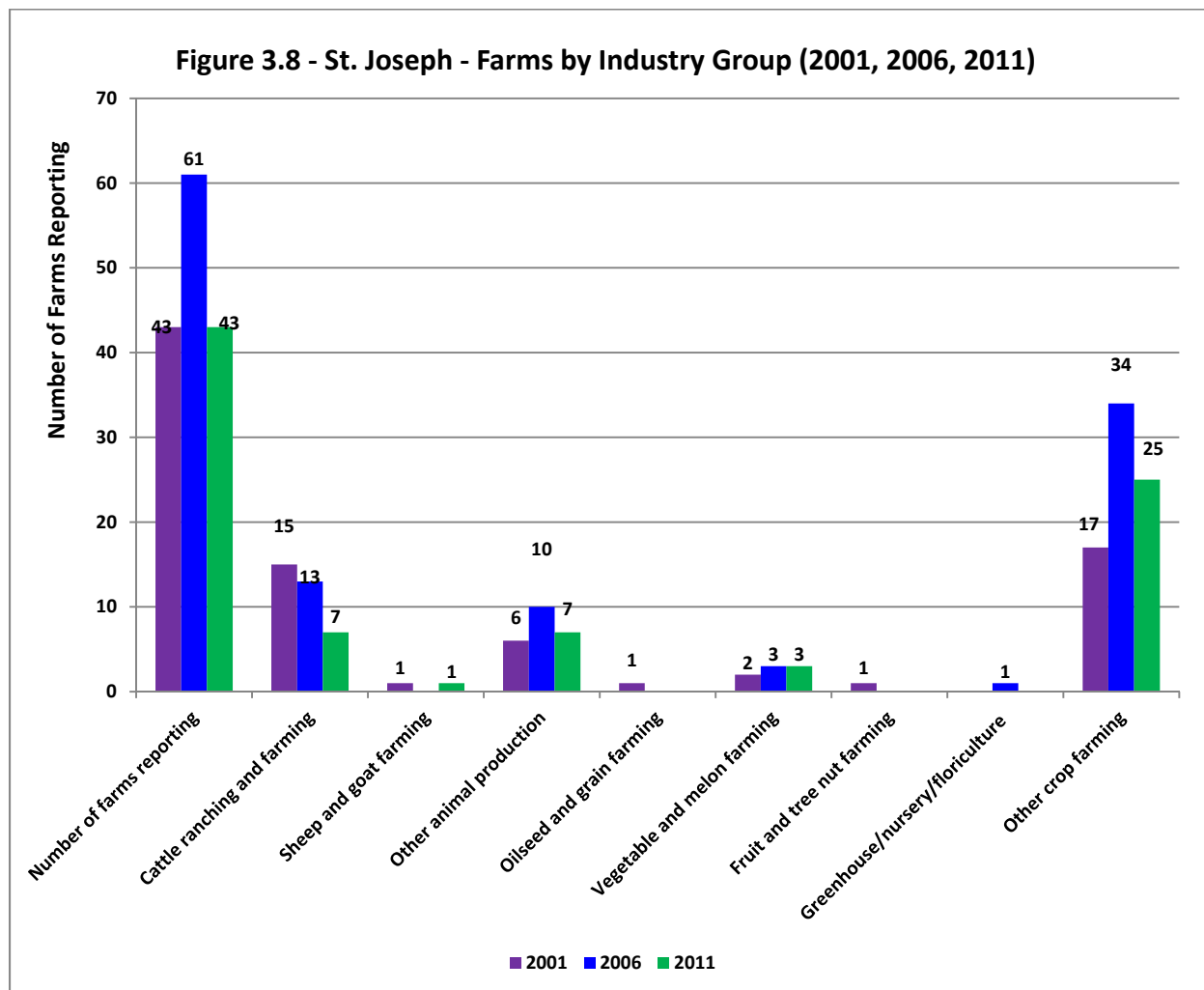
- Similar to Laird and MacDonald, cattle ranching decreased, and by 2011, no farms reported cattle ranching and farming.
- 'Other crop farming' increased between 2001 and 2011 and became the highest industry type reported.
- 'Other animal production' also increased and became the second highest industry type.
- Greenhouse, nursery and floriculture increased from 2001 to 2006, and became the third highest industry type reported by 2011.
- Although there were only a few farms, vegetable and melon farming had a larger increase from 2001 to 2011.
- Hog and pig farming was only reported in 2011.
- Poultry and egg production farms decreased from 2 to 1 between 2001 and 2011.
- There were no oilseed or grain farms reported for any Census period.



e. Farms by Industry Group in St. Joseph

Figure 3.8 illustrates farms by industry group in St. Joseph for the Census periods of 2001, 2006 and 2011. Some of the key findings include:

- In St. Joseph, 'other crop farming' has been the highest industry type reported for each Census period, despite fluctuations in numbers.
- Cattle ranching and farming was the second highest type of farming, but similar to the other census subdivisions, it declined each Census period.
- 'Other animal production' was the third highest type of farming reported in 2001 and 2006 but declined by 2011, becoming equivalent to cattle ranching and farming.
- Vegetable and melon farming increased from 2001 to 2006 and remained the same in 2011, despite the significant decrease in the number of farms in St. Joseph between 2006 and 2011. It was the only type of farming that did not decrease over that time period, aside from sheep and goat farming, which increased from zero farms to one.
- There were no farms reporting fruit and tree nut farming or greenhouse, nursery and floriculture production in 2011. There was no poultry or egg production reported for any Census period.

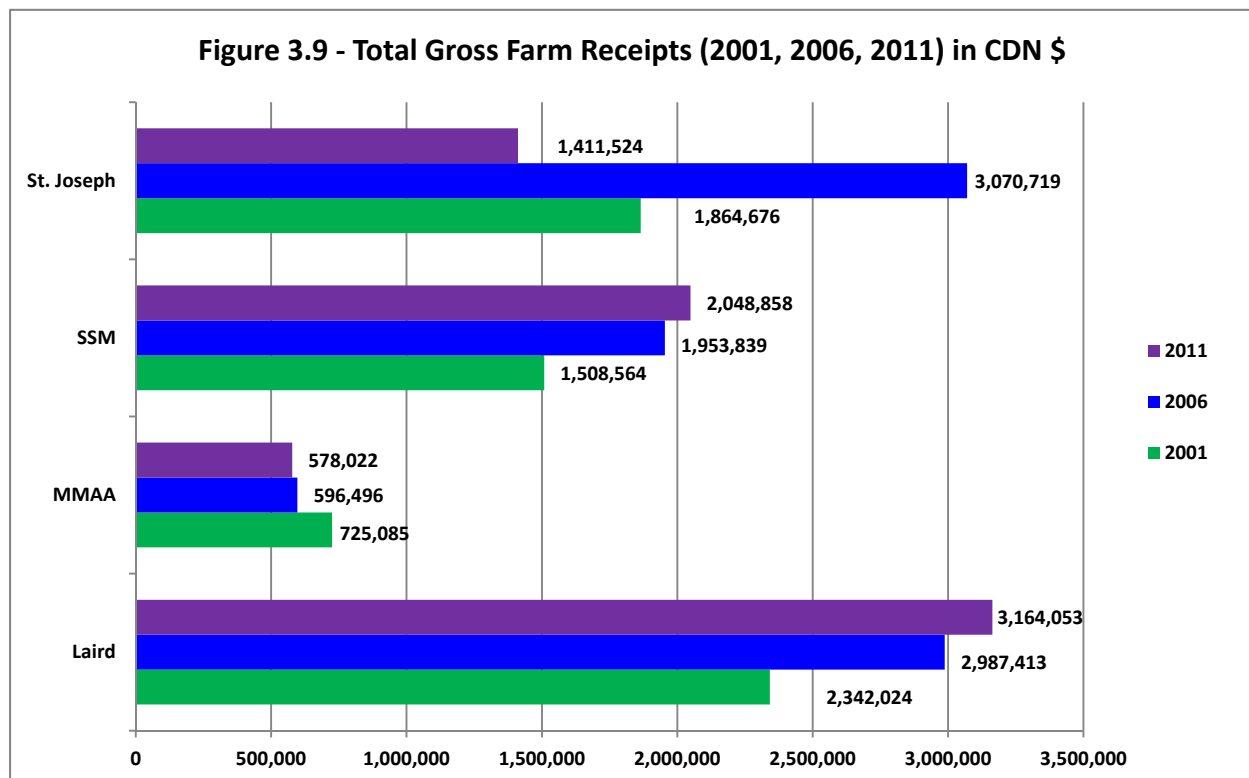


3.3. Total Gross Receipts

According to the Census questionnaire, 'gross farm receipts' are reported by calendar year or from the last completed fiscal year. Receipts from all agricultural products are included, in addition to any program payments. Farm capital sales (machinery, etc.) and receipts from the sale of any goods purchased only from retail sales are not included (Statistics Canada a, May 23, 2012). The reporting category of 'Gross Farm Sales' does not include forest products.

Figure 3.9 illustrates total gross farm receipts (in Canadian \$) reported for each census subdivision for each Census period. Some of the key findings include:

- Gross farm sales were highest in Laird for 2001 and 2011, despite a lower number of farms than Sault Ste. Marie and St. Joseph.
- Farms in St. Joseph reported the second highest gross farm sales in 2001 and the highest in 2006; however, this dropped below 2001 values by 2011, as did the number of farms.
- In Sault Ste. Marie, there was an increase of gross farm sales between 2001 and 2006, even though the number of farms fell by 10, and gross farm sales increased again between 2006 and 2011.
- MacDonald, Meredith and Aberdeen Additional generated the lowest amount of gross farm sales, and it decreased each time period, despite an increase in the number of farms each year.
- According to the Census data, most farms reported an income of under \$10,000, with some reporting \$10,000 to \$99,999. Farms that reported over \$99,999 were few for each Census Subdivision, aside from Laird. In Laird and St. Joseph, no farms reported over \$999,999 in income. In MacDonald, Meredith and Aberdeen Additional, no farms reported over \$249,999, which was the same for Sault Ste. Marie, aside from one farm that reported an income between one and two million dollars in 2006 only.



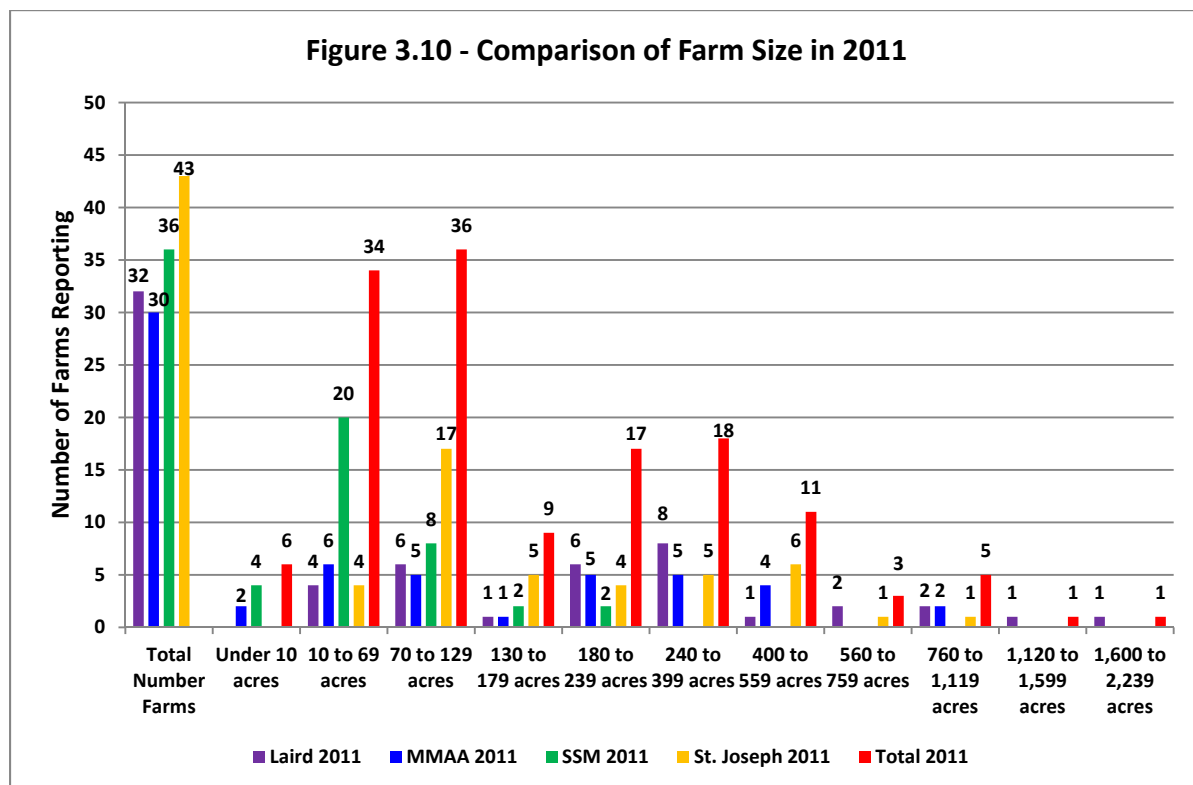
3.4. Farm Size

Farm size was summarized for each census subdivision, in order to characterize potential farming trends. The census subdivisions were compared for 2011 in order to observe differences between each census subdivision.

a. Farm Size for all Census Subdivisions

Figure 3.10 illustrates a comparison of farm size reported for each census subdivision in 2011. Some of the key findings include:

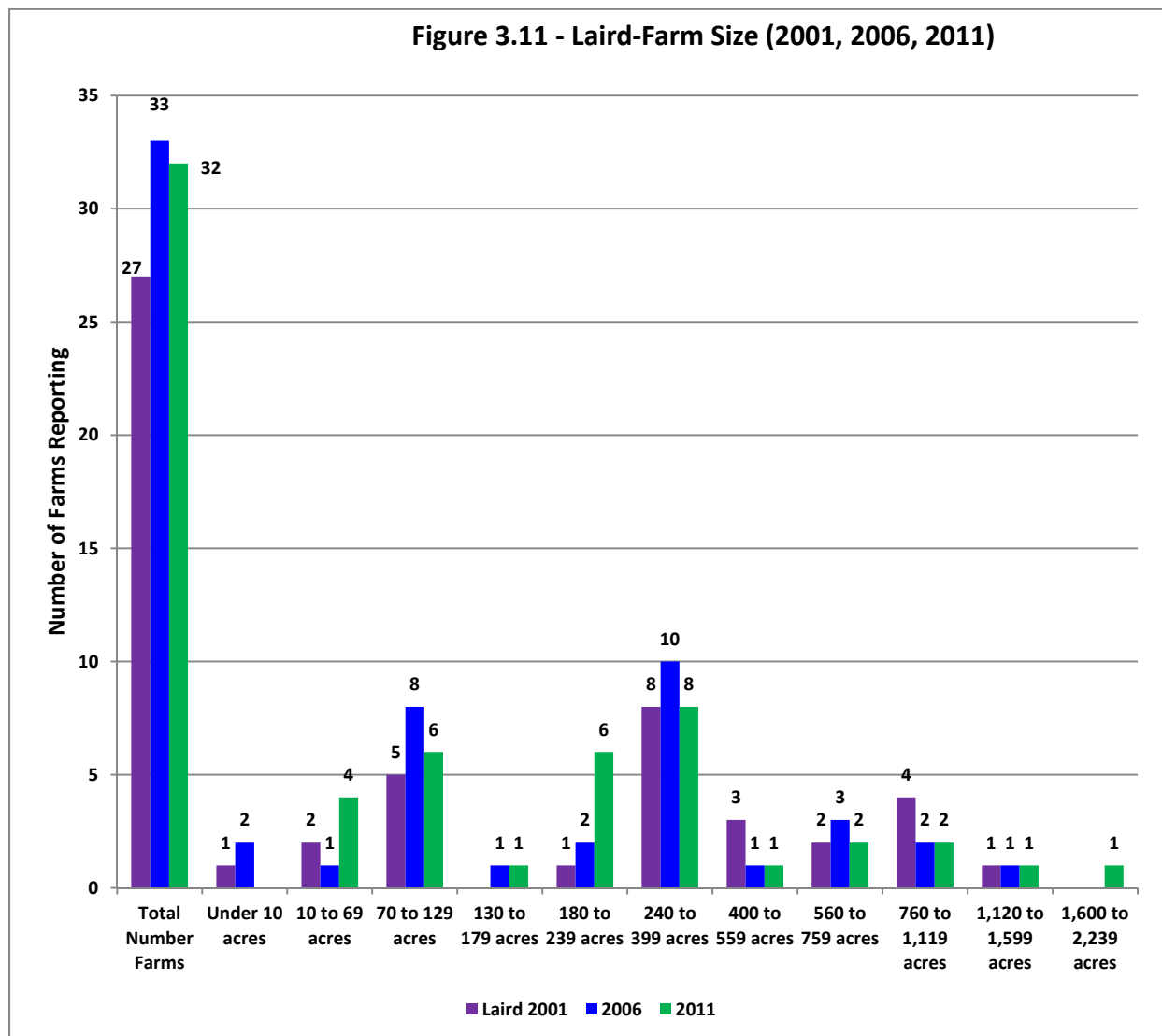
- Overall, the majority of farms reported an area of 10 acres to 399 acres. Some farms reported over 400 to 559 acres, and only a few farms reported over 560 acres. There were no farms that reported more than 2,239 acres.
- Only MacDonald and Sault Ste. Marie had farms that reported 'under 10 acres'.
- The biggest differences occurred in the 10 to 69 acre and 70 to 129 acre categories. Twenty farms in Sault Ste. Marie reported 10 to 69 acres, whereas in the other census subdivisions, that size was only reported by four to six farms.
- In the 70 to 129 acre category, 17 farms were reported in St. Joseph, and that size was only reported by five farms in MacDonald, six farms in Laird and eight farms in Sault Ste. Marie.
- Laird had the highest number of farms reporting in the 180 to 239 acre and 240 to 399 acre category, but by a much smaller difference.
- Laird and St. Joseph were the only census subdivisions that had farms report 560 to 759 acres, and Laird was the only census subdivision where a farm reported over 1,119 acres.



b. Farm Size in Laird

Figure 3.11 illustrates farm size reported in Laird for each Census period. Some of the key findings include:

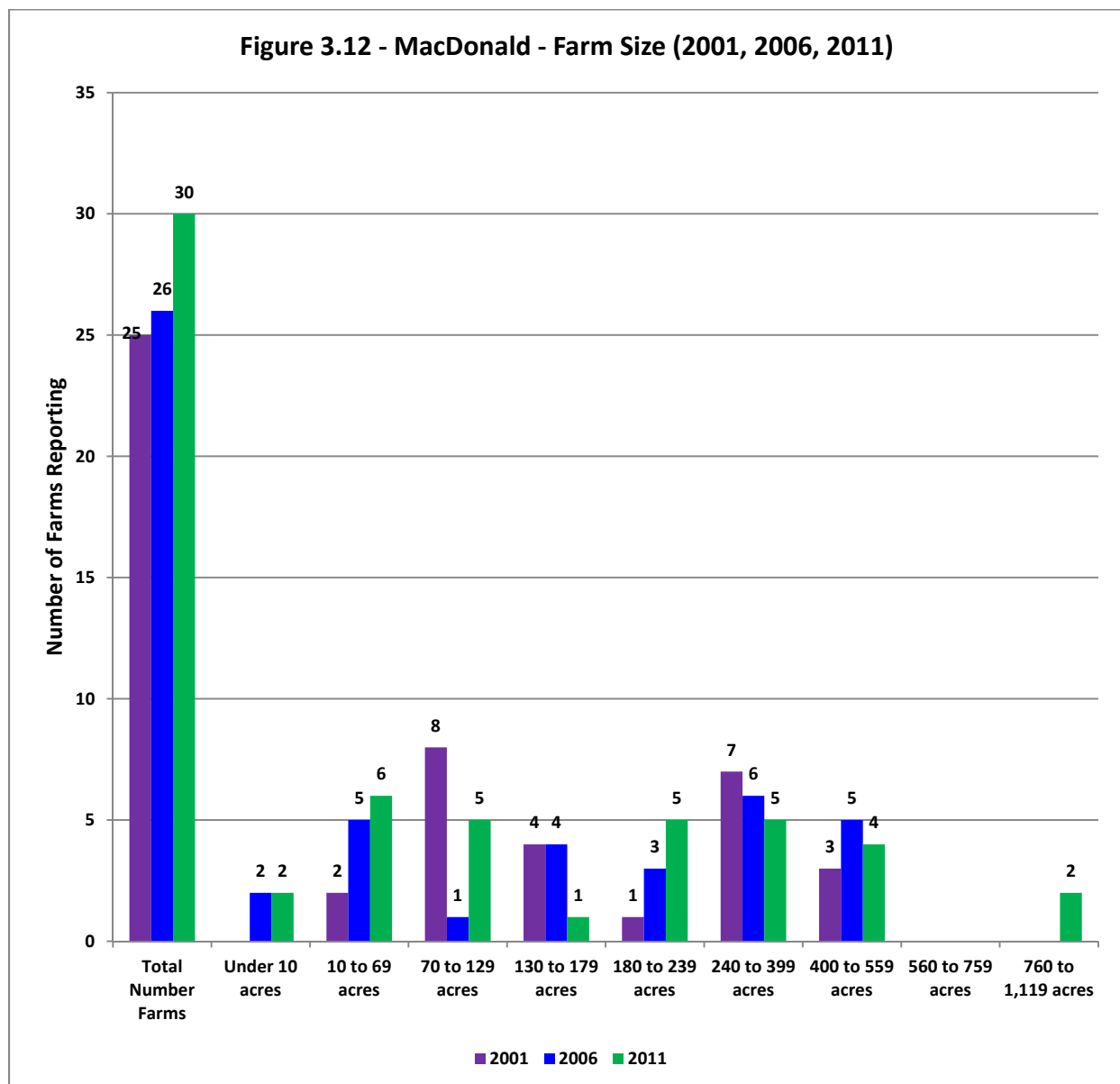
- Most farms were in the 240 to 399 acre category, followed by 70 to 129 acres.
- Only two farms were categorized as under 10 acres in 2006, and no farm reported this size category in 2011.
- Despite a fluctuation in 2006, the number of farms sized 10 to 69 acres increased between 2001 and 2011, and from 2006 to 2011, farms between 180 and 239 acres increased as well.
- No farms reported a size of 1,600 and 2,239 acres until 2011, and no farm reported over that acreage for any of the Census periods.
- For the other acreage categories, the number of farms ranged from one to four operations. Laird, which had a lower number of farms than Sault Ste. Marie and St. Joseph, had the largest farm size reported in 2011 of all the census subdivisions.



c. Farm Size in MacDonald, Meredith and Aberdeen Additional

Figure 3.12 illustrates farm size reported in MacDonald, Meredith and Aberdeen Additional for each Census period. Some of the key findings include:

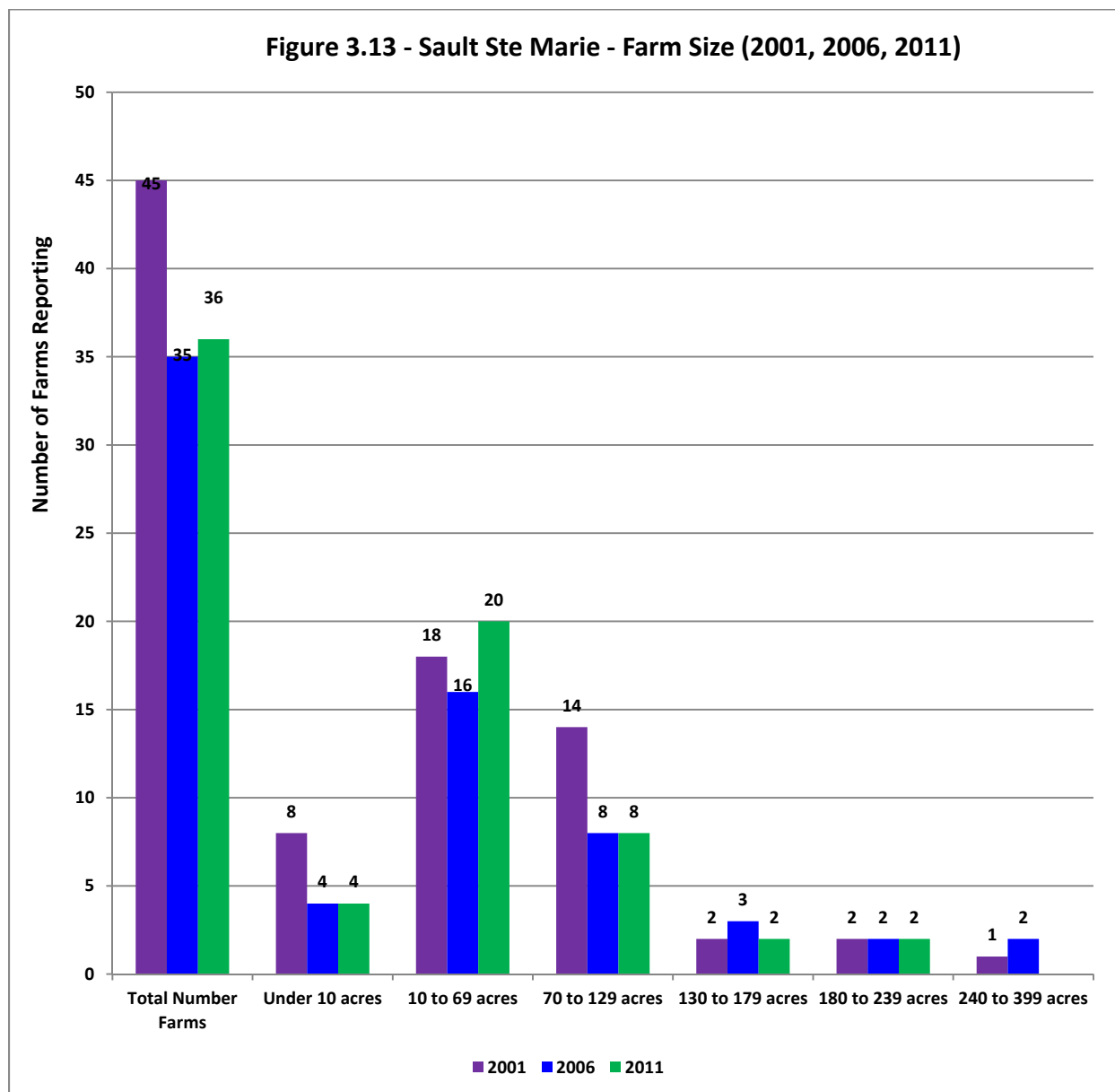
- The majority of farms reported acreage between 10 to 559 acres.
- There were no farms under 10 acres in 2001, but this increased in 2006.
- Farms reporting 10 and 69 acres increased during each Census period.
- Farms reporting 240 to 559 acres has decreased each year, and this is the only size category that showed a steady decline.
- No farms reported 560 to 759 acres; however, two farms reported 760 to 1,119 acres in 2011.
- No farms reported over 1,119 acres for any Census period.



d. Farm Size for Sault Ste. Marie

Figure 3.13 illustrates farm size reported in Sault Ste. Marie for each Census period. Some of the key findings include:

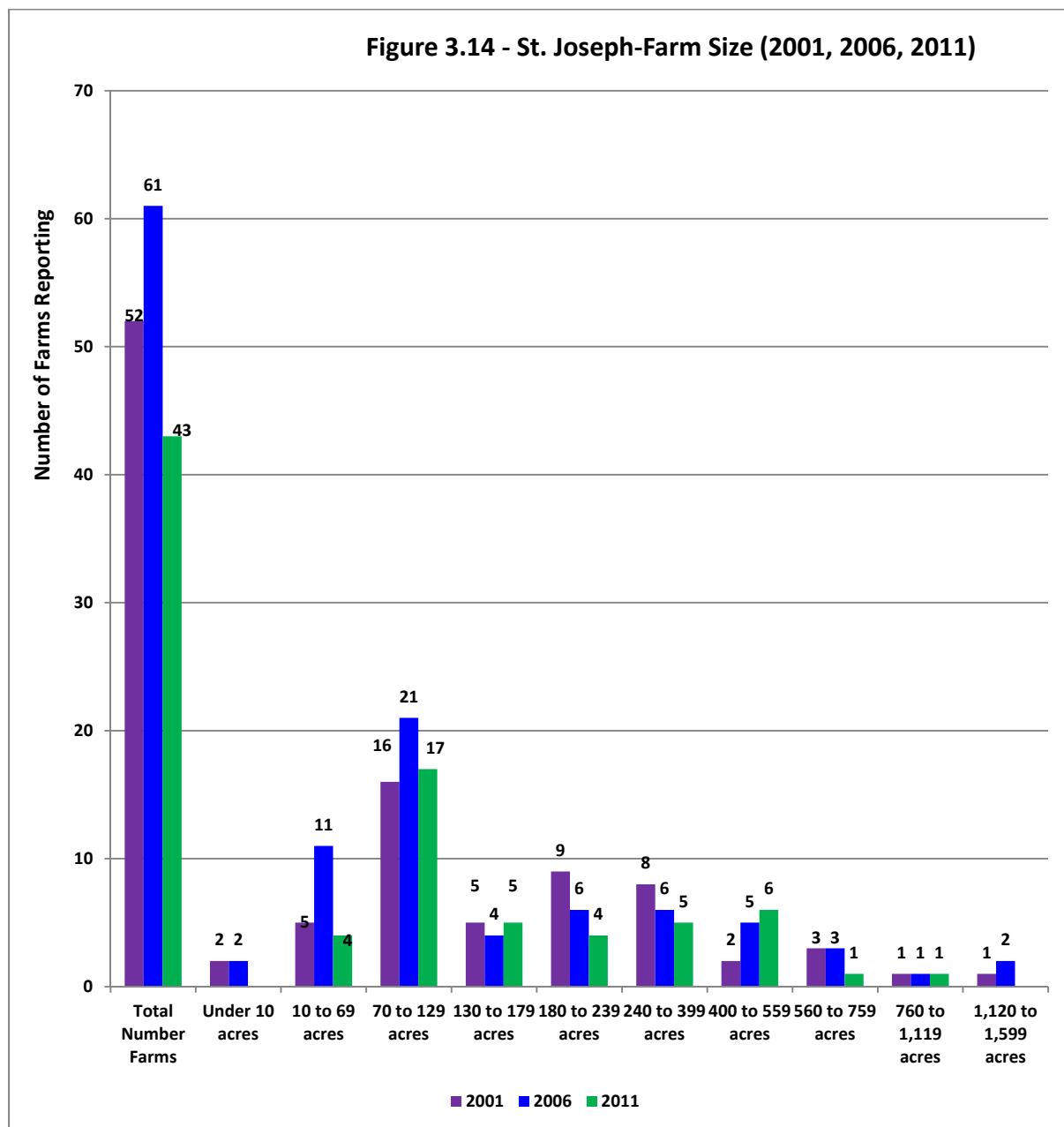
- In Sault Ste. Marie, where the second highest number of farms was reported, farm size was much smaller than the other census subdivisions, and no farm reported over 399 acres during any of the Census periods.
- The majority of farms reported 10 to 69 acres, followed by 70 to 129 acres.
- The number of farms between 180 and 239 acres remained the same each year.
- Farms reporting 240 to 299 acres increased in 2006, but declined to zero in 2011. By 2011, the largest farm was between 180 and 239 acres.



e. Farm Size in St. Joseph

Figure 3.14 illustrates farm size reported in St. Joseph for each Census period. Some of the key findings include:

- No farms reported an area over 1,599 acres, and by 2011, the largest farm was 760 to 1,119 acres. And farms on the island are located back from the river, for a 'buffer zone' (Trivers, 2014).
- The majority of farms were 70 to 129 acres, despite a decrease in 2011. Six farms reported 10 to 69 acres in 2006, but this declined to four farms by 2011.
- Farms between 400 to 559 acres increased between 2001 and 2011.
- All other farm categories, aside from farms reporting 130 to 179 acres and 760 to 1,119 acres, decreased in 2011.



3.5. Production Type

The following graphs are broken down by census subdivision to show the changes between each Census period. The graphs illustrate the number of farms reporting the category of production, and each bar is labelled with the number of acres that is under that type of production. Different crops can result in different impacts, and this information will help to quantify those impacts. In the Census questionnaire, types of production have been divided into the following categories:

- Cropland acres refers to the amount of land under crop production, but does not include areas under vegetable or fruit production.
- Summerfallow land refers to land that is not under production but where weeds are controlled through cultivation or chemical treatment. It may involve the application of herbicides.
- Tame or seeded pasture may involve the use of commercial fertilizer and/or herbicides.
- Natural land for pasture will have manure inputs from grazing animals which could impact water quality through runoff.
- Christmas tree area, wooded or wetland would have a beneficial impact, aside from Christmas tree areas that are amended with fertilizer and/or pesticides.
- Sod under cultivation for sale has the potential for commercial fertilizers and/or herbicides.
- Christmas trees grown for sale may involve the use of commercial fertilizers and/or various pesticides.
- Nursery products include ornamental plants, bulbs, vines, shrubs and trees and likely involve the use of chemical fertilizers and/or various pesticides.

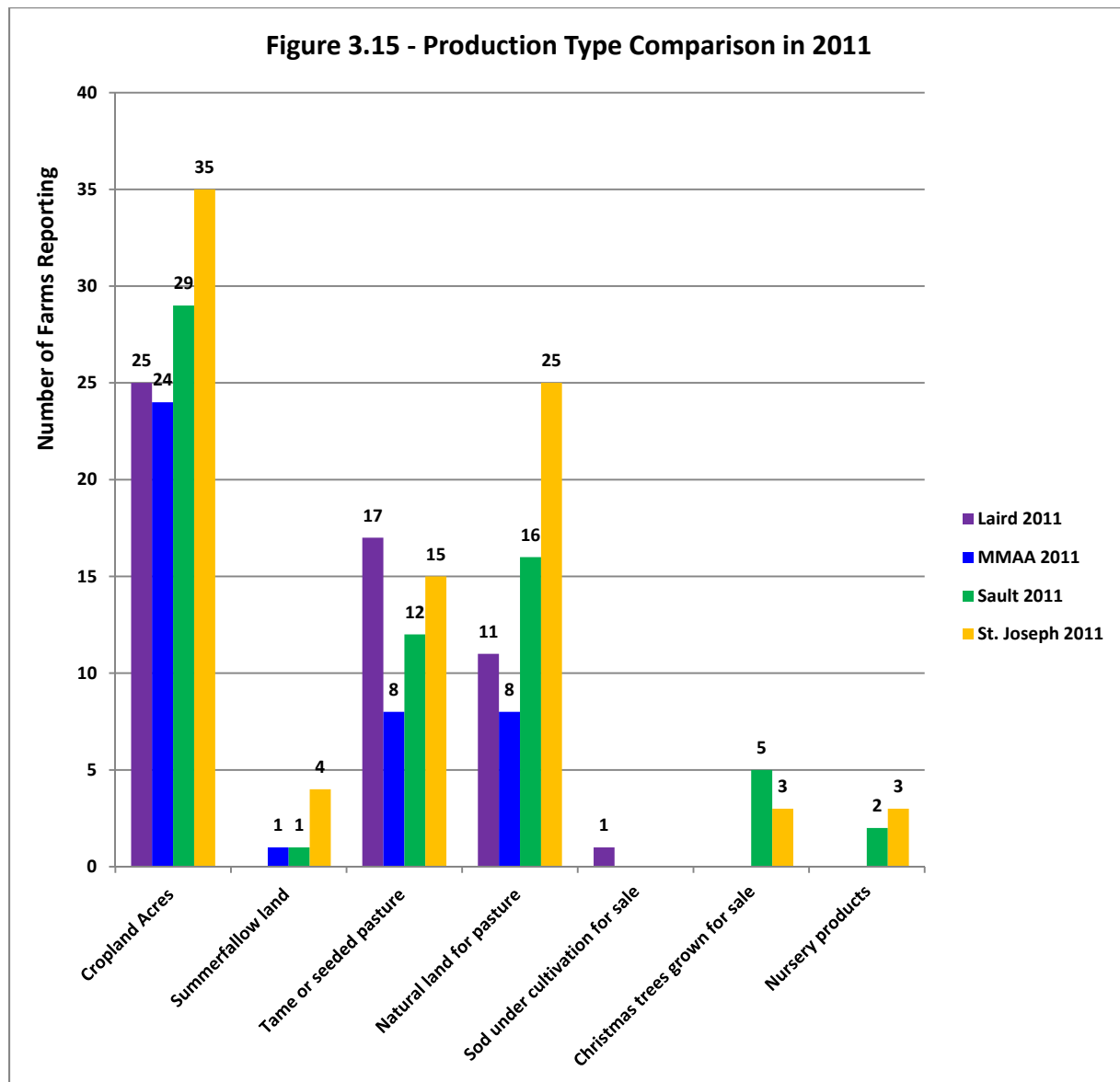
(Statistics Canada b, May 23, 2012).

For this section, Census data included both the number of farms reporting and the acreage; however, some of the acreage reported was listed as confidential. In this case, the bars are labelled with a small 'c' to indicate where this occurred.

a. Production Type for All Census Subdivisions

Figure 3.15 illustrates the number of farms reporting by type of production for Laird, Macdonald, Sault Ste. Marie and St. Joseph for 2011. Some of the key findings include:

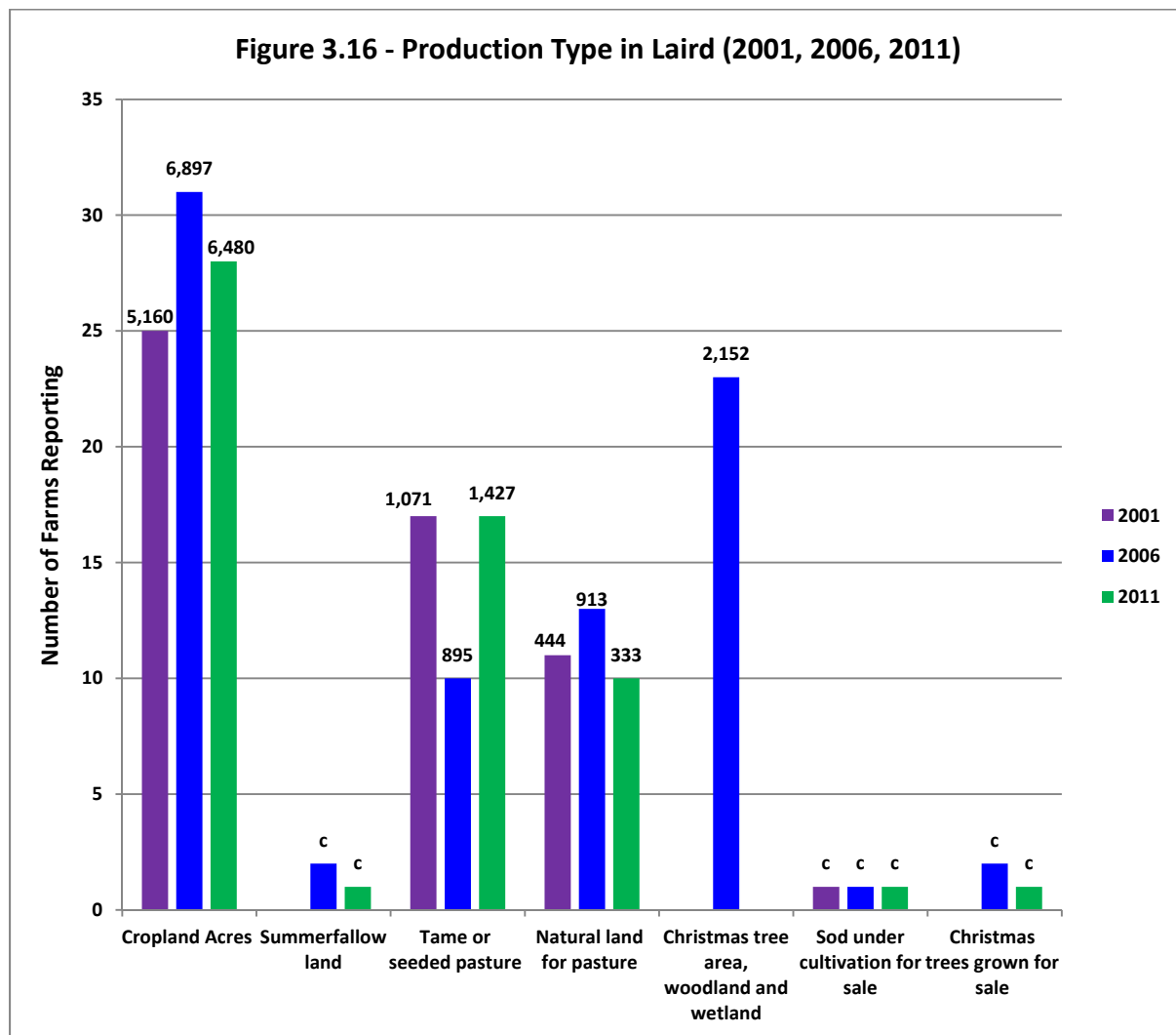
- The most common production type reported was cropland acres.
- Many farms also reported natural land for pasture and tame for seeded pasture.
- All other types of production (sod, Christmas trees and nursery products) were reported by five farms or fewer. In 2011, no farms in Laird reported summerfallow land, and it was the only census subdivision with one farm reporting the cultivation of sod for sale.
- Only Sault Ste. Marie and St. Joseph had farms reporting Christmas trees grown for sale and nursery products.



b. Production Type in Laird

Figure 3.16 illustrates production type and amount of acreage (on top of graph line) reported in Laird for the Census periods of 2001, 2006 and 2011. Some of the key findings include:

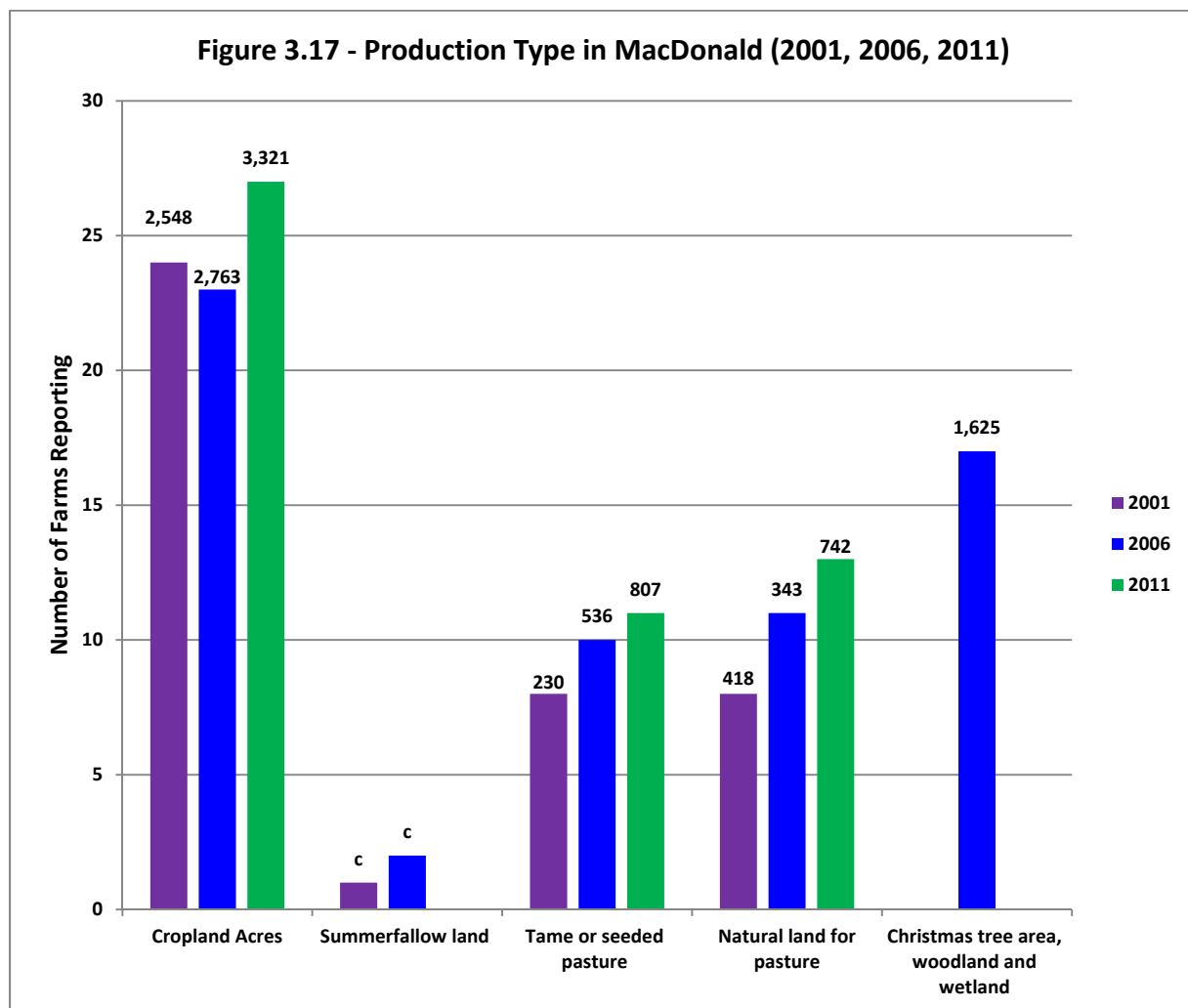
- Cropland acres was the highest reported type of production and greatest amount of acreage for each reporting period.
- The second highest production type was Christmas tree area, woodland and wetland; however, this information was only available for 2006.
- The third highest production type was for natural land for pasture and tame for seeded pasture.
- Farms reporting Christmas trees for sale or summerfallow land increased in 2006, and then decreased in 2011. The acreage was listed as confidential. No farms in Laird reported nursery products.
- Laird is the only census subdivision that had a farm listing sod under cultivation for sale, and that number remained the same over all reporting periods, although the acreage was listed as confidential.



c. Production Type in MacDonald, Meredith and Aberdeen Additional

Figure 3.17 illustrates production type and amount of acreage (in brackets) reported in MacDonald, Meredith and Aberdeen Additional for the Census periods of 2001, 2006 and 2011. Some of the key findings include:

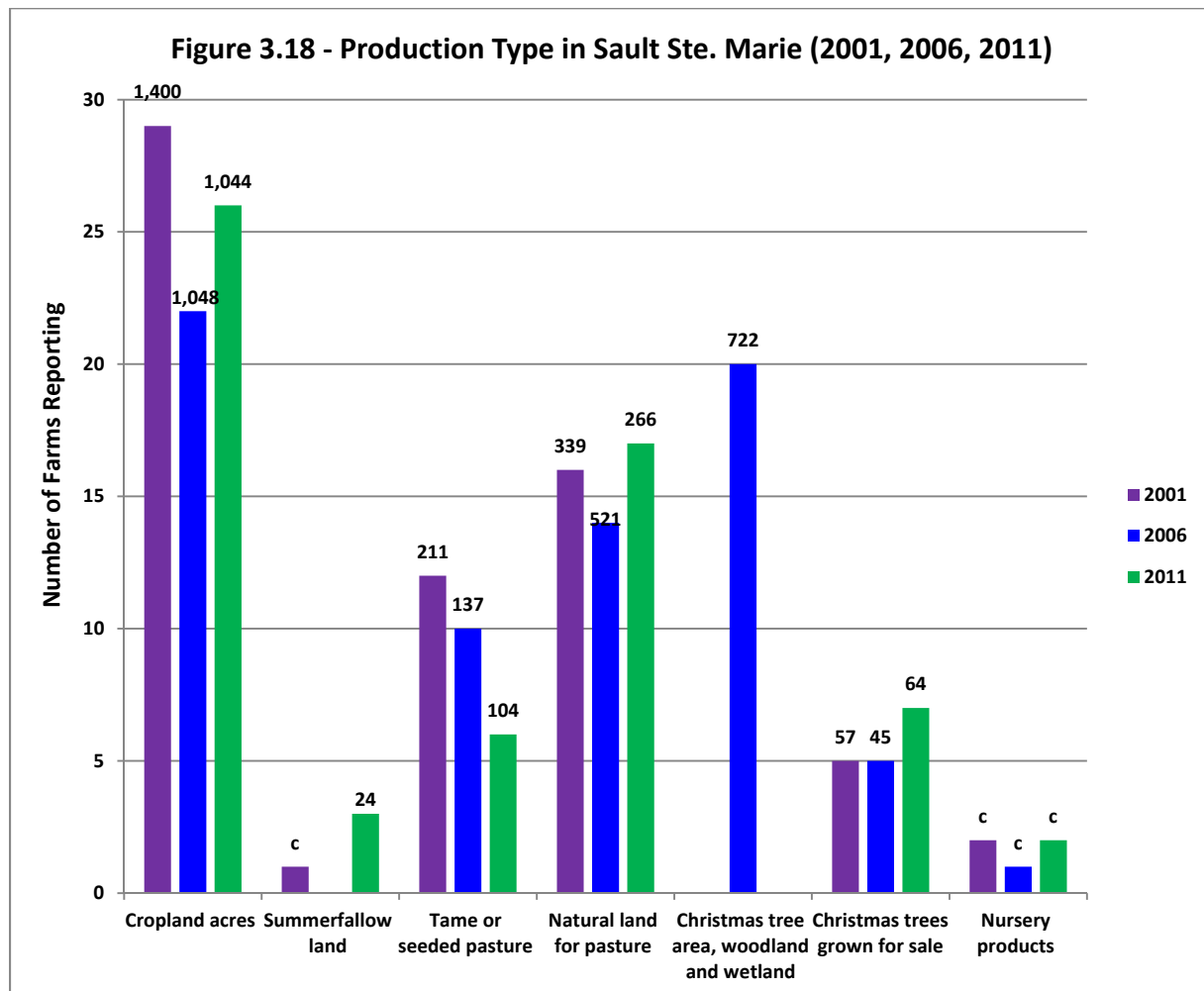
- Cropland acres was the highest type of production and greatest amount of acreage reported. Although the number of farms in MacDonald increased each Census period, the number of farms reporting cropland acres declined in 2006 but increased in 2011.
- Although MacDonald had significantly fewer farms and gross farm sales reported than the other census subdivisions, cropland acreage was higher in each year than in Sault Ste. Marie.
- Farms reporting tame or seeded pasture and natural land for pasture increased each year, as did the acreage.
- Seventeen farms reported Christmas tree area, woodland and wetland in 2006, but this data was not available in 2001 or 2011.
- No farms reported summerfallow land in 2011, and no farms reported sod cultivation for sale, Christmas trees grown for sale or nursery products for any Census period.



d. Production Type in Sault Ste. Marie

Figure 3.18 illustrates production type and amount of acreage (in brackets) reported in Sault Ste. Marie for the Census periods of 2001, 2006 and 2011. Some of the key findings include:

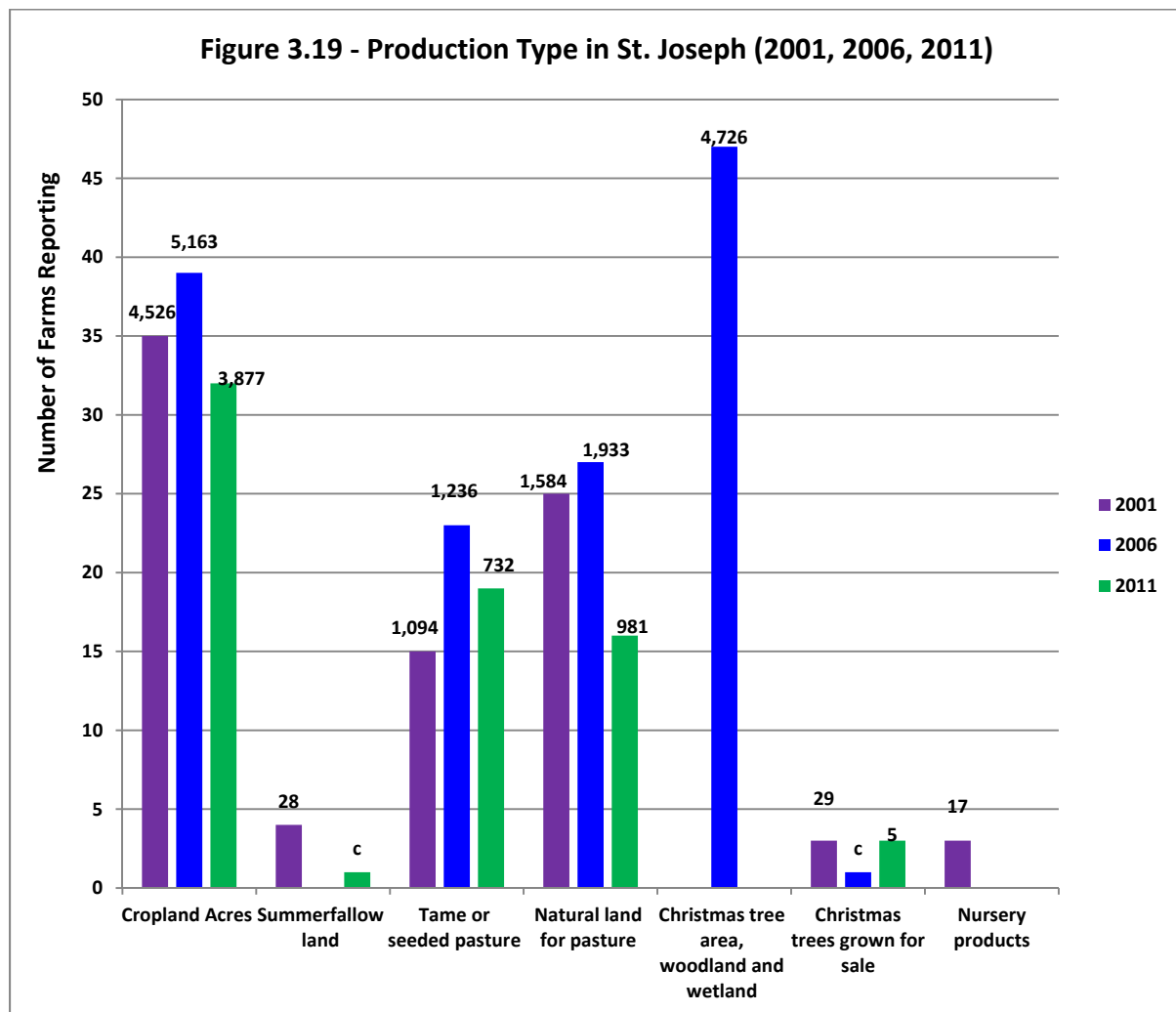
- Similar to the other Census Subdivisions, the highest production type and acreage reported was cropland acres, despite a fluctuation in 2006. Despite having a higher number of farms than Laird and MacDonald, Sault Ste. Marie had the least amount of acreage in cropland acres.
- The second highest production type was Christmas tree area, woodland and wetland; however, this information was only available for 2006.
- Despite fluctuations, many farms reported acreage for natural land for pasture and tame for seeded pasture, although farms reporting tame or seeded pasture declined each reporting period.
- No farms reported summerfallow land in 2006, but this increased to three farms in 2011 for a total of 24 acres.
- Despite fluctuations, farms growing nursery products and Christmas trees for sale increased in 2011.
- No farms in Sault Ste. Marie reported sod cultivation for sale.



e. Production Type in St. Joseph

Figure 3.19 illustrates production type and amount of acreage (in brackets) reported in St. Joseph for the Census periods of 2001, 2006 and 2011. Some of the key findings include:

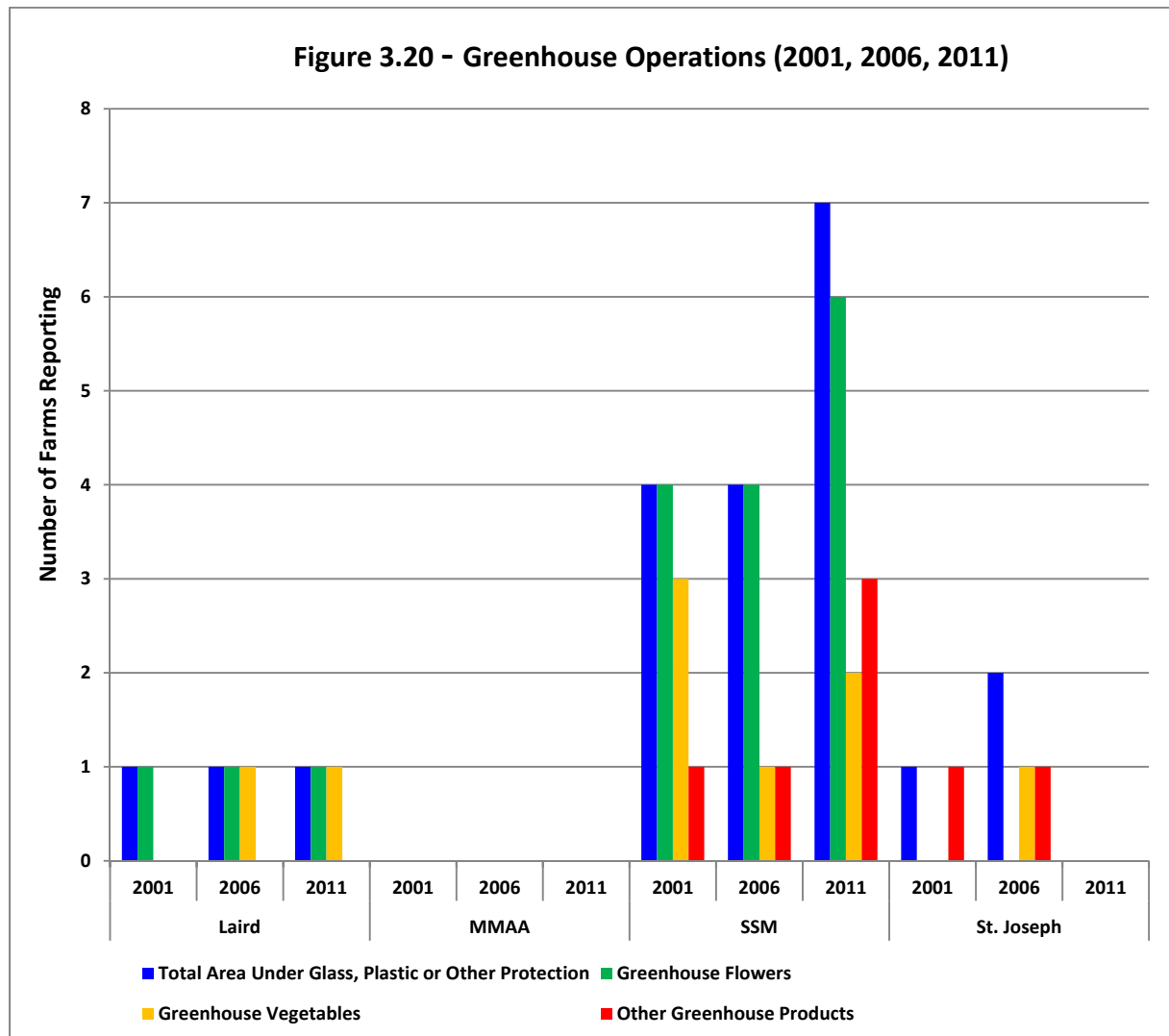
- The highest production type reported in St. Joseph was in 2006 when 47 farms reported Christmas tree area, woodland and wetland, although the acreage was less than what was reported for cropland acres.
- In 2001 and 2011, the highest number of farms reported cropland acres, and fluctuations of cropland acres corresponded with the total numbers of farms.
- Similar to the other census subdivisions, many farms reported natural land for pasture and tame or seeded pasture, despite declines in both categories in 2011.
- Although the number of farms that reported growing Christmas trees for sale did decrease by a large number between 2001 and 2011, the amount of acreage declined from 29 acres to five acres by 2011.
- Three farms reported nursery products in 2001 which fell to zero by 2006.
- No farms in St. Joseph reported sod cultivation for sale.



3.6. Greenhouse Operations

Figure 3.20 illustrates the type of greenhouse operations reported by each census subdivision for the Census reporting periods of 2001, 2006 and 2011. 'Other greenhouse products' include cuttings, tree seedlings and more. (Statistics Canada a, May 23, 2012). Some of the key findings include:

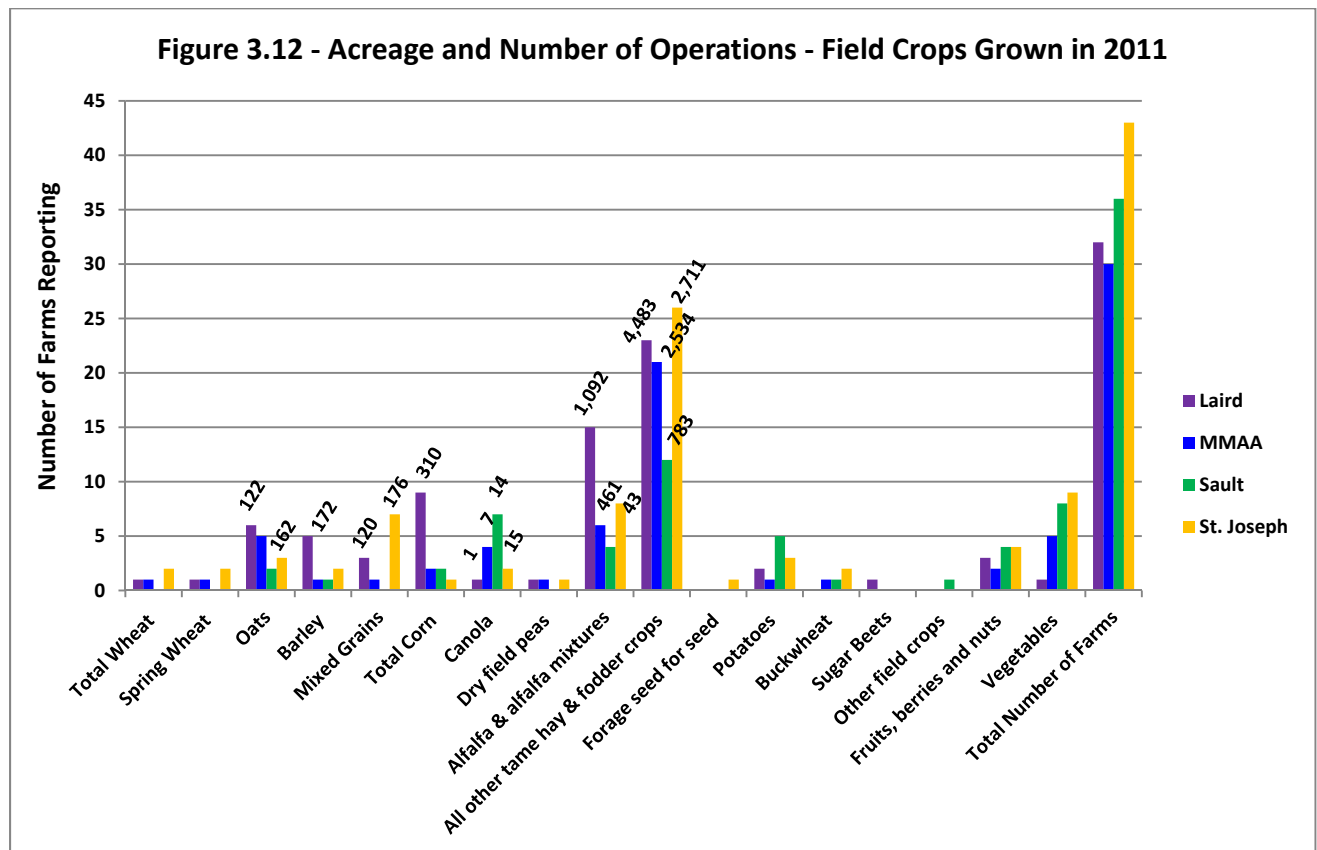
- Sault Ste. Marie had the highest number of farms reporting greenhouse production, followed by St. Joseph and then Laird. There were no farms in MacDonald, Meredith and Aberdeen Additional that reported greenhouse operations.
- In Laird, there was only one farm that reported any greenhouse production, which consisted of greenhouse flowers and vegetables.
- In Sault Ste. Marie, the number of farms reporting greenhouse production increased between 2006 and 2011.
- In St. Joseph, one farm reported greenhouse production in 2001 which was categorized as 'other' greenhouse products, and in 2006, there were two farms that reported greenhouse productions, one as vegetables and one as 'other'. By 2011, no farms reported greenhouse production.



3.7. Field Crops

Figure 3.21 illustrates the type field crops grown by each census subdivision in 2011, the number of farms that reported growing it and for some, the amount of acreage that was grown. Field crops were divided into various types of grain, vegetables, fruit and other cash crops, such as sugar beets. On the graph, acreage is only listed for major field crops grown, such as alfalfa, tame, mixed grains and others. For crops such as sugar beets, potatoes, wheat and others, the amount of acreage grown was less than 10 acres and was not listed. All field crops could be subject to fertilizer or pesticide inputs, depending on the season and farm situation. Some of the key findings include:

- The crop reported by the greatest number of farms and grown in the greatest quantity for all census subdivisions was ‘all other tame hay and fodder crops’.
- Although more farms in St. Joseph reported ‘all other tame hay and fodder crops’, farms in Laird reported growing a greater number of acres.
- Alfalfa and alfalfa mixtures was grown by many farms and on a greater scale in Laird and MacDonald.
- ‘All other tame hay and fodder crops’ and alfalfa and alfalfa mixtures are both grown for livestock. Oats, barley and mixed grains may be used for either livestock or human consumption, and those were grown at a larger scale than other crops produced solely for human consumption, such as fruit, berries, nuts and potatoes.
- Total corn included both feed corn for animals and sweet corn for humans.



3.8. Vegetable and Fruit Crops Grown

a. Types of Vegetable Crops Grown

Figure 3.13 illustrates the number of farms reporting various types of vegetable crops grown each Census period by census subdivision. The Census glossary defines “other vegetables” as herbs, rhubarb, melons, garlic, gourds and others. Crops such as sweet corn, broccoli, cauliflower and cabbage are heavy feeders and may require greater amounts of fertilizer than crops such as radishes, beets, lettuce and asparagus. Crops such as green peas and green and wax beans can help to fix nitrogen in the soil, which could reduce the use of fertilizer. Types of vegetables grown each year would fluctuate quite frequently and not necessarily reflect any trends despite changes in numbers. Some of the key findings include:

Figure 3.13 - Number of Farms Growing Vegetable Crops (2001, 2006, 2011)

Type of Vegetable Crop Grown	Laird			MMAA			Sault St. Marie			St. Joseph		
	2001	2006	2011	2001	2006	2011	2001	2006	2011	2001	2006	2011
Sweet Corn	0	2	1	3	3	4	3	6	3	5	5	7
Tomatoes	0	2	1	0	1	0	2	4	4	5	2	3
Cucumbers	0	2	1	1	2	1	0	3	4	5	2	3
Green Peas	0	2	1	1	2	1	2	2	3	4	2	2
Green & Wax Beans	0	2	1	0	2	2	3	2	5	5	2	2
Cabbage	0	1	1	0	1	1	1	1	2	3	1	3
Cauliflower	0	1	1	0	0	0	0	0	1	3	1	3
Broccoli	0	1	1	0	0	0	1	0	2	3	1	3
Carrots	0	1	0	1	2	1	3	1	5	4	2	3
Rutabagas & Turnips	0	0	0	0	2	1	0	0	1	1	1	3
Beets	0	0	1	1	2	1	3	1	4	3	2	2
Radishes	0	0	0	1	2	0	0	0	1	2	0	2
Shallots	0	2	0	0	1	0	1	0	2	4	0	1
Dried Onions	0	1	1	1	2	1	1	2	1	2	2	2
Celery	0	0	0	0	0	0	0	0	0	2	0	1
Lettuce	0	2	1	0	1	0	0	1	1	2	0	2
Spinach	0	0	0	0	0	0	2	0	1	0	0	1
Peppers	0	2	0	0	0	0	0	0	1	1	0	1
Pumpkin, Squash and Zucchini	0	2	2	1	3	3	3	3	6	4	4	4
Asparagus, Producing	0	0	0	0	0	0	0	0	0	0	1	1
Other Vegetables	0	0	0	1	0	0	1	3	4	2	2	3

Some of the key findings include:

- Farms in St. Joseph and Sault Ste. Marie grew the greatest diversity of crops, more than double than Laird and MacDonald, Meredith and Aberdeen Additional.
- The number of types of vegetable crops that farm operators grew increased in every census subdivision, except St. Joseph.
- Overall, there were not many farms reporting vegetable crops in comparison to the total number of farms, and no census subdivision had more than seven farms reporting one crop.

- For Laird, the total acreage of vegetables and the total acreage of sweet corn grown were reported as zero in 2001 and as confidential in 2006 and 2011. In MacDonald, the total amount of acreage of vegetables declined each year, from 20 acres in 2001 to 12 acres in 2011.
- Total acreage of sweet corn was listed as eight acres in 2006 and confidential in 2001 and 2011.
- In Sault Ste. Marie, total acreage of vegetables increased each reporting period, and almost tripled between 2001 and 2011, to 31 acres. The total acreage of sweet corn grown fluctuated between six and eight acres.
- In both St. Joseph, the total acreage of vegetables and total acreage of sweet corn increased significantly between 2006 and 2011. In 2011, 81 acres of vegetables were grown, of which 64 acres was sweet corn. This would have had the highest potential impact out of all the census subdivisions.

b. Types of Fruit Crops Grown

Figure 3.14 illustrates the number of farms reporting various types of fruit crops grown each Census period, by Census Subdivision. The Census glossary defines “other fruits, berries and nuts” as nectarines, currants, blackberries, hazelnuts and more (Statistics Canada a, May 23, 2012). Fruit such as apples, plums and prunes, pears, strawberries and cherries are often more heavily sprayed with pesticides than vegetables. These crops can be prone to insects and disease and can be difficult to grow organically.

Some of the key findings include:

- There are very few fruit crops reported in any of the census subdivisions.
- In 2011, farms in St. Joseph reported growing all of the types of fruit listed, although each fruit was grown by only one to four farms.
- For the other census subdivisions, fewer farms reported growing fruit and less variety was grown.

Figure 3.14 - Number of Farms Growing Fruit Crops (2001, 2006, 2011)

	Laird			MMAA			Sault Ste. Marie			St. Joseph		
	2001	2006	2011	2001	2006	2011	2001	2006	2011	2001	2006	2011
Apples	0	1	1	0	0	1	1	0	0	2	1	4
Plums and prunes	0	0	0	0	0	1	0	0	1	0	0	1
Strawberries	0	3	3	0	2	1	0	3	2	1	2	3
Raspberries	0	0	1	0	0	2	1	1	1	3	2	3
Pears total area	0	0	0	0	0	0	0	0	0	0	0	1
Cherries (sweet)	0	0	0	0	0	0	0	1	0	0	0	1
Cherries (sour)	0	0	0	0	0	0	0	1	0	0	0	1
Cranberries	0	0	0	0	0	0	0	0	0	1	0	1
Blueberries	0	0	0	0	0	0	0	0	1	2	0	2
Other fruits, berries and nuts	0	0	1	0	0	0	x	0	2	x	0	1
TOTAL	0	4	5	0	2	5	2	6	7	9	5	18

3.9. Livestock

The types of livestock and number of farms keeping livestock help to give an indication of potential impacts on water quality, in regards to nutrient management, and potentially stream and wetland crossings.

According to the Census questionnaire, 'total sheep and lambs' included rams, ewes and lambs, and 'total pigs' included boars, sows, gilts for breeding, weaner pigs, nursing pigs and grower and finishing pigs. 'Total cattle and calves' included dairy cows, beef cows, calves, steers, heifers and bulls. The Census changed in May of 2011 for poultry, and as of that date, poultry included any birds that were grown under contract, despite ownership. It included birds grown for sale and for personal use, but it did not include any that were kept at another operation. The Census questionnaire defines 'total hens and chickens' as laying hens, meat birds and breeding stock of various ages.

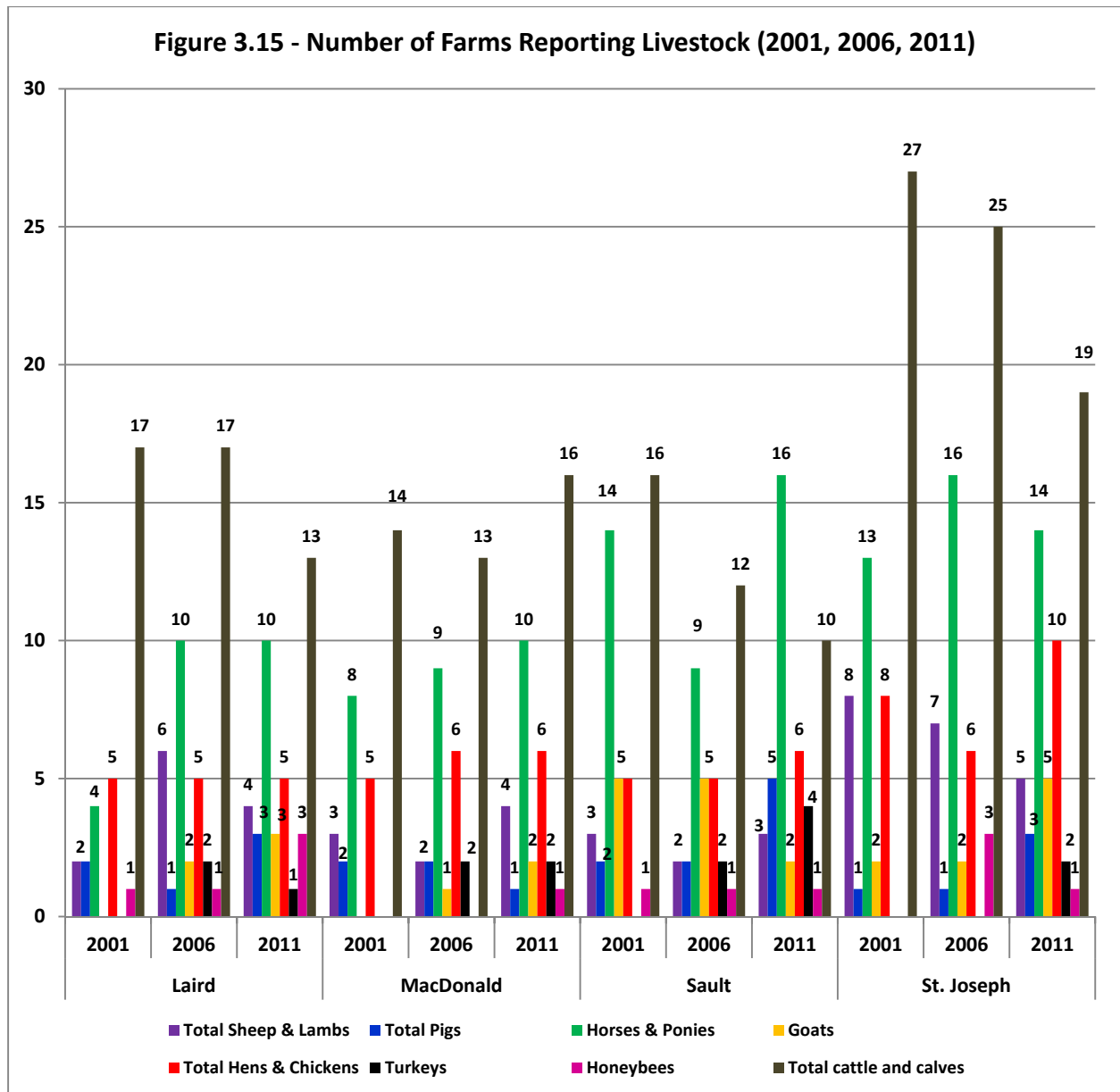
With livestock production there were many fluctuations in different categories. Fluctuations could be due to number of young raised each year, losses over the year and other factors, in addition to market influences. Between 2001 and 2006, there were major changes in the cattle and calf industry due to Bovine Spongiform Encephalopathy (BSE). The cattle and beef industry had been expanding, and the discovery of BSE in an Albertan cow caused 34 countries to close their borders to Canadian beef. This led to an increase in domestic supply and a sudden reduction in price, causing a crash in the domestic beef industry (LeRoy, 2006).

In addition to market fluctuations, there are certain marketing board regulations for selling meat, which directly influences the number of farms in production. For example, the Chicken Marketing Board has a quota system in place where to raise and sell chickens, the operator must purchase a quota and produce 14,000 units (minimum 90,000 birds per year). That quota costs 1.75 million dollars to purchase, and there have been no new quotas sold to farmers in Northern Ontario. This means all of the major chicken producers are located in Southern Ontario. Without a quota, operators are limited to raising no more than 300 meat birds or 100 laying hens each year, and they are not permitted to sell that meat unless it is from their farmgate. This quota system has had a huge influence on why there are no large poultry farms in the north, in comparison with Southern Ontario (Canadian Farmers of Ontario, 2013).

a. Number of Farms Reporting Livestock

Figure 3.15 illustrates the number of farms reporting livestock and honeybee colonies for each census subdivisions during the Census periods of 2001, 2006 and 2011. Some of the key findings include:

- Overall for each census subdivision, there has been an increase in the diversity of animals reported by farms for all reporting periods. In 2001, there was not one census subdivision that reported all types of livestock, and by 2011, all types of livestock were being reported by each one, including colonies of honeybees.
- Cattle and calves was the highest reported type of livestock in all census subdivisions for each reporting period, except for Sault Ste. Marie in 2011 when number of farms reporting cattle and calves declined and the number reporting horses and ponies increased.
- Horses and ponies were the second highest reported type of livestock for all census subdivisions for all Census reporting periods, aside from Laird in 2001.



- Many farms reported raising hens and chickens; however, the number of farms did not surpass 10 for any census subdivision. St. Joseph had the highest number of farms reporting sheep and lambs, although the number of farms reporting did not exceed eight. Laird also had more farms reporting sheep and lambs, but not as many as St. Joseph, and the numbers of farms reporting sheep and lambs decreased between 2006 and 2011.
- For other types of livestock (goats, pigs, turkeys and honeybee colonies), for all census subdivisions and reporting periods, there were no more than five farms that reported having them.
- The number of farms reporting cattle and calves declined each year for each census subdivision except in MacDonald, where there was an increase in reports from 2006 to 2011.
 - Most farms in MacDonald are small; however, there are two larger beef farms that could potentially have a larger impact than the other farms. The one beef farm has existed for years and has always had a minimum of 100 animals. Impacts would not necessarily have

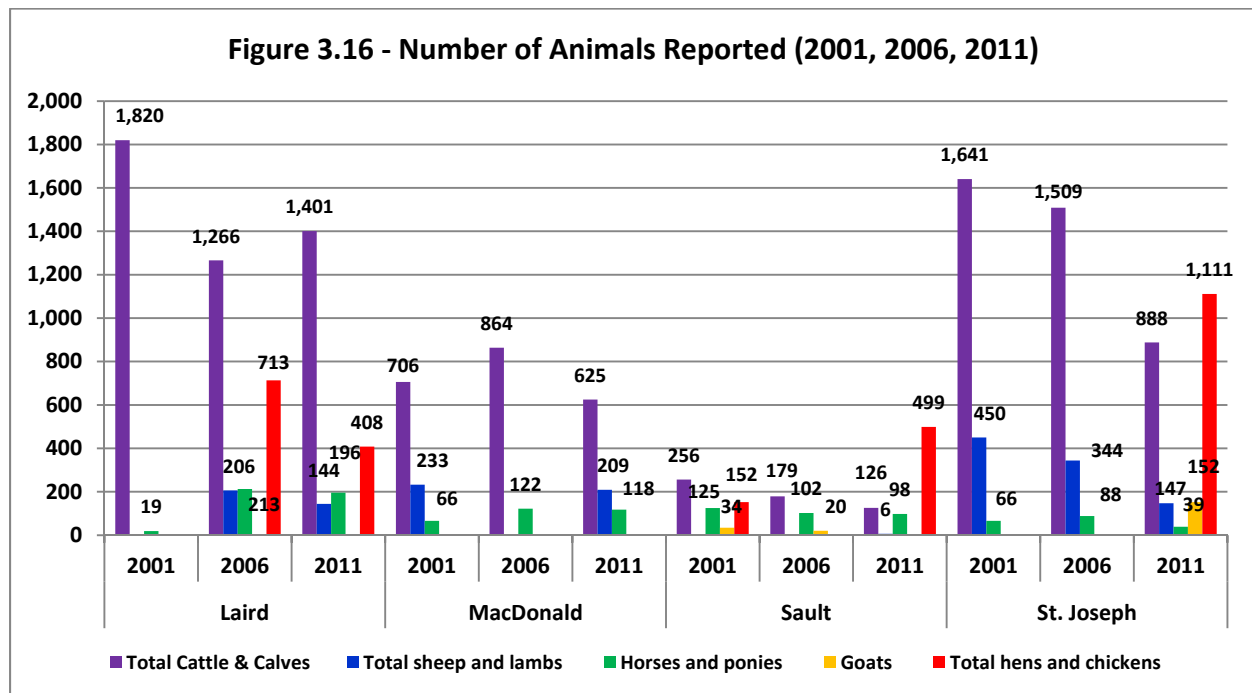
changed over time, but out of all the farms in the area, it would have a bigger impact than the others, due to the location on Echo Bay and the number of animals (Township of MacDonald, Meredith and Aberdeen Additional, 2014).

- The other farm has a cowherd of 80, and it is a grazing operation (grass-fed beef). The number of dairy farms in the area has dramatically declined, with only three in St. Joseph (one is located in Jocelyn Township) and four in Laird, one of which is located in Tarbutt and Tarbutt Additional (David Trivers, 2014).
- The number of farms reporting horses and ponies remained fairly stable, and increased in most census subdivisions but St. Joseph, where numbers declined in 2011.
- The number of farms reporting hens and chickens remained stable in Laird and increased in all other census subdivisions.
- The number of farms reporting sheep and lambs declined in Laird and St. Joseph but increased in MacDonald and Sault Ste. Marie by 2011.
- The number of farms reporting pigs decreased slightly in Laird and MacDonald but increased in Sault Ste. Marie and St. Joseph.
- There was one large hog operation in MacDonald, Meredith and Aberdeen Additional, but it has shut down. Most hog farming is now smaller, backyard operations (David Trivers, 2014).
- The number of farms raising goats increased in all census subdivisions except for Sault Ste. Marie. In general, turkeys and honeybees were the least reported.

b. Number of Animals Reported

Figure 3.16 illustrates the number of animals reported by farms in each census subdivision during the Census periods of 2001, 2006 and 2011. For many types of animals, the number was listed as confidential in the data. Pigs and turkeys were listed as confidential for most years, aside from Sault Ste. Marie in 2011, when 32 pigs and 48 turkeys were reported. Due to the lack of data, they are not included in Figure 3.16. Some of the key findings include:

- St. Joseph and Laird reported the highest numbers of animals reported. However, in general, aside from numbers of cattle and calves, the number of animals reported was quite low. Aside from cattle/calves and hens/chickens, the number of animals reported did not surpass 450.
- Laird and St. Joseph reported the highest number of cattle and calves, although numbers in St. Joseph declined during the reporting period.
- Sault Ste. Marie had the fewest cattle and calves in comparison to the other census subdivisions, and those numbers declined each reporting period.
- For all census subdivisions in each Census period but St. Joseph in 2011, farms reported more cattle and calves than all other types of livestock.
- Hens and chickens were the second highest type of livestock reported in Laird and Sault Ste. Marie and the highest for St. Joseph in 2011. The numbers of hens and chickens were listed as confidential for each year in MacDonald, and in all other years where they are not illustrated on the graph.
- The number of goats was listed as confidential for each census subdivision, aside from Sault in 2001 and 2006, where there were 34 and 20 animals, respectively, and St. Joseph in 2011 with 152 goats reported. The number of sheep and lambs was listed as confidential for Laird in 2011, MacDonald in 2006 and Sault Ste. Marie in 2001 and 2006.



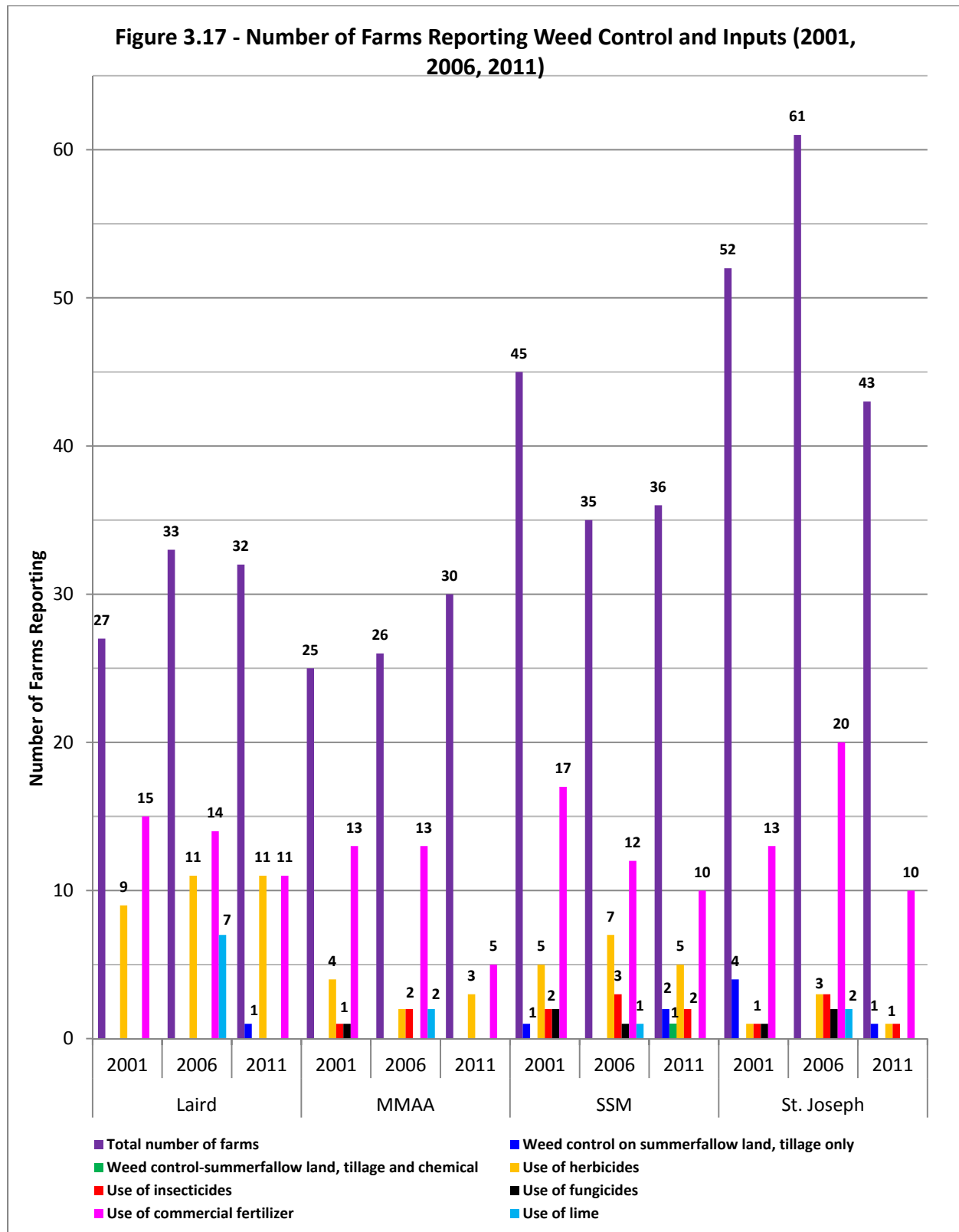
3.10. Land Management

There are many farm practices that could have impacts on water quality, both negative and positive. Some of those practices include weed and pest control, soil amendments, tillage practices, manure management and conservation practices. Using tillage only would mitigate risks from chemical use; however, it may still impact soil erosion and runoff.

a. Number of Farms Reporting Weed Control and Inputs

Figure 3.17 illustrates the number of farms reporting weed control and inputs for all census subdivisions. Weed control on summerfallow land would fluctuate depending on crop and grazing rotation and may not be as closely tied to the fluctuation in numbers of farms. Commercial fertilizer and herbicide use would be more commonly used, whereas the use of insecticides and fungicides would likely be tied to a specific pest or disease in that particular season and may only be used once over a number of years, depending on the situation. The most common type of herbicide used is Glyphosate (used on grain), followed by MCPA 300 and sometimes MCPA 500. Ambutox and Cobutox are also used. Most corn and soybean crops are 'Roundup Ready' (David Trivers, 2014). Some of the key findings include:

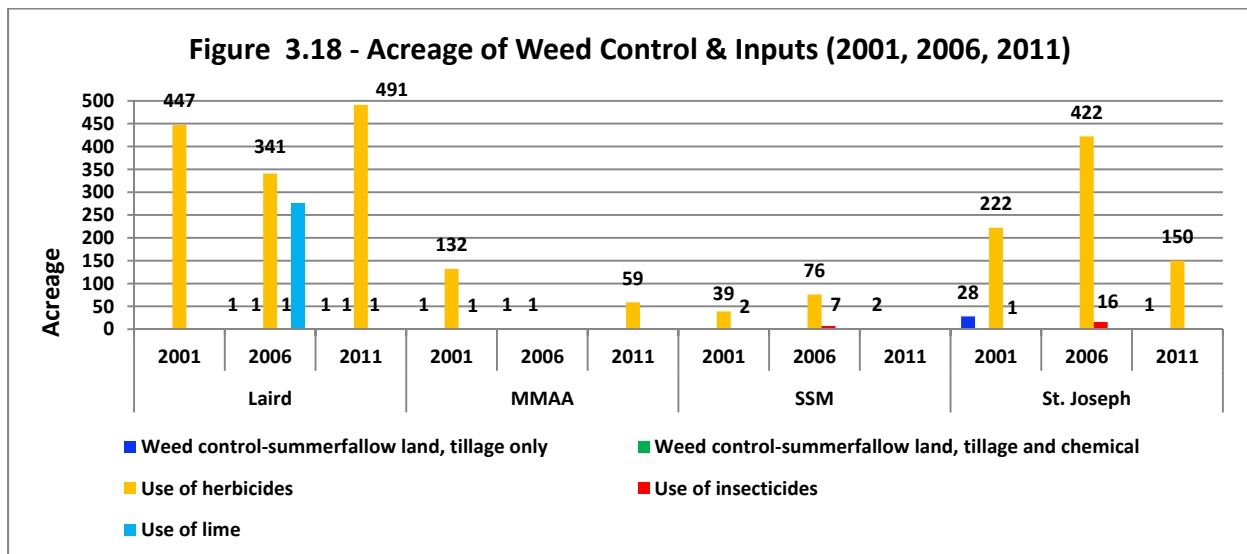
- Commercial fertilizer was the input used by the highest number of farms, followed by the use of herbicides.
 - The number of farms reporting the use of commercial fertilizer decreased for each census subdivision between 2001 and 2011.
 - In 2001, more farms in Sault Ste. Marie used commercial fertilizer, and in 2006 and 2011, more farms in Laird used commercial fertilizer than in the other census subdivisions.
- Herbicide use was the highest in Laird each year, followed by Sault Ste. Marie.
 - The number of farms using herbicide in MacDonald, Meredith and Aberdeen Additional fluctuated between 4 to 3 from 2001 and 2011. In St. Joseph, fluctuations in farms reporting herbicide use followed the fluctuations in the number of farms.
 - Despite having the greatest number of farms, St. Joseph had the fewest number of farms reporting herbicide use, fluctuating from one farm in 2001 to three in 2006 and back to one farm in 2011. And farms on the island are located back from the river, which create a 'buffer zone' (Trivers, 2014).
 - Very few farms reported using insecticide, fungicide or lime.
 - The number of farms reporting insecticide use did not exceed three farms, and fungicide use did not exceed two farms or any census subdivision during any reporting period.
 - Insecticides and fungicides were used during more Census periods in Sault Ste. Marie and St. Joseph.
 - No farms in Laird reported using insecticides or fungicides, and in MacDonald, fungicide use was only reported in 2001.
- Farms using tillage as weed control on summerfallow land were also reported by fewer farms.
 - Only one farm in Sault Ste. Marie reported using tillage and chemical weed control on summerfallow land, and any other farms that reported using weed control on summerfallow land used tillage only.



b. Acreage of Weed Control and Inputs

Figure 3.18 illustrates the total number of acres that were treated with lime, pesticides or tilled for weed control for all census subdivisions in each Census period. It is important to note that for the purpose of the Census questionnaire, areas treated with inputs were only recorded once, even if there were multiple applications of the input. Therefore, the acreage displayed in Figure 3.18 is only the acreage treated once during the season. For example, 447 acres in Laird was treated with herbicide in 2001, but the area could be higher, depending on the number of times the acreage was treated. It is also important to note that the one farm in Sault Ste. Marie that reported using weed control on summerfallow land by tillage and chemical application listed the number of acres as confidential information and it was not reported. In 2006, farms had reported using herbicides on 76 acres and insecticides on seven acres. Although farms reported using fungicides (as above in Figure 3.17), the amount of acreage was listed as confidential and is not displayed on Figure 3.18. Some of the key findings include:

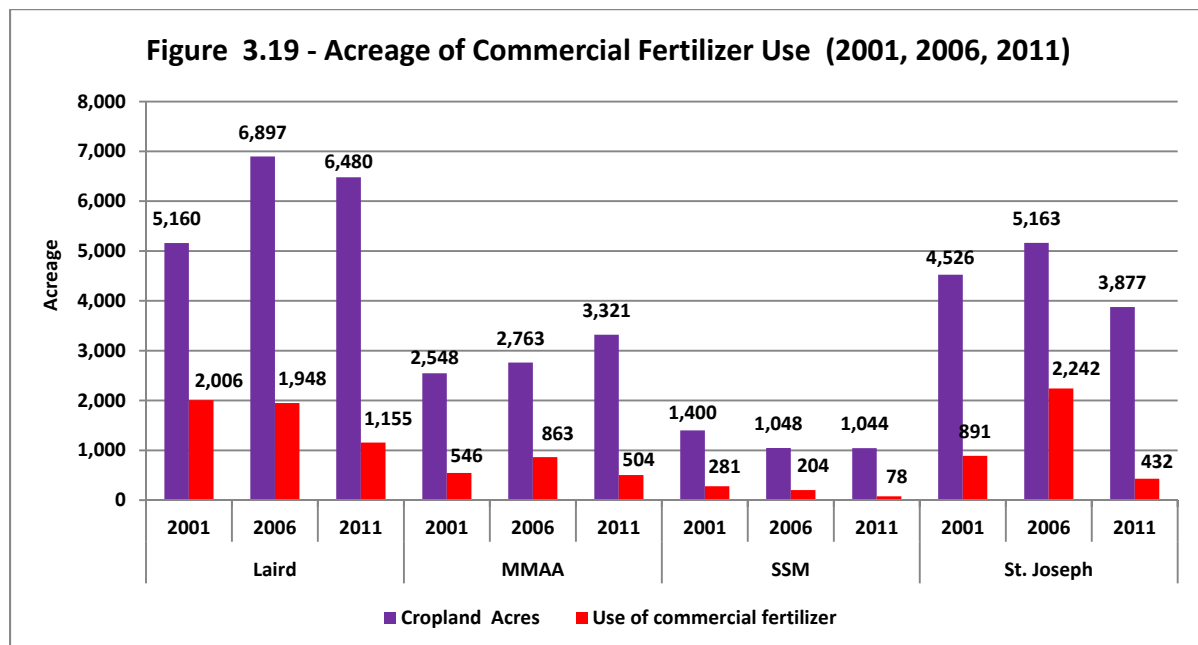
- For all census subdivisions, herbicides were applied to the greatest number of acres, followed by one application of lime in 2006 in Laird. The amount of acreage for herbicide use fluctuated within each census subdivision. Laird reported the highest amount of acreage for herbicide use, followed by St. Joseph and Macdonald. In 2011, Laird farms reported 491 acres, followed by St. Joseph (150 acres) and MacDonald (59 acres). The number of acres treated with herbicide was listed as confidential for MacDonald in 2006 and Sault Ste. Marie in 2011; therefore, it is not displayed in Figure 3.18.
- Weed control on summerfallow land through tillage and chemical application was only reported as one acre. The number of acres reported for weed control on summerfallow land through tillage was one to two acres for all reports but St. Joseph in 2001, where 28 acres was reported.
- There appeared to be limited application of insecticide across the entire census subdivisions. However, for some Census reporting periods, the number of acres was listed as confidential, and therefore, was not illustrated in the graph. Sixteen acres in St. Joseph and seven acres in Sault Ste. Marie were treated in 2006. Aside from that, insecticide use remained at one acre or lower for all other years when it was reported.



c. Acreage of Commercial Fertilizer Use

Figure 3.19 illustrates the amount of acreage of commercial fertilizer use compared with total cropland acres for each census subdivision for the years 2001, 2006 and 2011. It is important to note that for the purpose of the Census questionnaire, areas treated with inputs were only recorded once, even if there were multiple applications of the input, and therefore the acreage listed below is only the acreage treated once in the season. Some of the key findings include:

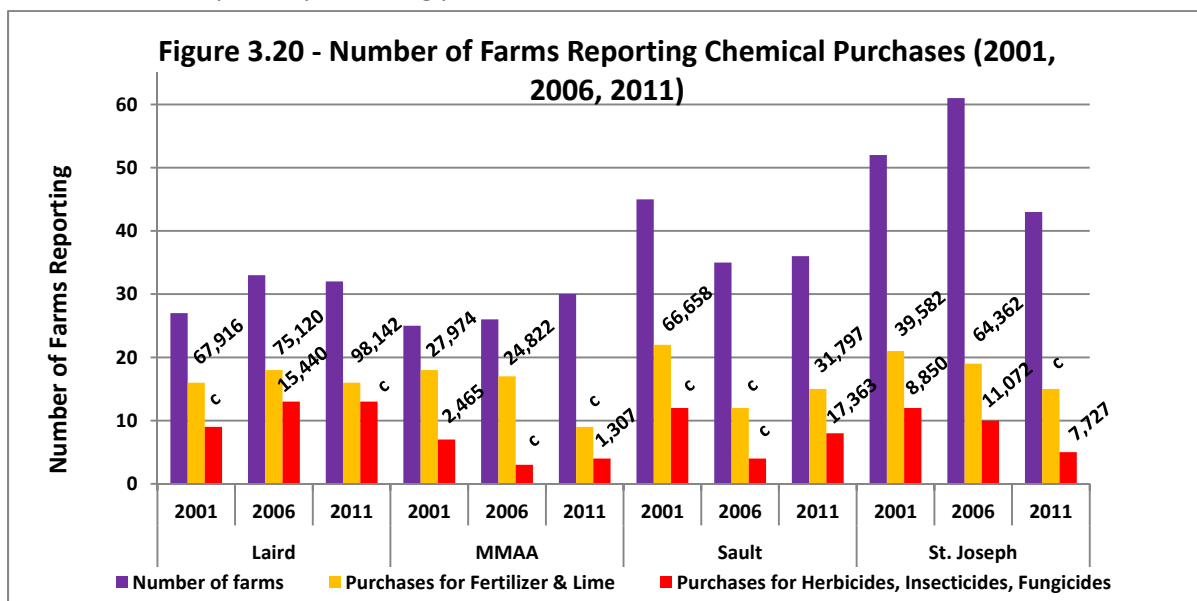
- The use of commercial fertilizer was much higher than the other inputs identified in Figure 3.17 for all of the Census Subdivisions. Although it is the input reported by the highest number of farms on the largest amount of acreage, treatments of commercial fertilizer were applied on less than 50 percent of cropland acres.
- In 2011, the percentage of cropland acres treated with commercial fertilizer was highest in Laird, followed by MacDonald, St. Joseph and Sault Ste. Marie respectively.
- While the total acreage of cropland has fluctuated in each census subdivision between 2001 and 2011, the total acreage of commercial fertilizer use declined in all census subdivisions, as follows:
 - In Laird, farms reported fertilizing 39% of cropland acres in 2001, which decreased to 28% in 2006 and decreased to 18% of cropland acreage in 2011.
 - In MacDonald, Meredith and Aberdeen Additional, farms reporting commercial fertilizer use increased between 2001 and 2006, from 21% to 31% and declined to 15% of cropland acres in 2011.
 - In Sault Ste. Marie, farms reported commercial fertilizer use on 20% of cropland acres in 2001, and this declined to 7% of cropland acres in 2011.
 - In St. Joseph, farms reported commercial fertilizer use on 20% of cropland acres, and this increased to 43% in 2006 and declined to 11% in 2011.



d. Number of Farms Reporting Chemical Purchases

Figure 3.20 illustrates the number of farms that purchased soil amendments (fertilizer and lime) and pesticides (herbicides, insecticides and fungicides) by census subdivisions for the years 2001, 2006 and 2011. Where it was not listed as confidential, the total amount (\$) spent is listed above the bar. This information provides supplemental insight into the application of chemicals as previous data on the number of times an area may be treated was not available (Figures 3.18 and 3.19). It should be noted that for many of the Census periods, the total amount spent on pesticides was listed as confidential and not reported (listed as a 'c' on figure); however, the number of farms that reported purchasing pesticides is still displayed. Some of the key findings include:

- For all census subdivisions, a higher number of farms reported purchases of fertilizer and lime than purchases for herbicides, insecticides and fungicides. Despite any fluctuations in 2006, between 2001 and 2011, the number of farms that purchased fertilizer declined in all census subdivisions. The number of farms that reported purchasing pesticides declined in MacDonald, Sault Ste. Marie and St. Joseph but increased in Laird.
- In MacDonald, Meredith and Aberdeen Additional, the total number of farm increased each year, however, the number of farms that purchased fertilizer and pesticides declined between 2001 and 2011.
- Farmers in Laird purchased the most fertilizer and lime in all three Census periods and the total amount spent also increased each Census period.
- Farms reporting purchases of herbicides, insecticides and fungicides in St. Joseph decreased between 2001 and 2006; however, the amount spent increased by over \$2,000. In Laird, the total number of farms and number of farms purchasing fertilizer declined; however, the amount spent on fertilizer increased by \$20,000. This increase could have been due to multiple applications, or it could be a result of a certain pesticide used that year that was more expensive.
- Overall, for each Census period in each census subdivision, the number of farms purchasing fertilizer did not exceed 20 farms, aside from Sault Ste. Marie in 2001 (22 farms). The number of farms that reported purchasing pesticides did not exceed 13 farms.



3.11. Manure Management

The biggest risks associated with manure application are leaching of nutrients and bacteria into surface water. There are setbacks in place that control where manure can be applied:

- 330 feet from municipal wells
- 50 feet from drilled wells or 100 feet from any well
- 10 to 200 feet from a shoreline (distance would depend on method of application, slope of land, etc.)

The NMA has specific setbacks listed for regulated farms, including an automatic 10 foot buffer from manure application along watercourses (Hilborn, 2005).

In applying it to fields, out of all types of manure (liquid, solid, composted), composted manure poses the least risk because it has had time to break down and is applied in less quantity. Solid manure is more risky than composed; however, it is still quite a low risk. Liquid manure has the highest risk, due to its high nitrogen content and high risk of runoff. In 2003, application of applying liquid manure by a high trajectory gun was banned for all farms, and a transition was made to drag hoses for spreading (David Trivers, 2014).

Incorporating manure is a better practice than leaving manure on the surface, where it is more subject to runoff. Incorporating manure reduces nutrient and bacteria movement towards surface water and positions the nutrients closer to the crops' roots. However, conventional methods of incorporating/injecting manure can make soil more subject to erosion from wind and water, and application in the fall increases that risk. OMAFRA advises operators to shallowly till prior to manure application, to increase the capacity of the soil to absorb the nutrients and to reduce the risk of nutrients and bacteria from leaching into field tiles or surface water. Liquid manure has a higher risk of runoff, and in the past, it has only been used for cereal, grains and grassland. With technology changes, operators use a drop hose, which allows the manure to be applied underneath the canopy of the crop, and therefore will minimize leaching. Injection of liquid manure can increase the risk of leaching; however, if it is done properly, it can minimize leaching (factors include depth of soil where injection occurs, moisture levels in soil, etc.) (Payne, 2009).

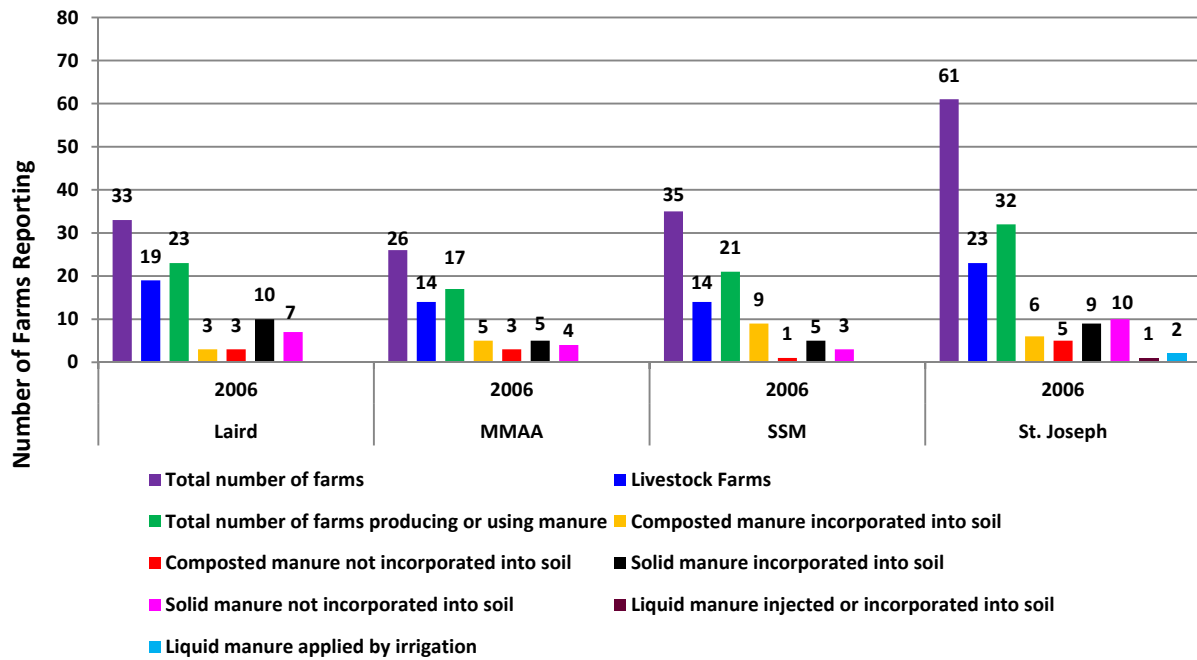
a. Types of Manure Management

Figure 3.21 illustrates the total number of farms producing or using manure and how many farms incorporated manure into the soil and how many did not. The number of farms reporting manure production and application was not available for 2001 or 2011, and therefore, only data from 2006 can be used, and no overall trends could be determined. It is important to note that farms in both Laird and MacDonald reported injecting or incorporating liquid manure into the soil; however, this was listed as confidential and is not illustrated in the graph. Some of the key findings include:

- For all census subdivisions, the number of farms producing or using manure was greater than the number of livestock farms. This would be due to farms purchasing and applying manure from another farm. For all census subdivisions, there are significantly more farms producing and using manure than those that are reporting applying solid and composted manure into the soil. This appears to indicate that more manure is being produced than used, requiring it to be stored in some capacity or sold to and moved off farm.

- Overall, St. Joseph had the largest total number of farms reporting the use or production of manure (32), followed by Laird (23), Sault Ste. Marie (21) and MMA (17).
 - In Laird, of the 23 farms that reported producing or using manure, 19 reported using it on their own operation and two farms reported selling/giving it to others.
 - In MacDonald, Meredith and Aberdeen Additional, of the 17 farms that reported producing or using manure, 14 reported using it on their own operation and four farms reported selling/giving it to others.
 - In Sault Ste. Marie, of the 21 farms that reported producing or using manure, 17 reported using it on their own operation and three farms reported selling/giving it to others.
 - In St. Joseph, of the 32 farms that reported producing or using manure, 27 reported using it on their own operation and five farms reported selling/giving it to others.
- In Laird and MacDonald, farms did report the use of liquid manure both injected/incorporated into the soil and not injected/incorporated into the soil; however, the number of farms reporting was confidential, and it cannot be listed in Figure 3.21. One farm in St. Joseph reported the use of liquid manure injected or incorporated into the soil. St. Joseph was the only census subdivision that applied by liquid manure by irrigation (2 farms).
- In Laird, MacDonald and Sault Ste. Marie, there were a higher number of farms that incorporated composted and solid manure into the soil than those that did not incorporate it.
- In St. Joseph, six farms reported incorporating composted manure into the soil, and five reported not incorporating composted manure. For solid manure, nine farms reported incorporating solid manure, whereas 10 reported they used solid manure but did not incorporate into the soil.
- Aside from the farms in St. Joseph that reported the application of liquid manure, all other farms reported using composted or solid manure, which is less risky than the application of liquid manure.
- According to Trivers (2014), this is a separate matter from manure storage. Storing liquid manure is usually less risky, because runoff is fully contained.

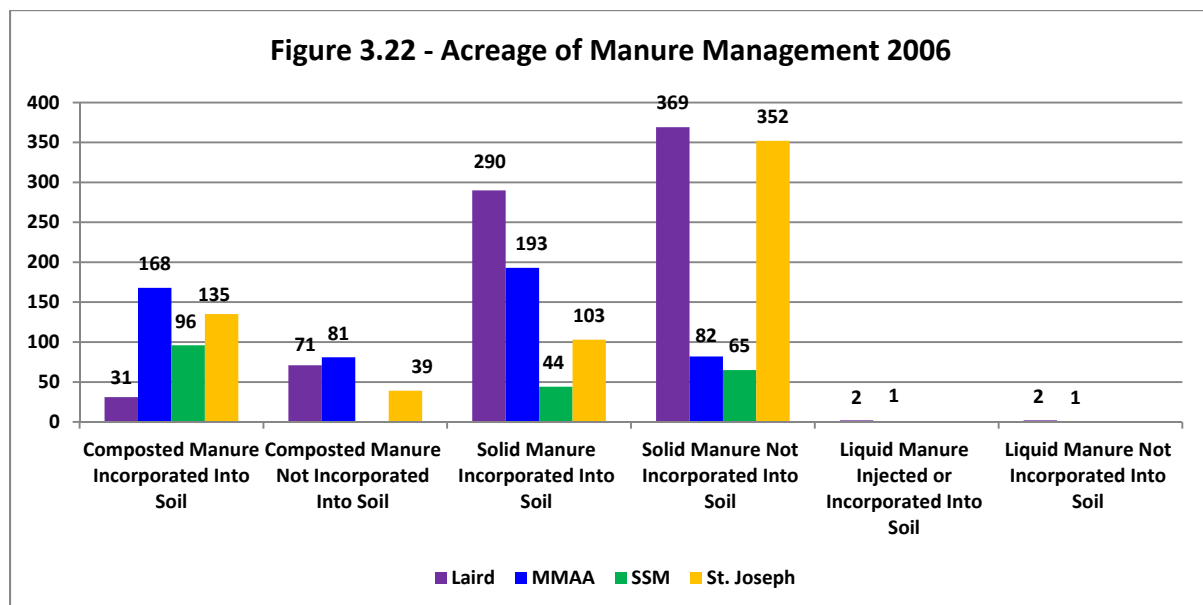
Figure 3.21 - Manure Management 2006



b. Acreage of Manure Management

Figure 3.22 illustrates the total acreage of land under manure management for all census subdivisions in 2006. The acreage of manure application was not available for 2001 and 2011 and therefore only data from 2006 could be used, and no overall trends could be determined. Some of the key findings include:

- Overall, solid manure was applied on more acreage (1,498 acres) than composted manure (621 acres) or liquid manure (6 acres). All census subdivisions had more acreage of solid manure management than composted manure management.
- In total Laird had 763 acres under manure management, St. Joseph had 629 acres, MacDonald had 526 acres and Sault Ste. Marie had 205 acres.
- Laird and St. Joseph had the highest amount of acreage where solid manure was not incorporated into the soil, and Sault Ste. Marie also had a greater amount of acreage where solid manure was not incorporated into the soil. MacDonald was the only census subdivision that had farms incorporating solid manure on more acreage than those that did not.
- Laird and MacDonald had the highest amount of acreage where composted manure was not incorporated into the soil. However, all census subdivisions, aside from Laird, incorporated composted manure on a greater amount of acreage than those that did not.
- Sault Ste. Marie had the lowest amount of acreage reported for all three types of manure management.
- Liquid manure was only applied in Laird and Macdonald with minimal coverage:
 - In Laird, there were two acres where liquid manure was injected or incorporated into the soil, and two acres where it was used but not incorporated into the soil.
 - In MacDonald, there was one acre where liquid manure was injected or incorporated and one acre where it was used but not incorporated into the soil.
 - It should be noted that In St. Joseph, the number of acres where liquid manure was injected or incorporated into the soil or applied by irrigation was listed as confidential, and therefore is not displayed in Figure 3.22.



3.12. Tillage Practices

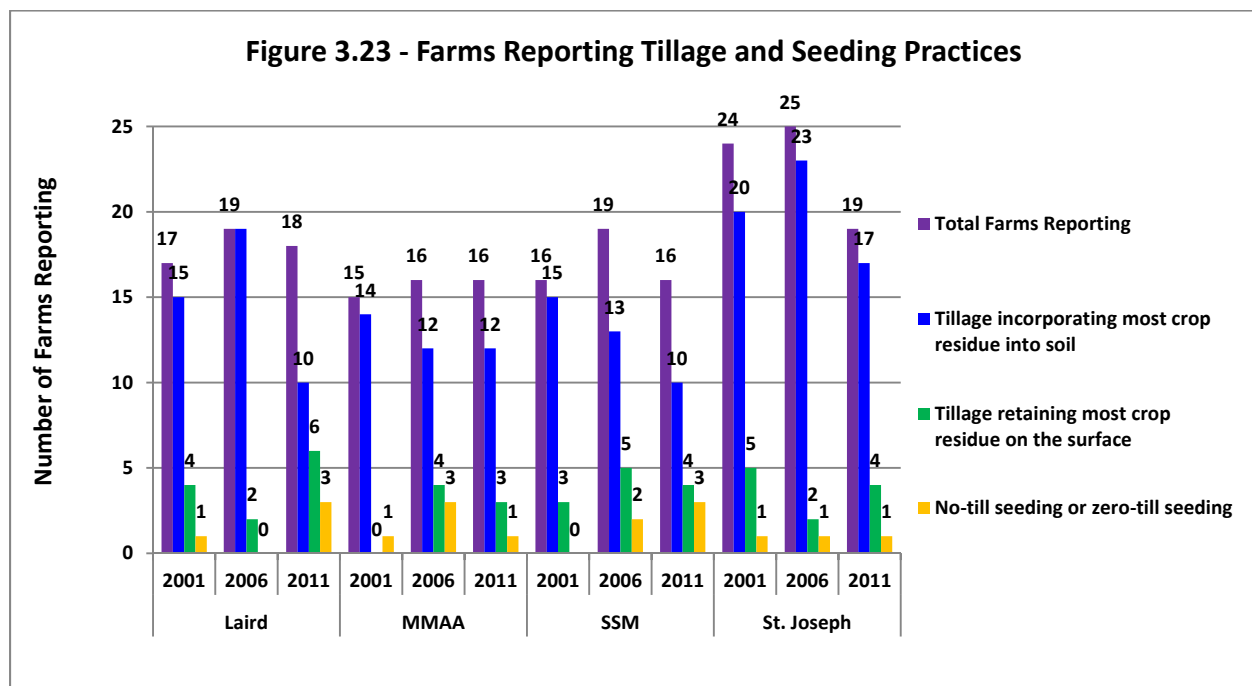
Tillage practices have a large influence on soil conservation. In general, frequent tilling can damage soil structure and increase the risk of soil erosion, which can then be flushed into watercourses. At the end of a farming season, some farmers leave their crops standing or leave the crop residue on the surface of the soil which helps to decrease the risk of soil erosion between late fall and spring. Another practice that reduces soil erosion is seeding without tilling.

Leaving crop residues on the surface can help maintain and improve soil structure, quality and moisture; overall, it is a key component in improving soil moisture and can contribute considerable amounts of macronutrients and help to build up organic matter in nutrient-poor soils. However, benefits are dependent upon existing conditions (amount of existing organic matter, risk of erosion, current nutrient levels, moisture content) (Hartman, 2008).

a. Farms Reporting Tillage and Seeding Practices

Figure 3.23 illustrates the number of farms reporting types of tillage practice in comparison with the number of farms overall by each census subdivision and for the years 2001, 2006 and 2011. Some of the key findings include:

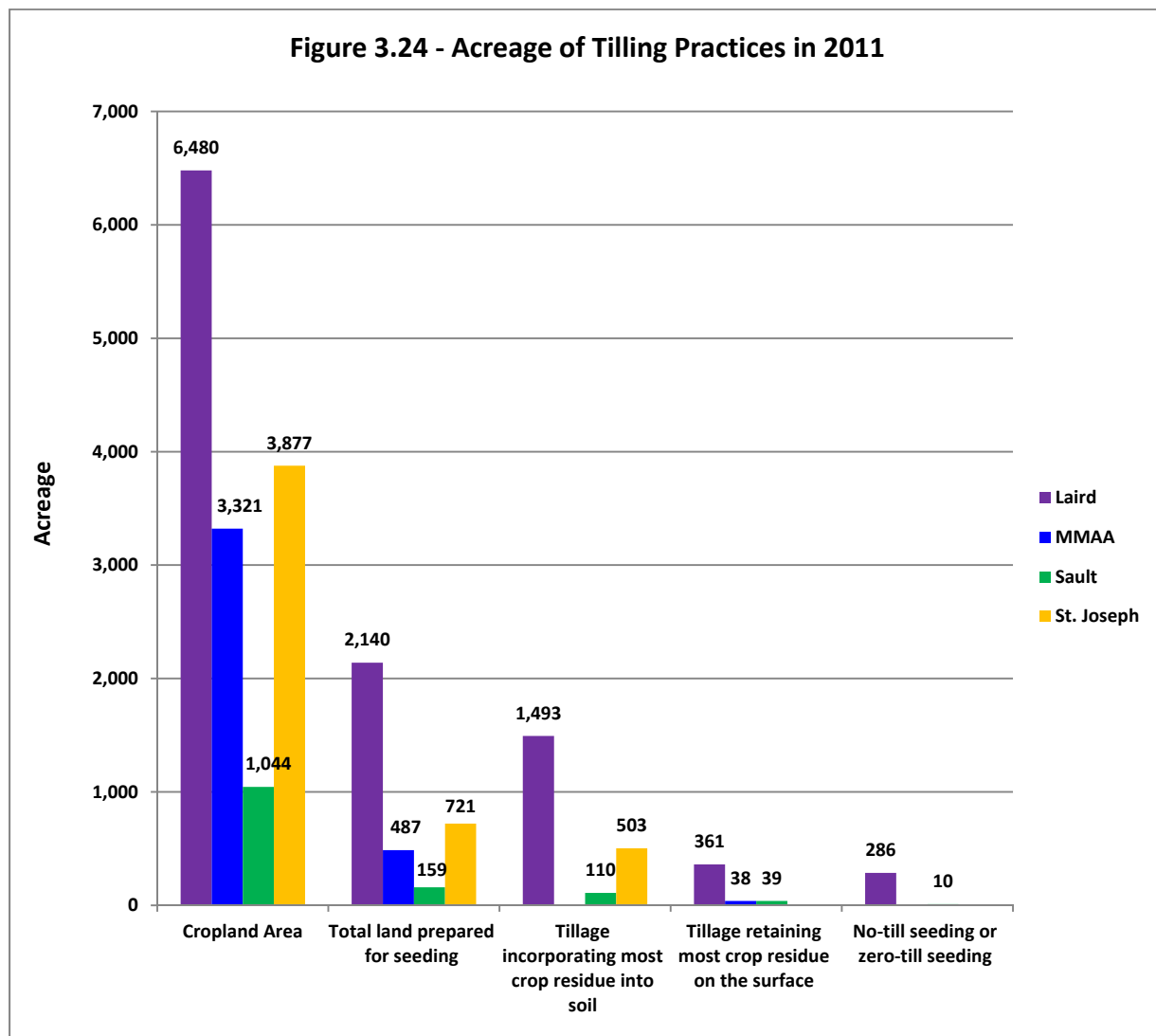
- Significantly fewer farms reported retaining most crop residue on the surface and no-till or zero-till seeding than those that reported incorporating most crop residue into the soil.
- The number of farms retaining most crop residue on the surface fluctuated for all census subdivisions between 2001 and 2011, with no overall trend. In Laird and St. Joseph, farms that practiced retaining most crop residue on the surface increased from 2006 to 2011, and in MacDonald and St. Joseph, the number of farms decreased between 2006 and 2011. The number of farms practicing no-till or zero-till seeding increased from 2001 to 2011 in Laird and Sault Ste. Marie, whereas it remained the same in St. Joseph and fluctuated in MacDonald.



b. Acreage of Tilling Practices

Figure 33.24 illustrates the number of acres for each tillage practice in comparison with the number of acres prepared for seeding and the number of cropland acres reported in 2011. For MacDonald, the number of acres where most of the crop residue was incorporated into the soil and for St. Joseph, the number of acres where crop residue was retained on the surface was listed as confidential. Acreage of no-till or zero-till seeding was listed as confidential for MacDonald and St. Joseph. Some of the key findings include:

- When comparing the number of cropland acres, the total land prepared for seeding and tillage and planting techniques, there are very few farms practicing tillage that retains most crop residue on the surface or no-till/zero-till seeding. All census subdivisions had considerably fewer acres for tillage retaining most crop residue on the surface and no-till/zero-till seeding than the total acreage prepared for seeding and where tillage incorporated most crop residue into the soil. Out of all the census subdivisions, Laird had the greatest amount of acres under tillage, followed by St. Joseph.



3.13. Conservation Measures

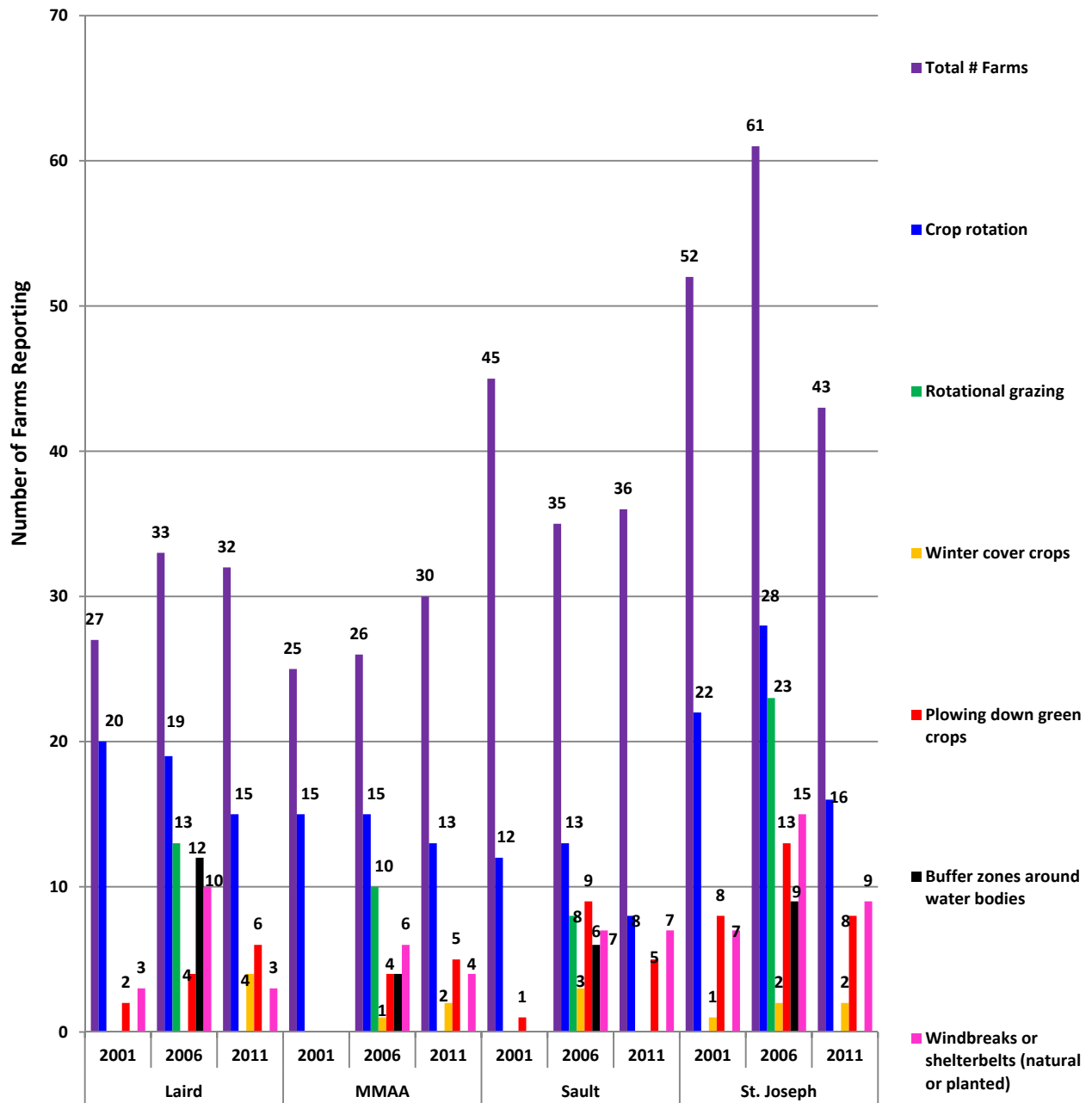
There are many different types of conservations measures being applied that reduce the impacts of agricultural activities on water quality. Crop rotation can help reduce the risk of pests and disease, which can then reduce the need for pesticide applications. Certain varieties of cover crops are grown to improve soil conditions (e.g. nitrogen fixation) which can then reduce the need for fertilizer application. Crop rotation contributes to the maintenance and improvement of soil structure, which, in turn, can reduce the risk of soil erosion (OMAFRA, 2009). Rotational grazing gives pastures time for recovery and helps to reduce the risk of soil erosion (OMAFRA, 2000). Plowing down green crops incorporates the organic matter into the soil, which helps to improve soil structure and amount of organic matter. This can help reduce the need for fertilizer applications. Growing winter cover crops helps to prevent soil erosion over the late fall, winter and spring. Planting or keeping a windbreak can catch soil particles and help reduce soil erosion, increase habitat and protect crops from wind damage (OMAFRA, 2009). Reducing soil erosion can prevent soil particles from reaching watercourses and protect water quality from farming practices. In addition, buffer zones around watercourses filter run-off from farms before it reaches surrounding watercourses and helps to protect water quality, fish habitat and create wildlife habitat (OMAFRA b, 2013).

Conservation Practices

Figure 3.25 illustrates the various conservation practices that farms have reported for all census subdivisions for 2001, 2006 and 2011. It is important to note that the number of farms reporting buffer zones around water bodies and rotational grazing systems were not available for 2001 and 2011, and therefore, not displayed in Figure 3.25 for those years. Some of the key findings include:

- The most common conservation practice in all of the census subdivisions was crop rotation, although for each Census area, fewer farms practiced crop rotation in 2011 than in 2001. In 2006, rotational grazing was the second highest conservation practice reported by farms, aside from Sault Ste. Marie.
- In 2006, buffer zones were reported by 36% of farms in Laird, 17% of farms in Sault Ste. Marie and 15% of farms in MacDonald and St. Joseph. For farms without watercourses, this conservation practice would not apply.
- For each Census period, St. Joseph had the highest number of farms reporting plowing down green crops and keeping windbreaks or shelterbelts. St. Joseph also had the highest number of farms, and the conservation practices appeared to correspond with the fluctuations in total number of farms each Census period.
- Planting winter cover crops was the least reported conservation practice for all census subdivisions. In 2011, it was practiced by only four farms in Laird, and two farms in MacDonald and St. Joseph. Farms in Sault Ste. Marie only planted winter cover crops in 2006.

Figure 3.25 - Conservation Practices (2001, 2006, 2011)



4. Comparison of Agricultural Activities Between the St. Marys River, South Huron and Ontario

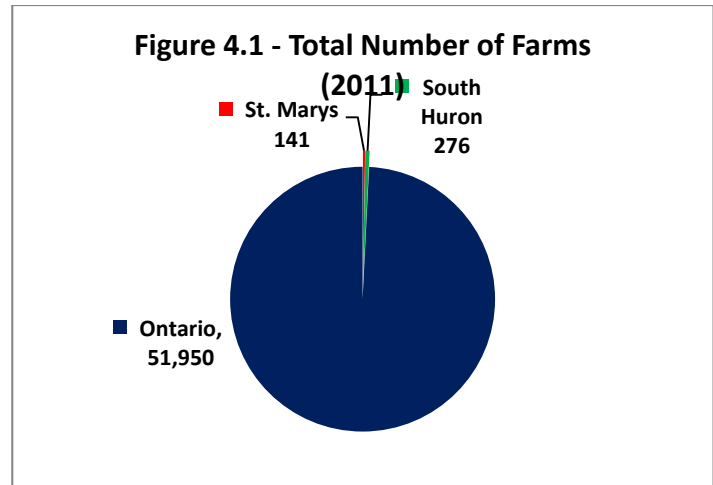
This section compares areas around the St. Marys River AOC (Laird, MacDonald, Meredith and Aberdeen Additional, Sault Ste. Marie and St. Joseph) with the reference site of South Huron. South Huron is located within Huron County, on the shore of Lake Huron, in Southwestern Ontario (Map 4). The Township is 425 square kilometres, and in 2011, the population was 10,000 permanent residents with seasonal cottagers (Municipality of South Huron, 2012). South Huron was chosen because it is a non-AOC region, known to have agricultural activities, and it is located within the upper Great Lakes. In addition, both St. Marys and South Huron are also compared to the whole of Ontario in this section, in order to provide more context to the comparison.

Map 4 - Census Subdivisions around South Huron



4.1. Total Number of Farms

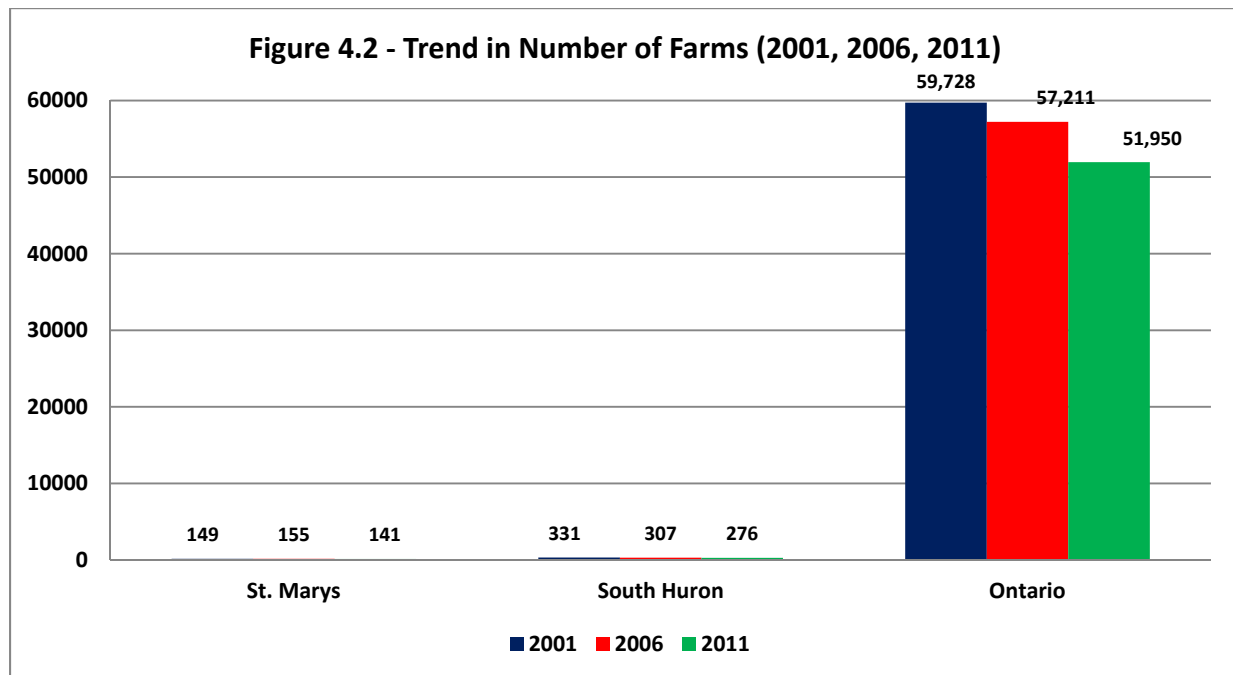
Figure 4.1 demonstrates that in comparison to South Huron, St. Marys has almost 50% fewer farms (141 farms) than South Huron (276 farms) and comprises 0.3 % of all farms in Ontario (51,950 farms). South Huron comprises 0.5% of Ontario farms.



4.2. Trend in the Number of Farms

Figure 4.2 illustrates the trend in the number of farms in St. Marys, South Huron, and Ontario between 2001 and 2011. Some of the key findings include:

- The total number of farms declined in all three comparison areas between 2001 and 2011.
- Farms in both South Huron and Ontario have declined in each Census period since 2001.
- In St. Marys, farm numbers slightly increased between 2001 and 2006; however, the number of farms declined between 2006 and 2011 to levels below 2001 numbers.



4.3. Total Area of All Farms

Figure 4.3 illustrates the total area (acreage) of all farms in St. Marys, South Huron and Ontario in 2006. Total farm area was listed as 'not available' for 2011 and, therefore, data from 2006 was used. Some of the key findings include:

- In St. Marys the reported total area of farms was 33,408 acres, which was one third of the area reported for South Huron, and 0.25 % of the total farm area reported for Ontario.
- St. Marys, South Huron and Ontario had similar trends in size of farms. Farms with an area between 10 and 399 acres accounted for 74% of farms in St. Marys, 60% of farms in South Huron and 69% of farms in Ontario.

While the total area of farms varied between all three areas, they shared similar statistics for individual farm size which is illustrated in Table 4.3.9

- Farms that were 10 to 129 acres accounted for 50% of farms in St. Marys, 47% of farms in Ontario and 35% of farms in South Huron.
- Farms that were 180 to 399 acres accounted for 25% of farms in both St. Marys and South Huron, and 22% of farms in Ontario.

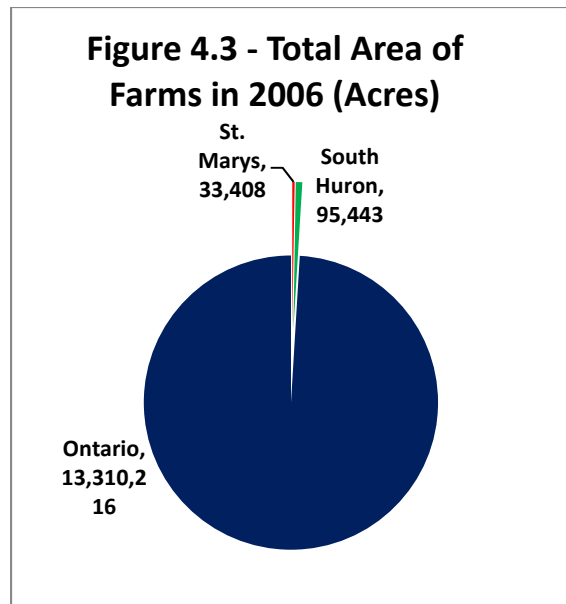


Table 4.3 – Percentage of Farm Size (2006)

Number of Acres	St. Marys	South Huron	Ontario
Under 10 acres	4	7	5
10 to 69 acres	24	18	24
70 to 129 acres	26	17	23
130 to 179 acres	6	9	10
180 to 239 acres	12	11	9
240 to 399 acres	13	14	12
400 to 559 acres	8	7	6
560 to 759 acres	2	6	4
760 to 1,119 acres	4	5	3
1,120 to 1,599 acres	1	3	2
1,600 to 2,239 acres	1	1	1
2,240 to 2,879 acres	0	1	0
2,880 to 3,519 acres	0	1	0
3,520 acres +	0	1	0

4.4. Number of farms by Industry Type (NAICS)

Table 4.4 illustrates the number of farms by industry type in St. Marys, South Huron and Ontario in 2011, in accordance with the North American Industry Classification System (NAICS). Some of the key findings include:

- There was much less cattle ranching and farming, hog and pig farming, poultry and egg production, sheep and goat farming and oilseed and grain farming in St. Marys (56 farms) than in both South Huron (257) and Ontario (51,950). Production in those categories for St. Marys represented less than 0.5% of Ontario levels.
- St. Marys had 54% less cattle ranching and farming than South Huron and 11 to 17% less hog and pig farming, poultry and egg production and sheep and goat farming.
- For oilseed and grain farming, St. Marys only had one farm reporting, whereas it was reported by 168 farms in South Huron and 15,818 farms in Ontario.
- St. Marys had more farms reporting 'other animal production', 'vegetable and melon farming', 'fruit and tree nut farming', 'greenhouse/nursery/floriculture' and 'other crop farming' than South Huron. 'Other animal production' was reported by 31 farms in St. Marys, versus 12 farms in South Huron.
- 43% (61) of farms in St. Marys reported 'other crop farming' in comparison to 3% (8) farms in South Huron. Part of this difference could potentially be due to maple syrup production in the St. Marys watershed.

Table 4.4 - Number of farms by Industry Type (NAICS) (2011)

Industry by NAICS Classification	St. Marys		South Huron		Ontario	
	# Farms Reporting	%age of Farms	# Farms Reporting	%age of Farms	# Farms Reporting	%age of Farms
Cattle ranching and farming	19	13	41	15	11,141	21
Hog and pig farming	2	1	18	7	1,235	2
Poultry and egg production	2	1	12	4	1,619	3
Sheep and goat farming	1	1	6	2	1,446	3
Other animal production	31	22	12	4	6,966	13
Oilseed and grain farming	1	1	168	61	15,818	30
Vegetable and melon farming	8	6	5	2	1,531	3
Fruit and tree nut farming	6	4	1	0	1,548	3
Greenhouse/nursery/floriculture	10	7	5	2	2,372	5
Other crop farming	61	43	8	3	8,274	16
Total Number	141	100	276	100	51,950	100

4.5. Total Amount of Gross Farm Sales

Figure 4.5 illustrates the total amount of gross farm sales in St. Marys, South Huron and Ontario for 2011. Some of the key findings include:

- St. Marys gross farm sales totaled 7,203,000 dollars in 2011, which is 5% of gross farm sales in South Huron, 0.06 % of gross farm sales in Ontario.
- South Huron gross farm sales totaled 146,001,000 dollars, 1.2% of gross farm sales in Ontario.

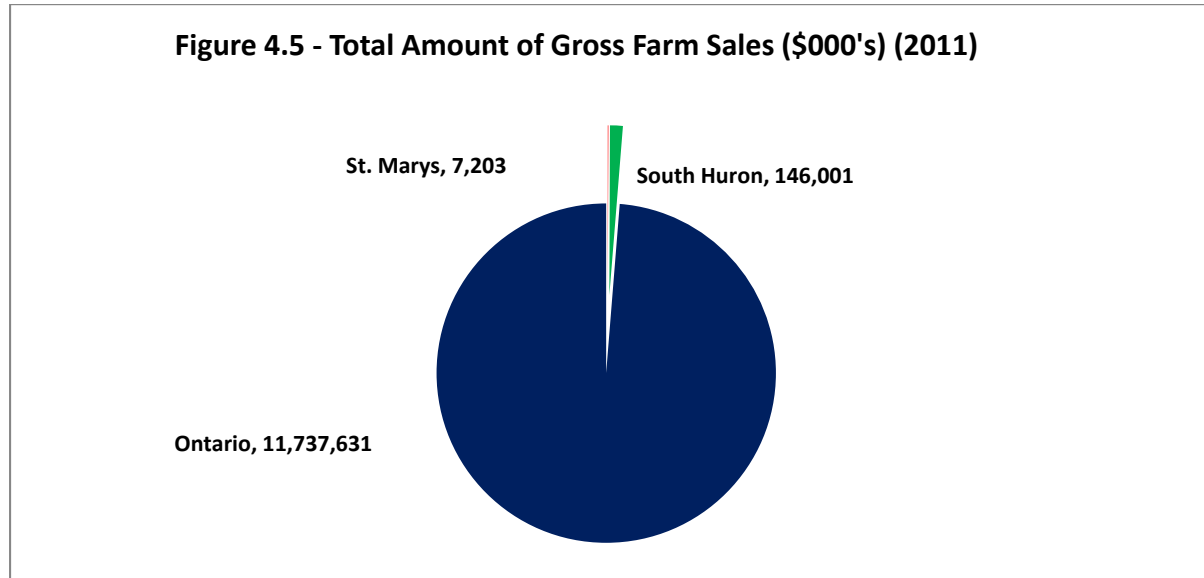


Table 4.5 displays the number of farms reporting receipts in three different income categories. Some of the key findings include:

- In St. Marys, 91% of all farms reported gross farm receipts of less than 100,000 dollars, versus 46% of farms in South Huron and 66% of farms in Ontario. In conclusion, unlike South Huron and Ontario, a significant majority of farms in St. Marys reported less than 100,000 dollars in gross farm receipts.
- Only three percent of farms in St. Marys reported over 500,000 dollars, in comparison to 22% of farms in South Huron and 11% of farms in Ontario.

Table 4.5 – Gross Farm Receipts (2011)

Amount in Gross Farm Receipts	St. Marys		South Huron		Ontario	
	# of Farms	% of Farms	# of Farms	% of Farms	# of Farms	% of Farms
Farms Under \$100,000	129	91	126	46	34,270	66
Farms Over \$100,000 to \$500,000	9	6	89	32	12,071	23
Farms Over \$500,000	4	3	61	22	5,609	11
Total	141	100	276	100	51,950	100

4.6. Number of Farms by Production Type

Table 4.6 illustrates the type of production reported by farms in St. Marys, South Huron and Ontario in 2011. Some of the key findings include:

- Cropland acres were reported by the highest percentage farms in all three comparison areas (80 to 88%).
- St. Marys and South Huron each represented less than one percent of Ontario production in all categories.
- The number of farms in cropland acres production in St. Marys (113) is less than half of the number of farms in South Huron (243) and is only 0.25 % of all farms in Ontario (45,604).
- St. Marys reported the lowest percent of farms in cropland production (80%), in comparison to 88% in both South Huron and Ontario.
- In St. Marys, six farms reported having summerfallow land, whereas it was only reported by one farm in South Huron. However, it should be noted that summerfallow land is part of crop rotation, and it would vary from year to year.
- St. Marys had the highest percentage of farms reporting Christmas tree production (5%), compared to South Huron (2%) and Ontario (1%).
- St. Marys had the highest percentage of farms reporting natural land for pasture (43%), compared to South Huron (33%), and Ontario (30%).

Table 4.6 - Number of Farms By Production Type in 2011

Type of Production	St. Marys		South Huron		Ontario	
	# of Farms	% of Farms	# of Farms	% of Farms	# of Farms	% of Farms
Cropland Acres	113	80	243	88	45,604	88
Summerfallow land	6	4	1	0.4	1,122	2
Tame or seeded pasture	52	37	53	19	14,605	28
Natural land for pasture	60	42	33	12	15,553	30
Sod under cultivation for sale	1	1	0	0	122	0.2
Christmas trees grown for sale	8	6	0	0	647	1
Nursery products	5	4	5	2	1,004	2
Total Number of Farms	141	*	276	*	51,950	*

* A single farm may have more than one type of production and therefore the number of farms listed by type of production will not equal the total number of farms, and the percentages will not equal 100.

4.7. Total Acreage of Production Type

Table 4.7 provides the total amount of acreage reported for each type of production category in St. Marys, South Huron and Ontario in 2011. Some of the key findings include:

- St. Marys had only 16% (14,722 acres) of the cropland acres reported by South Huron (94,118 acres). Both areas comprised about 1.2% of total cropland acres in Ontario (8,929,948 acres).
- Farms in St. Marys reported more acres under tame or seeded pasture (3,222 acres) when compared to South Huron (1,944 acres).
- Farms in St. Marys had over double the acreage (2,333 acres) of natural land for pasture than in South Huron (970 acres).
- St. Marys reported 69 acres and South Huron report 0 acres of Christmas tree production.
- Some of the numbers in the Census data are listed as confidential. In this case, acreage under summerfallow land was not available for South Huron. In St. Marys, only Sault Ste. Marie reported 24 acres of summerfallow land, and others listed this information as confidential. This means that the number would be greater than 24.

Table 4.7 Total Acreage by Production Type (2011)

Type of Production	St. Marys	South Huron	Ontario
Cropland Acres	14,722	94,118	8,929,948
Summerfallow land	24*	confidential	23,450
Tame or seeded pasture	3,070	1,944	648,758
Natural land for pasture	2,322	970	984,808
Sod under cultivation for sale	0*	0	28,414
Christmas trees grown for sale	69	0	14,715
Nursery products	0*	31	25,270

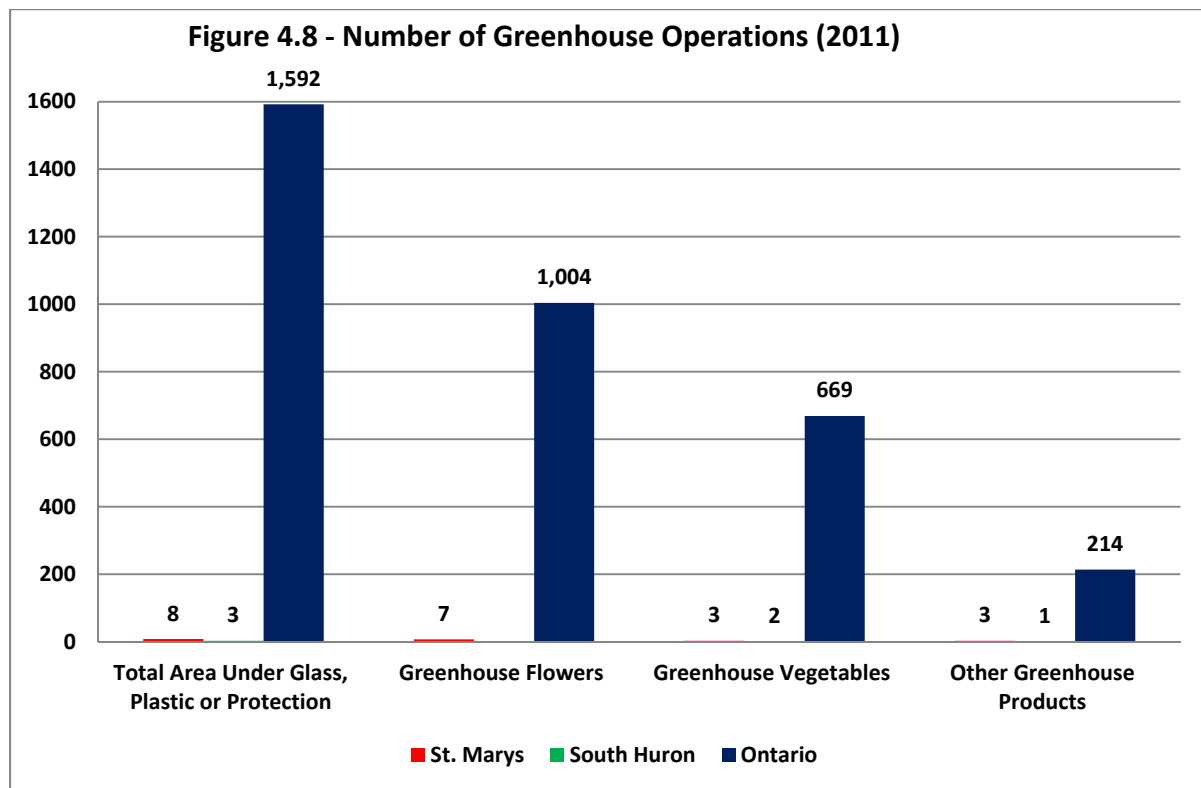
** Some census subdivisions listed numbers as confidential; therefore, this number represents the minimum amount.*

4.8. Total Number of Greenhouse Operations

Depending on the operation, greenhouse production can involve higher concentrations of fertilizers, greater amounts of water use and increased runoff. Some farms may not have any mechanisms in place to capture nutrient feedwater from the greenhouse after being discharged. That runoff from the greenhouse would drain into surface water and potentially into groundwater sources. Greenhouse operations must be sure to comply with existing regulations (municipal by-laws, Permit to take Water, etc.), and a greenhouse that discharges nutrient feedwater without treatment is required to obtain an Environmental Compliance Approval from MOE. However, this does depend on the size of the greenhouse operations. OMAFRA provides greenhouse vegetable operators with a number of Best Management Practices for helping to decrease water use, decrease nutrient applications and mitigate discharge of nutrient feedwater (OMAFRA, Dec 9, 2013).

Figure 4.8 provides the total number of greenhouse operations in St. Marys, South Huron and Ontario in 2011. Some of the key findings include:

- Greenhouse production in St. Marys (8 farms) is greater than in South Huron (3 farms), and comprises less than 0.7% of all Ontario production.
- Eight greenhouse operations exist in St. Marys, of which seven produced greenhouse flowers and three produced both vegetables and 'other' products.
- Greenhouse flower production in St. Marys represented 88% of greenhouse production, whereas in Ontario, greenhouse flowers represented 62% of greenhouse production.



4.9. Type and Acreage of Field Crops Grown

Production of field crops can vary widely, depending on the crop rotation and what purpose the crop serves. Certain field crops have a greater impact on soil fertility and potentially on fertilizer and pesticide use. Corn is a heavy feeder and depletes the soil of nitrogen. Farms that grow corn usually rotate the crop with soybeans to help prevent a depletion of nutrients; however, corn crops require greater amounts of nutrients and may indicate more fertilizer applications (Statistics Canada, March 18, 2014). Most corn and soybean used in the St. Marys area are 'Roundup Ready' (David Trivers, 2014), meaning that they are resistant to glyphosate (herbicide) applications and that glyphosate can be applied anytime from plant emergence to flowering. Due to its use in biofuels in the U.S., demand for corn and the price of corn increased dramatically in late 2006/early 2007, resulting in a large increase of farms producing corn (Statistics Canada, March 24, 2014). Corn prices have now fallen from eight dollars per bushel to four dollars per bushel, indicating corn production may fall (OSCIA, 2014).

Fruit production may involve greater amounts of pesticides, but it would depend on the operation. Fruit such as strawberries and fruit trees (apples, pears, etc.) are more difficult to grow and usually require greater inputs than fruit crops such as blueberries and raspberries.

Table 4.9 provides the type and total acreage of field crops that were grown in 2011 for St. Marys, South Huron and Ontario. Some of the key findings include:

- All three areas generally grew the same variety of field crops, aside from St. Marys, where there was no winter wheat, fall rye, spring rye or soybeans reported.
- In St. Marys, the majority of farms (88 farms out of 141) reported growing 'all other tame hay and fodder crops' (livestock feed).
- In St. Marys, more farms reported producing barley, mixed grains, dry field peas, forage seed for seed, potatoes, buckwheat and sugar beets than in South Huron. This is likely related to what the field crops were being produced for, as the field crops in St. Marys may have been grown more for livestock feed than food production.
- 13 farms in St. Marys reported fruit, berry and nut production, compared to only 3 farms in South Huron.
- In Ontario, over one million farms grew winter wheat, and all other crops were grown by fewer than 21,000 farms.

Table 4.9 – Type and Acreage of Field Crops Grown in 2011

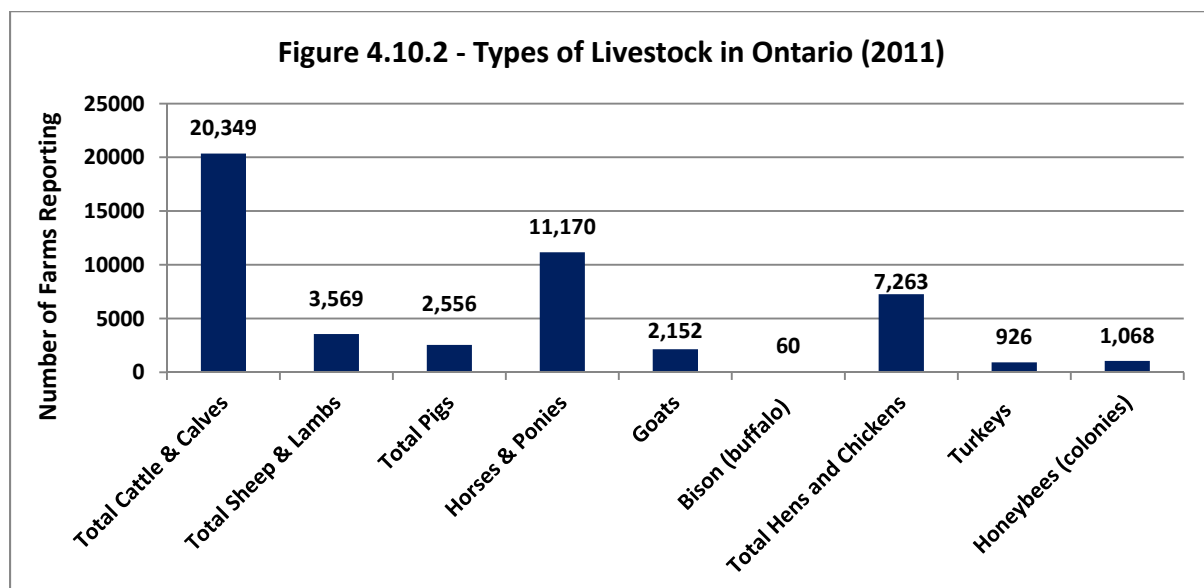
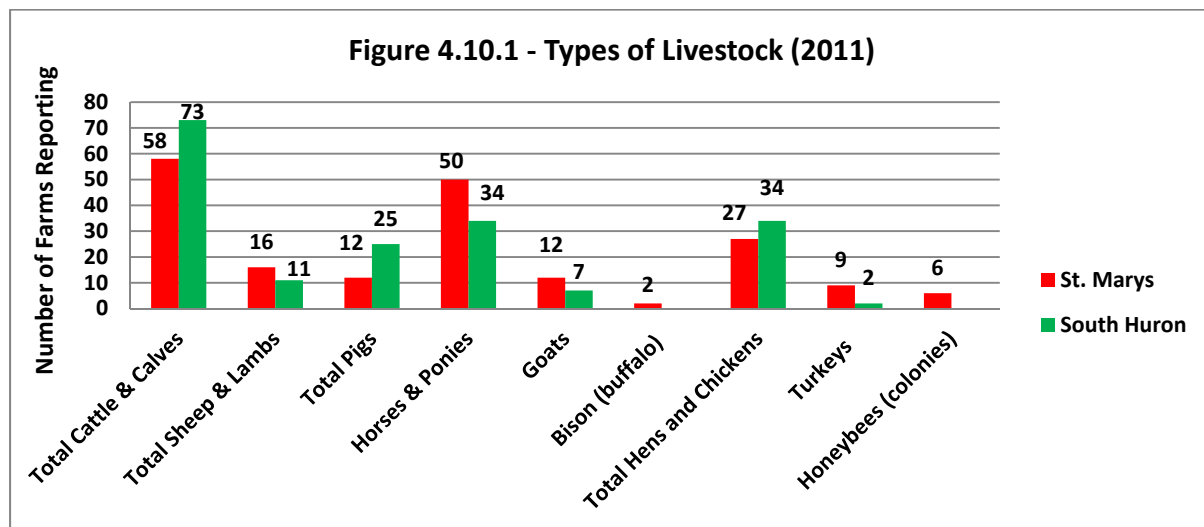
Type of Field Crop	St. Marys		South Huron		Ontario	
	# Farms Reporting	Acres	# Farms Reporting	Acres	# Farms Reporting	Acres
Total wheat	4	0*	171	20,868	13,713	1,217,328
Spring Wheat (excluding durum)	4	0*	8	989	1,968	114,643
Winter wheat	0*	0*	Error**	8,045	1,100,003	445,155
Oats	16	284*	4	197	2,542	71,040
Barley	9	172*	5	154	3,223	126,881
Mixed Grains	11	296*	3	77	3,750	106,162
Total Corn	14	310*	174	33,420	18,642	2,304,057
Fall Rye	0	0	0	0	729	32,934
Spring Rye	0	0	0	0	39	1,934
Canola	14	42	15	32	3,235	15,202
Soybeans	0	0	171	26,354	18,773	2,464,870
Dry field peas	3	0*	2	confidential	133	4,803
Alfalfa and alfalfa mixtures	33	1,596	69	3,544	20,641	1,346,210
All other tame hay and fodder crops	82	10,511	22	519	10,877	731,701
Forage seed for seed	1	0*	0	0	214	7,536
Potatoes	11	17*	1	confidential	811	37,384
Buckwheat	4	0*	0	0	257	6,306
Sugar beets	1	0*	0	0	103	10,816
Other field crops	1	0*	1	confidential	577	28,294
Fruits, berries and nuts (producing and non-producing)	13	36*	3	12	2,709	52,740

**** -** There was an error in the database for the number of farms reporting winter wheat in South Huron. The number of farms that grew winter wheat would have been a minimum of 163, as 171 farms reported growing some type of wheat, and only eight of those farms grew spring wheat.

4.10. Type of Livestock in 2011

Figure 4.10.1 illustrates the types of livestock reported by farms in St. Marys and South Huron in 2011, and Figure 4.10.2 illustrates the same for Ontario. Some of the key findings include:

- St. Marys had fewer farms reporting cattle and calves, pigs and hens and chickens in comparison to South Huron.
- St. Marys had 58 farms reporting raising cattle and calves, South Huron had 73 farms, and Ontario over 20,000 farms. Both St. Marys and South Huron comprised less than 1% of the farms in Ontario raising cattle and calves.
- More farms in St. Marys raised sheep and lambs, horses and ponies, goats and turkeys.
- A total of eight farms in St. Marys reported raising bison and colonies of honeybees, and none were reported for South Huron.
- Less than half the farms in St. Marys (out of 141 farms) and South Huron (out of 276 farms) reported livestock production of each type of animal.



4.11. Number of Livestock Report 2011

Table 4.11 lists the number of each type of animal reported for St. Marys, South Huron and Ontario in 2011. Some of the key findings include:

- Despite having fairly similar numbers of farms reporting livestock in St. Marys and South Huron (see Figure 4.10-2), farms in South Huron reported a significantly higher number of animals, implying that St. Marys farms are less livestock intensive. For example, there were only 15 more farms that reported cattle and calves in South Huron than in St. Marys; however, farms in South Huron reported over 15,000 more animals than farms in St. Marys. The same differences were observed for hens and chickens. The total number of hens and chickens reported for Ontario was over 46 million, whereas only 2,018 were reported in St. Marys, and 248,038 were reported in South Huron.
- The only type of animal that farms reported more of in St. Marys than South Huron was horses and ponies.
- The total number of animals reported in St. Marys comprises about 0.01% of the total animals in Ontario. The number of animals reported in South Huron comprises 0.06%.

Table 4.11 - Number of Animals Reported in 2011

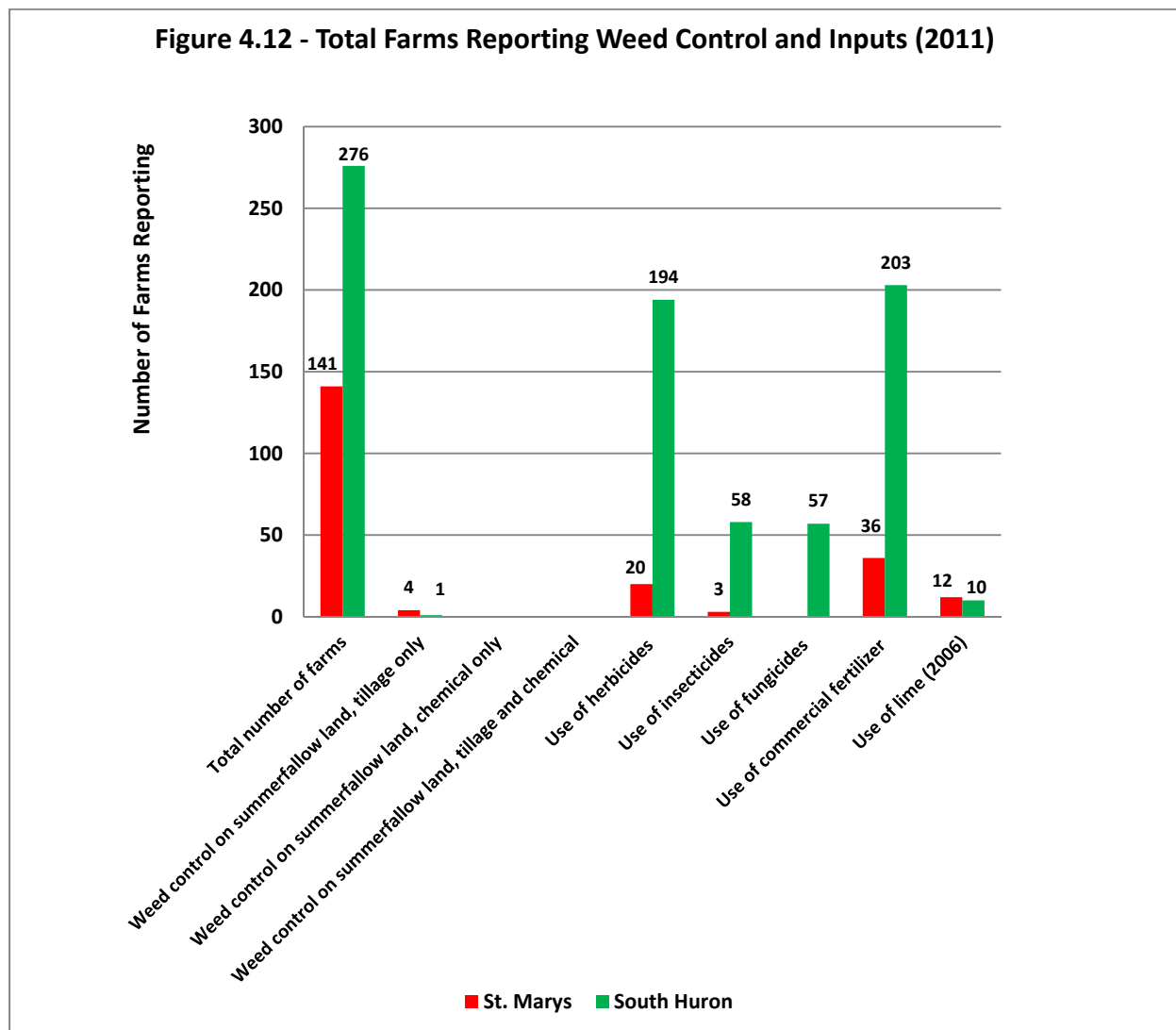
Type of Livestock	St. Marys	South Huron	Ontario
Total Cattle & Calves	3,040	18,922	1,741,381
Total Sheep & Lambs	506	1,344	352,807
Total Pigs	32*	70,397	3,088,646
Horses & Ponies	451	228	86,642
Goats	152*	179	116,260
Bison (buffalo)	0*	0	2,320
Total Hens and Chickens	2,018	248,038	46,902,316
Turkeys	48*	confidential	3,483,828
Honeybees	25*	0	67,563
TOTAL	6,272	338,908	58,841,763

** In St. Marys, some numbers in individual census subdivisions were listed as confidential, and therefore the numbers represent the minimum number of animals possible and are not comparable (i.e., pigs, goats, bison, turkeys and honeybees). Those numbers are represented with asterisks.*

4.12. Total Farms Report Weed Control and Inputs

Figure 4.12 illustrates the types of weed control inputs that farms reported using in St. Marys and South Huron in 2011. Some of the key findings include:

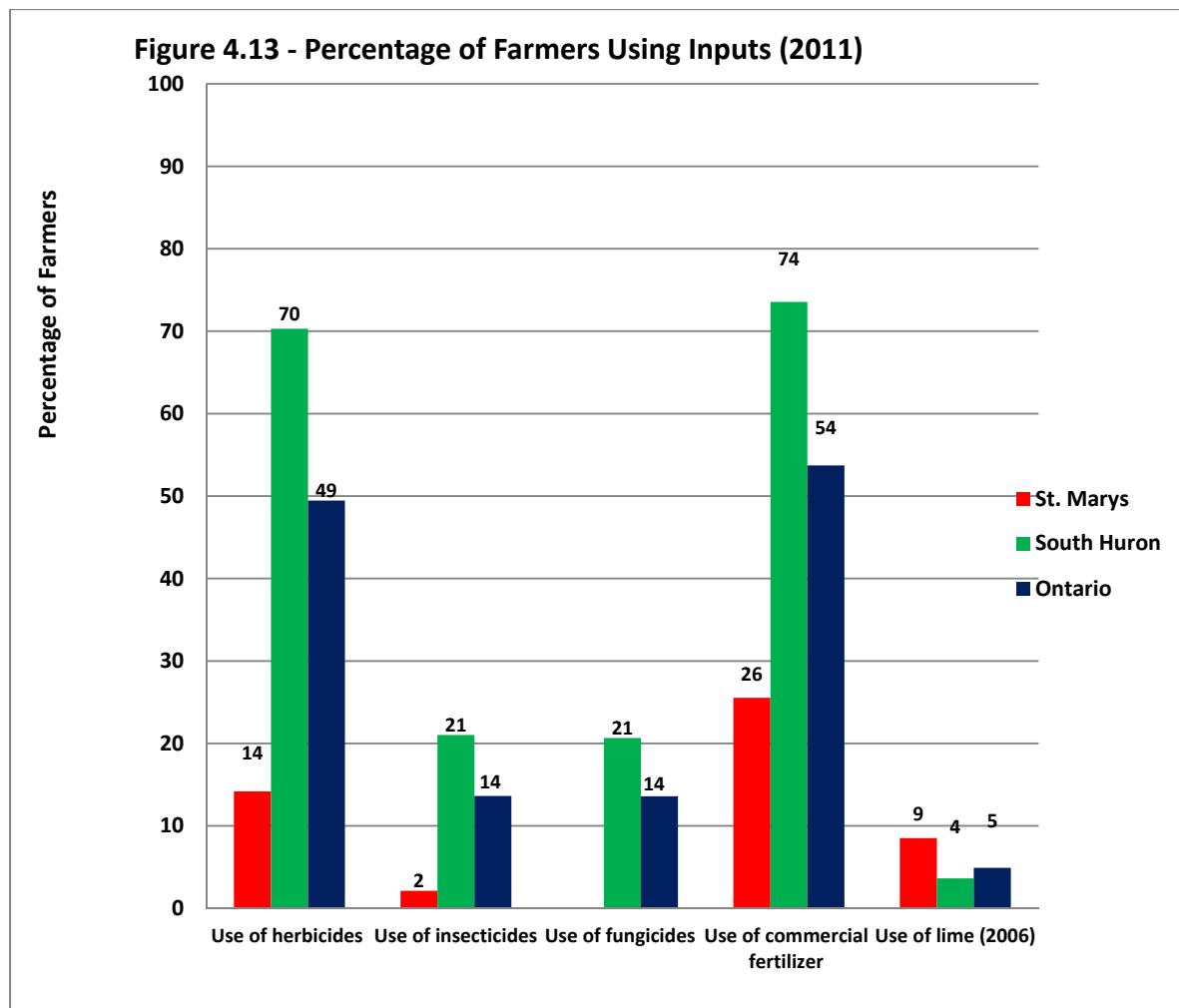
- In St. Marys, 36 out of 141 farms (26%) reported using fertilizer, whereas in South Huron, 203 out of 276 farms (74%) reported using fertilizer.
- Significantly fewer farms reported using insecticides in St. Marys (3) than in South Huron (58).
- No farms in St. Marys reported using fungicides, whereas there were 57 farms reporting fungicides in South Huron.
- 4 farms in St. Marys and only 1 farm in South Huron used tillage for weed control on summerfallow land, and no farms in either area reported using chemicals on summerfallow land.
- More farms in St. Marys (12) reported the use of lime, than South Huron (10).



4.13. Percentage of Farms Using Inputs

Figure 4.13 illustrates the percentage of farms in each area that reported using inputs such as herbicides, insecticides, fungicides, fertilizer and lime. Some of the key findings include:

- St. Marys had a higher percentage of farms reporting the use of lime (9%), followed by Ontario (5%), than South Huron (4%).
 - St. Marys farmers reported the lowest use of fertilizer, herbicide, fungicide and insecticide, followed by Ontario and then South Huron:
 - 26% of farms in St. Marys reported using fertilizer, compared to 54% in Ontario and 74% in South Huron.
 - 14% of farms in St. Marys reported herbicide, compared to 49% of farms in Ontario and 70% of farms in South Huron.
 - Only 2% of farms in St. Marys reported use of insecticide, compared to 14% of farms in Ontario and 21% of farms in South Huron.
- No farms in St. Marys reported the use of fungicides, compared to 14% of farms in Ontario and 21% of farms in South Huron.



4.14. Number of Acres Treated with Inputs

Table 4.14 lists the number of acres that were treated with inputs in St. Marys, South Huron and Ontario in 2011. Many of the types of inputs in St. Marys were listed as confidential are not comparable. Some of the key findings include:

- St. Marys farmers reported using fertilizer on 2,169 acres, and South Huron farms reported using fertilizer on 80,823 acres.
- Herbicides were used on close to six million acres in Ontario, whereas it was used on 700 acres (minimum) in St. Marys, and 82,458 acres in South Huron.

Table 4.14 - Acres of Land Treated with Inputs in 2011

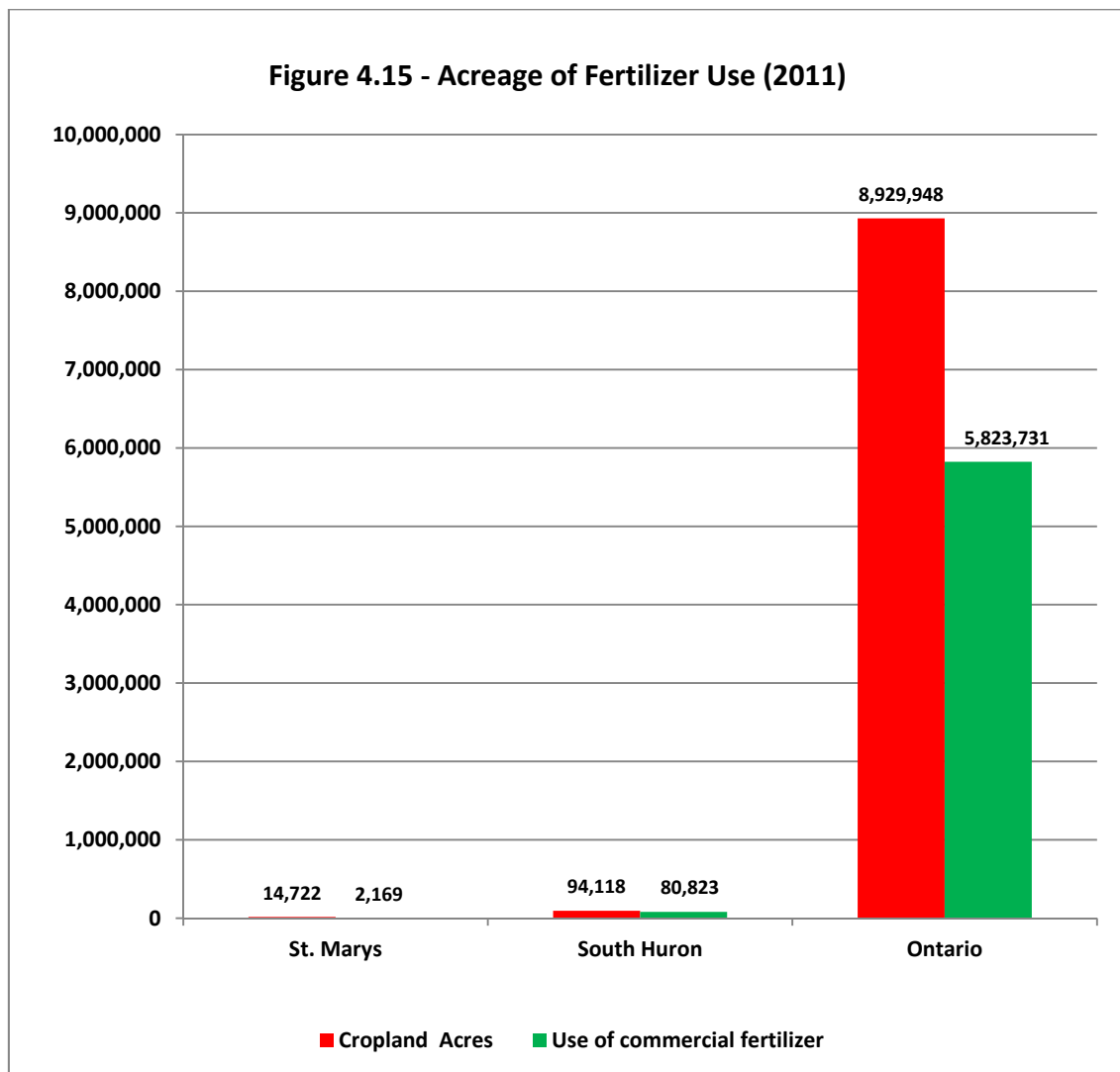
Types of Inputs	St. Marys	South Huron	Ontario
Weed control on summerfallow land, tillage only	4*	1	857
Weed control on summerfallow land, chemical only	0	0	1,578
Weed control-summerfallow land, tillage and chemical	1*	0	4,545
Use of herbicides	700*	82,458	5,923,725
Use of insecticides	1*	21,674	1,173,027
Use of fungicides	0	13,701	980,782
Use of commercial fertilizer	2,169	80,823	5,823,731
Use of lime	n/a	746	178,589

* Denotes the minimum number possible

4.15. Acreage of Fertilizer Use

Figure 4.15 illustrates the amount of acreage treated with fertilizer in comparison to cropland acres reported in St. Marys, South Huron and Ontario in 2011. Some of the key findings include:

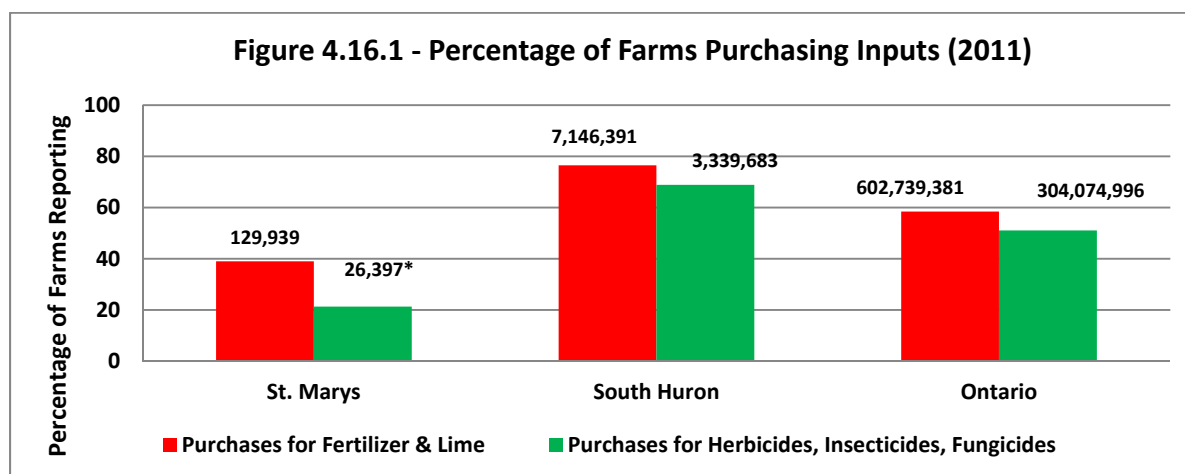
- St. Marys applied fertilizer on 15% of its total cropland acres, which was significantly lower than South Huron (86%) and Ontario (65%).
- In both South Huron and Ontario, there have been huge increases in purchases of fertilizer and lime and pesticides.
 - Between 2001 and 2011 in South Huron, purchases on fertilizer and lime increased by 2,803,192 dollars, and purchases of pesticides increased by 436,944 dollars between 2006 and 2011.
 - In Ontario, fertilizer and lime purchases increased between 2001 and 2011. Between 2006 and 2011, the amount increased by 239,041,518 dollars, and pesticide purchases increased by 46,868,468 dollars.



4.16. Percentage of and Trends in Farms Purchasing Inputs

Figure 4.16.1 illustrates the percentage of farms reporting that purchased two types of inputs, together with the total amount spent (shown above bar) in St. Marys, South Huron and Ontario in 2011. Table 4.16.2 provides the total amount of purchases in St. Marys, South Huron and Ontario in 2001, 2006 and 2011. Fertilizer and lime were collected as one category, and herbicides, insecticides and fungicides were collected as another category. Some of the key findings include:

- The percentage of farms purchasing inputs in St. Marys was much lower than South Huron or Ontario:
 - Fertilizer and lime was purchased by 39% of farms in St. Marys, 76% of farms in South Huron and 69% of farms in Ontario.
 - Pesticides were purchased by 21% of farms in St. Marys, 69% of farms in South Huron and 51% of farms in Ontario.
 - There was a significantly higher amount spent on inputs in South Huron compared to St. Marys.



- The total amount of fertilizer purchased in St. Marys declined between 2001 and 2011, and in 2011 comprised only 1.8% of the fertilizer purchased in South Huron and 0.02% in Ontario.
- The total amount of pesticides purchased in St. Marys more than doubled between 2001 and 2011, but in 2011 total pesticides purchased in St. Marys comprised only 0.8% of the total pesticides purchased in South Huron and 0.009% in Ontario.

Table 4.16.2 - Total Amount of Purchases on Inputs 2001, 2006 and 2012

Type of Input	St. Marys			South Huron			Ontario		
	2001	2006	2011	2001	2006	2011	2001	2006	2011
Amount Spent on Fertilizer & Lime	202,130	164,304	129,939	4,343,199	4,456,189	7,146,391	363,697,863	422,881,752	602,739,381
Amount Spent on Herbicides, Insecticides, Fungicides	11,315	26,512	26,397	2,952,905	2,902,739	3,339,683	257,206,528	283,021,264	304,074,996

4.17. Manure Management

The biggest risk associated with manure application is the potential leaching of nutrients and bacteria into surface water. There are setbacks in place that control where manure can be applied:

- 330 feet from municipal wells
- 50 feet from drilled wells or 100 feet from any well
- Ten to 200 feet from a shoreline (distance would depend on method of application, slope of land, etc.)

The *Nutrient Management Act* (NMA) has specific setbacks listed for regulated farms, including an automatic 10 foot buffer from manure application along watercourses (Hilborn, March, 2005).

In the application to fields, out of all types of manure, composted manure poses the least risk, solid manure has a slightly higher risk (though it is still a fairly low risk) and liquid manure has the highest risk. This is a separate matter from manure storage; in that storing liquid manure is usually less risky because runoff is fully contained (Trivers, 2014).

Incorporating manure into the soil is a better management practice than leaving manure on the surface, where it is more subject to runoff. Incorporating manure reduces nutrient and bacteria movement towards surface water and positions the nutrients closer to the crops' roots. However, conventional methods of incorporating/injecting manure can make soil more subject to erosion from wind and water, and application in the fall increases that risk.

OMAFRA advises operators to shallowly till prior to manure application, to increase the capacity of the soil to absorb the nutrients and to reduce the risk of nutrients and bacteria from leaching into field tiles or surface water. Liquid manure has a higher risk of runoff, and in the past, it has only been applied on cereal crops, grains and grassland. With technology changes, operators use a drop hose, which allows the manure to be applied underneath the canopy of the crop, and therefore will minimize leaching. Injection of liquid manure can increase the risk of leaching; however, if it is done properly, it can minimize leaching (factors include depth of soil where injection occurs, moisture levels in soil, etc.) (Payne, 2009).

a. Types of Manure Management

Figure 4.17.1 shows a comparison of manure management between St. Marys and South Huron for 2011. The total number of farms producing and using manure is higher than the number of livestock farms because it includes farms that do not produce their own manure but bring it in from other farms. Some of the key findings include:

- St. Marys had 70 livestock farms and South Huron has 116.
- St. Marys had 93 farms producing or using manure, which is less than half of the number of farms producing or using manure in South Huron (197 farms).
- The number of farms that incorporated composted manure into the soil were similar for both areas, 23 farms in St. Marys and 22 in South Huron.
- In both areas, there were more farms that incorporated solid manure into the soil than composted manure.
- There was a minimum of one farm in St. Marys that reported that they had injected or incorporated liquid manure into the soil, compared to 37 farms in South Huron.

- Liquid manure not incorporated into the soil was listed as confidential by one census subdivision in St. Marys, where the others had listed zero. This implies that it was reported by at least one farm. South Huron had much higher reports of liquid manure (25 farms) than St. Marys (0*).

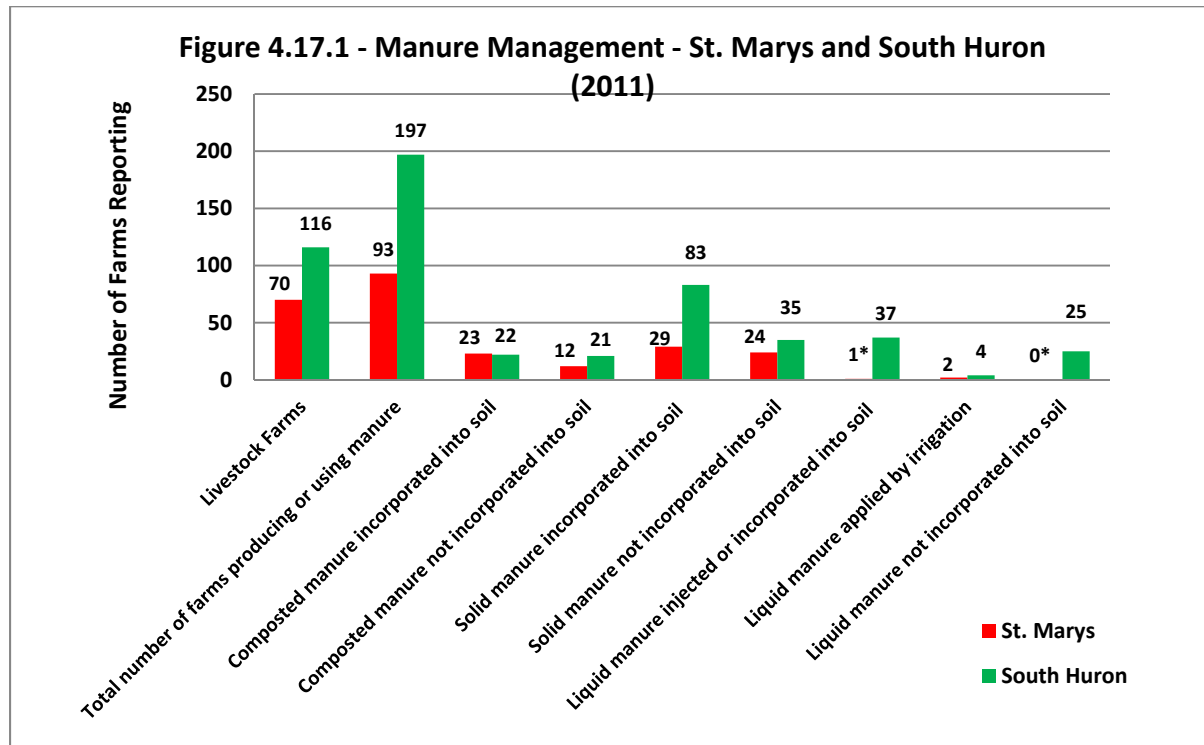
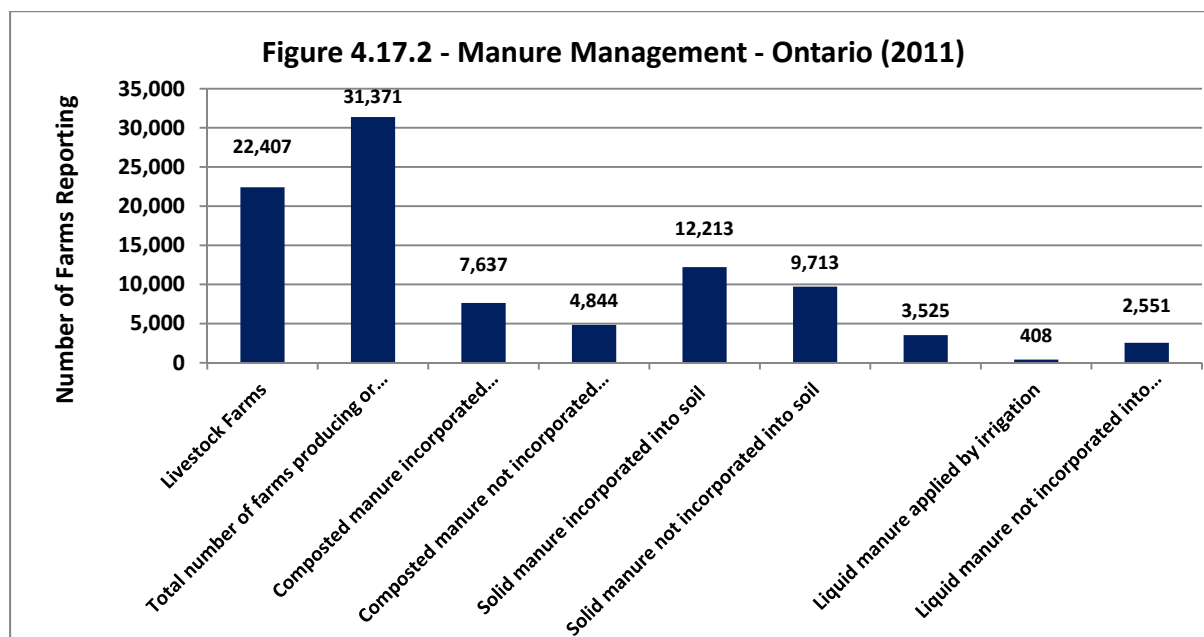


Figure 4.17-2 illustrates manure management in Ontario.

- Ontario was similar in that more farmers incorporated manure into the soil than those that did not, and more farms incorporated solid manure than composted or liquid.



b. Acreage of Manure Management

Table 4.17.3 lists the type of manure and the number of acres it was applied on, for St. Marys, South Huron and Ontario in 2011. Some of the key findings include:

- For all types of manure application, St. Marys had the least amount of acreage where it was applied.
- The total acreage of applied manure in St. Marys was less than 1% of the acreage where manure was applied in Ontario.
- Although more farms in St. Marys reported incorporating solid manure into the soil (29 farms) than those that did not (24 farms), there was a higher amount of acreage where it was not incorporated (868 acres) than where it was (630 acres).
- In South Huron, more farms reported incorporating solid manure into the soil than liquid manure; however, liquid manure was injected/ incorporated into a greater number of acres (6,891) than solid manure (5,762). There were also 3,825 acres where liquid manure was not incorporated into the soil. This implies manure management in South Huron has a greater risk because farms spread liquid manure over a greater area than both composted and solid manure combined.
- In St. Marys, liquid manure is the least common practice, and it was only spread on a minimum of three acres.
- Solid manure was used on the greatest amount of acreage in St. Marys. In Ontario, solid manure was spread over the highest amount of acreage (both incorporated and not incorporated into the soil), followed by liquid manure and then composted manure.
- In conclusion, manure management in St. Marys is much less risky due to the number of farms, amount of acreage and type of manure being applied.

Table 4.17.3 - Acreage of Manure Management (2011)

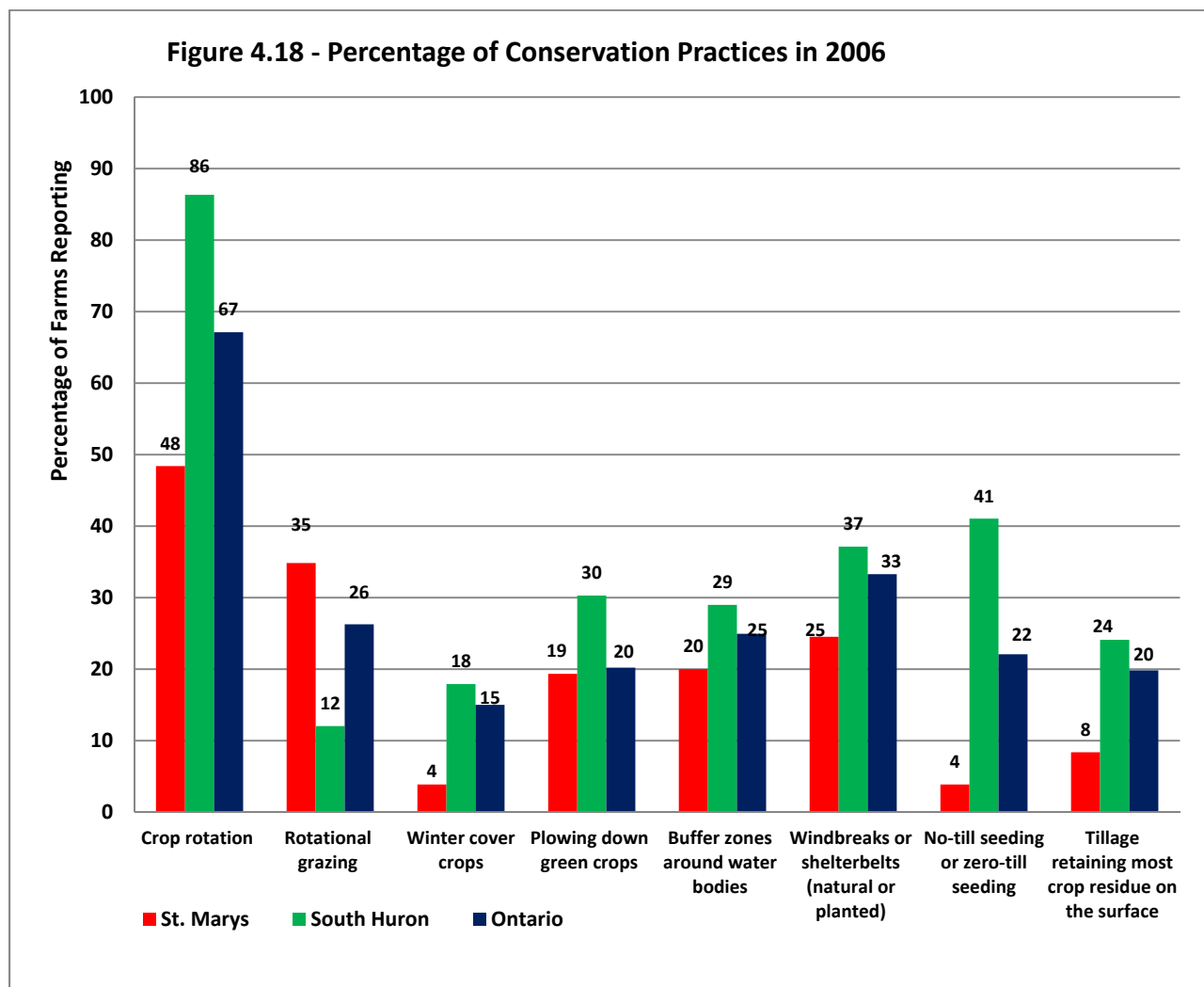
	St. Marys	South Huron	Ontario
Composted Manure Incorporated Into Soil	430	1,448	242,995
Composted Manure Not Incorporated Into Soil	191	747	140,332
Solid Manure Incorporated Into Soil	630	5,762	597,933
Solid Manure Not Incorporated Into Soil	868	1,185	386,465
Liquid Manure Injected or Incorporated Into Soil	3*	6,891	445,033
Liquid Manure Applied by Irrigation	0*	256	32,117
Liquid manure not incorporated into soil	3	3,825	244,651

** means information was listed as confidential*

4.18. Conservation Practices

Figure 4.18 demonstrates various conservation practices in St. Marys, South Huron and Ontario in 2006. Data on conservation practices in 2011 was not available for many categories; therefore, data from 2006 has been used instead. Some of the key findings include:

- Out of all three areas, St. Marys had the lowest percentage of farms reporting all types of conservation practices, aside from rotational grazing, followed by Ontario and then by South Huron.
- For all three areas, crop rotation was the most common conservation practice.
- Rotational grazing was the second most common practice in St. Marys (35%) and the least practiced in South Huron (12%). This percentage re-iterates that animals in South Huron may be raised in more intensive feedlots versus pasture, given the high number of animals reported for South Huron versus St. Marys, yet few farms reporting natural land for pasture and rotational grazing.
- St. Marys reported a significantly lower percentage of farms using winter cover crops and no-till/zero-till seeding.



4.19. Best Management Practices

Through the Canada-Ontario Farm Stewardship Program (COFSP), farmers have an opportunity to apply for funding in order to complete environmental projects developed through their EFP. This is a cost-share program, and the percentage of cost-share varies with different BMPs. The cost-share funding provides farmers with greater incentives to adopt BMPs and decrease their farm's environmental risk (OSCIA, et. Al.).

Data for BMPs completed through this program from April 2009 to March 31, 2013 was available at a District/County level; therefore, projects for Algoma District may not have all taken place within the St. Marys River AOC, and projects listed for Huron County may not have all taken place within South Huron. To comply with a privacy policy agreed to by the program partners, in all cases where the number of completed projects in a particular BMP category was less than five, the actual project numbers are masked (i.e. <5). The corresponding aggregated cost-share contribution through COFSP has not been altered (OSCIA, 2014.).

Figure 4.19.1 illustrates the total amount (both farm and COFSP contribution) spent on BMP projects in Algoma District. Some of the key findings include:

- A total of \$248,282.44 was spent on BMPs in Algoma District in from April 2009 to March 31, 2013.
- In Algoma, for each BMP category there were less than five projects completed. However, the total investment of the project varies, and depends on the cost (and extent) of the project.
- A significantly higher amount has been spent on relocating livestock confinement and horticultural facilities from riparian areas than the other BMPs.
- A considerable amount has been spent on upland and riparian area habitat and farmyard and horticultural facilities runoff control.
- 2,000 dollars has been spent on riparian erosion control structures, and close to 17,000 dollars has been spent on energy conservation measures. Close to 8,500 dollars has been spent on wintering site pasture management and 5,375 dollars on in-barn water improvements for water efficiency.

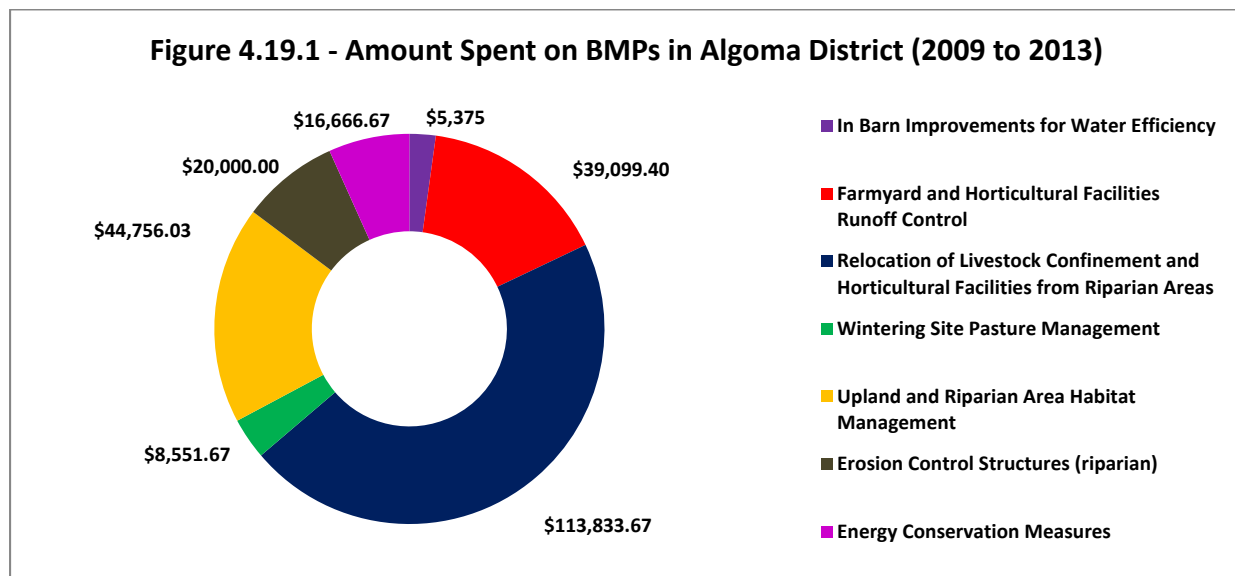
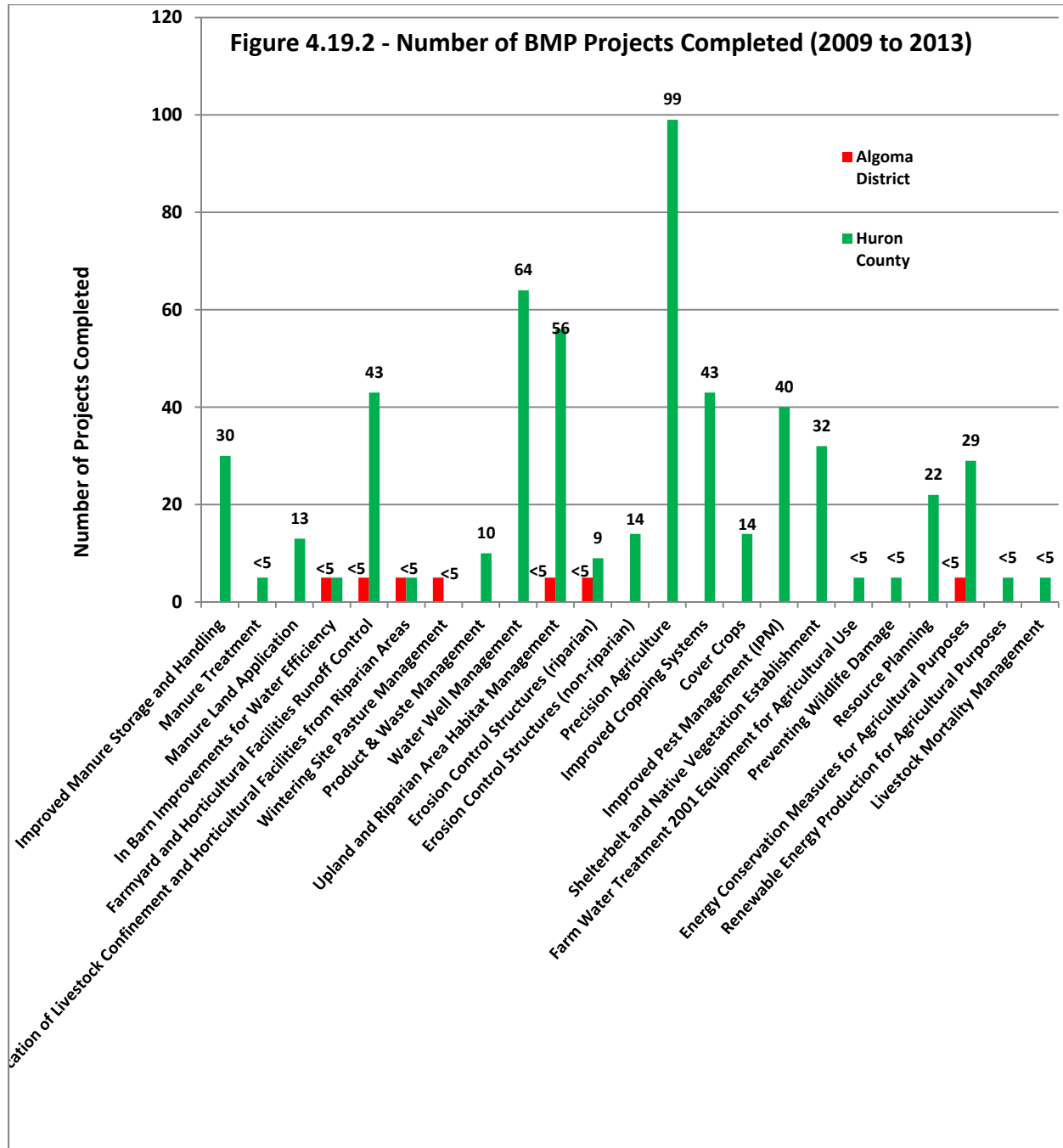


Figure 4.19.2 illustrates the number of BMPs carried out in Algoma and Huron. Some of the key findings include:

- Overall, there have been much fewer BMPs carried out over the four years in Algoma as there has been in Huron. This may reflect the lower number of farms and agricultural activity in Algoma versus Huron.
- BMPs for relocation of livestock confinement and horticultural facilities from riparian areas and in-barn water improvements for water efficiency were listed as less than five projects for both Algoma District and Huron County.



5. Summary of Key Findings

The main considerations for determining potential impacts to water quality from agricultural activities are:

- land use and intensity of agriculture (production type and acreage),
- number and area of farms,
- crops grown and risk of runoff from sediment (tillage practices, seeding and conservation practices),
- nutrients and bacteria (numbers and type of livestock, manure management and application, commercial fertilizer use), and
- pesticides (number of farms purchasing, acreage and amount spent).

The following provides a summary of the key findings from the available data:

5.1. Comparison of Census Subdivisions within the St. Marys region

a. St. Joseph Census Subdivision (St. Joseph Township, Jocelyn Township)

St. Joseph had the highest number and highest acreage of total farms. St. Joseph had the highest number of farms reporting vegetable and fruit crops and the second highest number of farms growing grain crops. In 2011, more farms in St. Joseph reported raising cattle/calves (19), hens/chickens (10), sheep/lambs (five) and goats (five) than the other census subdivisions, although the numbers of farms reporting those animals were still quite low. Although St. Joseph had the highest number of farms reporting cattle and calves, the actual number of animals was reported at 888, which was the second highest of the census subdivisions. Farms in St. Joseph reported the highest number of hens and chickens (1,111 birds). More farms in St. Joseph used solid manure than composted, and only a small number of farms (three or less) reported applying liquid manure to fields. Acreage of manure use was second highest in St. Joseph, at 629 acres. St. Joseph had the second highest number of farms reporting fertilizer and herbicide use, and the second highest amount of acreage where it was applied (3,877 acres for fertilizer and 150 acres for herbicide). Despite having a higher number of farms than the other census subdivisions, the total gross farm receipts for St. Joseph have declined. It reported the second highest amount in 2001, the highest amount in 2006 and the third highest in 2011.

Of the four consolidated census subdivisions, St. Joseph had the highest amount of agricultural activity and the highest diversity of farming. In comparison to the other subdivisions, there was a high amount of livestock farming and three dairy farms, but there was also a higher amount of vegetable and fruit cropping. St. Joseph had the most farms and the greatest amount of total farm acreage; however, it had lower reported use and acreage of commercial fertilizer, manure and herbicide application. St. Joseph Township is an island, and there could be a greater risk of runoff into the St. Marys River, depending on the distance of farms from the Two Tree River and the island shore, and if farms close to any watercourse had shoreline buffers. St. Joseph had the greatest amount of fluctuation between Census reporting periods, and it was difficult to discern any trends. Overall, impacts from agriculture on St. Joseph would likely be fairly low, if BMPs were being followed.

b. Sault Ste. Marie Census Subdivision (City of Sault Ste. Marie)

Sault Ste. Marie had the second highest number of farms but the least total acreage of farms, indicating farm size was smaller than the other census subdivisions. Sault Ste. Marie had the second highest number of farms reporting vegetable and fruit crops, and it had the highest amount of greenhouse production. Sault Ste. Marie had the least amount of cattle and calf production, with only 10 farms reporting and considerably fewer animals (126). Sault Ste. Marie and MacDonald had the second highest number of farms reporting hens/chickens (6), and farms in Sault Ste. Marie reported a total of 499 birds. This was still considerably less than 1,111 birds reported for St. Joseph. Sault Ste. Marie had a higher number of farms reporting horses (16), pigs (five) and turkeys (four) than the other census subdivisions, and the lowest number of farms reporting sheep/lambs. More farms in Sault Ste. Marie applied composted manure to fields than solid, which has the least associated risks, and it was the only census subdivision where no farms reported using liquid manure, which has the highest associated risk. Acreage of manure application was considerably lower than the other census subdivisions, by more than half, at 205 acres. Fewer farms in Sault Ste. Marie reported fertilizer use, and it had the lowest amount of acreage where it was applied (1,044 acres). Information on amount and acreage of herbicide was listed as confidential.

Sault Ste. Marie appeared to have the lowest farming impact of all four consolidated census subdivisions. It had a higher number of farms than Laird and MacDonald, but it had the lowest number of acreage for applied manure and commercial fertilizer. Cattle farming has declined, and there are few animals in production. Farming in Sault Ste. Marie was mixed, with more farms reporting vegetable and fruit crops than in Laird and MacDonald.

Sault Ste. Marie has five tributaries that flow into the St. Marys River. Given the type and intensity of farming, it would likely not have much impact on the water quality of the tributaries and in turn, the St. Marys River. Again, any impacts would come from individual farms without BMPs.

c. Laird Census Subdivision (Laird Township, Tarbutt and Tarbutt Additional Township)

Out of the four census subdivisions, Laird had the third highest number of total farms and the second highest total acreage of farms. Laird had the highest number of farms reporting grain crops, and the lowest number of farms reporting vegetable crops. Very few farms in Laird reported fruit crops.

In 2011, Laird and MacDonald had the second highest number of farms reporting cattle/calves (13), and the fewest number of farms reporting hens/chickens (5) and turkeys (1). It had a higher number of farms (3) reporting honeybee colonies than the other census subdivisions. Although Laird had the third highest number of farms reporting cattle and calves, the actual number of animals was greater than the other census subdivisions, at 1,401 animals. There were 4 dairy farms in Laird (1 in Tarbutt and Tarbutt Additional), which likely accounts for the larger number of animals. Farms in Laird reported the lowest number of hens and chickens (408 birds). More farms in Laird applied solid manure than composted, and a small number of farms (confidential) reported using liquid manure on a total of two acres. Acreage of manure use was highest in Laird, at 763 acres. Laird had the highest number of farms reporting fertilizer and herbicide use. Farms in Laird used commercial fertilizer and herbicides on a considerably higher amount of acreage than the other census subdivisions. Commercial fertilizer was applied on 6,480 acres, and herbicide was applied on 491 acres. Despite having a lower number of farms than St.

Joseph and Sault Ste. Marie, the total gross farm receipts for Laird were highest of all the census subdivisions in 2011.

Out of all the consolidated census subdivisions, agricultural activities would be the greatest from Laird. It had fewer farms than St. Joseph and Sault Ste. Marie, but had the second highest total acreage. There was more cattle/calf and grain cropping in Laird than vegetables and mixed livestock, although there were farms reporting all other types of livestock. It was the only census subdivision that reported 'oilseed and grain farming' to the NAICS, although it was only reported by one farm. Laird had the highest number of cattle/calves, and the highest acreage where manure was applied. It had a significantly higher number of acres that were treated with commercial fertilizer and herbicide than the other census subdivisions.

Laird census subdivision has two tributaries, the Bar River in Laird Township and Shoefelt Creek in Tarbutt and Tarbutt Additional Township. Overall, although Laird has a higher agricultural impact than the other subdivisions, agricultural activity is still fairly low. Impacts on water quality would depend on the BMPs of the farms surrounding the Bar River and Shoefelt Creek.

d. MacDonald Census Subdivision (MacDonald, Meredith and Aberdeen Additional Township)

In MacDonald, Meredith and Aberdeen Additional, the total number of farms has increased slightly each Census reporting year; however, it still had the lowest number of farms of all the census subdivisions, although farms reported a higher amount of total acreage than Sault Ste. Marie. MacDonald, Meredith and Aberdeen Additional reported the third highest number of farms growing vegetable crops, with very few farms producing grain crops or fruit crops. MacDonald and Laird had the second highest number of farms reporting cattle/calves (13), and MacDonald and Sault Ste. Marie reported the second highest number of farms raising hens/chickens (6). MacDonald had the third highest number of cattle and calves (625), and the number of hens and chickens was listed as confidential. An equal number of farms in Laird applied solid manure and composted manure. The number of farms using liquid manure was listed as confidential; however, it was likely only reported by one farm, as the total acreage of liquid manure applied was only one acre. Acreage of manure use was third highest in MacDonald, at 526 acres. MacDonald had the lowest number of farms reporting fertilizer use, but the amount of acreage where it was applied was the third highest (3,321 acres). In MacDonald, use of herbicide was reported by the least amount of farms and on the least amount of acreage (59 acres). MacDonald reported the fewest number of farms, which coincides with the lowest amount of total gross farm receipts reported.

Agricultural activities in MacDonald seemed to be fairly low, although despite a lower number of farms, it still had the second highest number of farms reporting cattle and calves. There were two larger beef farms that would have a larger impact than the other farms. The one beef farm has existed for years and has always had a minimum of 100 animals. Impacts would not necessarily have changed over time, but out of all the farms in the area, it would likely have a bigger impact than the others, as the cattle have access to the shoreline and could negatively impact water quality from nutrient and sediment runoff (Township of MacDonald, Meredith and Aberdeen Additional, 2014). The other beef farm has a cowherd of 80, and it is a grazing operation. There was one large hog farm in MacDonald, but that farm has stopped any large-scale production (David Trivers, 2014). There were more livestock and livestock crops reported for MacDonald than vegetable and fruit cropping, and the majority of farms are hay

production. Overall, agricultural impacts from MacDonald, Meredith and Aberdeen Additional appeared to be low, aside from the one beef operation on the shoreline.

5.2. Comparison of St. Marys, South Huron and Ontario

a. Land Use and Intensity of Agriculture

Total Number of Farms: St. Marys has almost 50% fewer farms (141 farms) than South Huron (276 farms) and comprises 0.3 % of all farms in Ontario (51,950 farms).

Acreage Farmed: In St. Marys, total acreage of farms was 33,408 acres in 2006. This was less than one third of the area reported for South Huron, recorded at 95,443 acres and less than 0.25% of total farm area in Ontario, which was 13,310,216 acres. Despite large differences of total farm acreage between all three areas, farms of 10 to 399 acres accounted for 60% or more of the farms in St. Marys, South Huron and Ontario.

Total Gross Receipts: To help provide more insight into the scope of farm operations, the gross total receipts were compared. The gross farm receipts reported for St. Marys totaled 7,203,000 dollars, which was significantly less than South Huron (146,001,000 dollars) and Ontario (over 11 billion dollars). Ninety-one percent of farms in St. Marys made 100,000 dollars or less, whereas only 46% of farms in South Huron and 66% of farms in Ontario reported less than 100,000.

Production Type: According to NAICS, in 2011 'other crop farming' was the highest industry overall for farms in St. Marys, and 'other animal farming' was the second highest reported industry. The third highest reported industry in 2011 was cattle ranching and farming. In St. Marys, there was less than 54% cattle ranching/farming, 11% less hog/pig farming and 17% less poultry/egg and sheep/goat farming than in South Huron. St. Marys had 39% more farms reporting 'other animal production' and 87% more farms reporting 'other crop farming' than in South Huron, although it was still less than one percent of Ontario levels. This shows that agricultural activities in St. Marys are much more mixed than in South Huron and Ontario.

From the Statistics Canada data, the number of farms reporting cropland acres in St. Marys (113) was less than half of the number of farms in South Huron (243), which had 80% more acres in cropland production. In Ontario, 45,604 farms reported cropland production of over eight million acres. St. Marys had the highest percentage of farms reporting Christmas tree production (5%), compared to South Huron (2%) and Ontario (1%). St. Marys had the highest percentage of farms reporting natural land for pasture (43%), compared to South Huron (33%), and Ontario (30%). Both St. Marys and South Huron comprised less the 1% of acreage under production in Ontario. Depending on the operation, greenhouse production can involve higher concentrations of fertilizers, greater amounts of water use and increased runoff. In comparison to Ontario, very few farms in both St. Marys (eight) and South Huron (three) reported greenhouse operations. In St. Marys, of those eight operations, seven produced greenhouse flowers and three produced both vegetables and 'other' products. Greenhouse production in St. Marys was greater than in South Huron, but it still comprised less than one percent of all Ontario production.

In St. Marys, the majority of farms reported growing 'all other tame hay and fodder crops' (livestock feed), and more farms reported producing barley, mixed grains, dry field peas, forage seed for seed,

potatoes, buckwheat and sugar beets than in South Huron. This is likely related to what the field crops were being produced for, as the field crops in St. Marys may have been grown more for livestock feed than food production. In South Huron, the majority of farms grew wheat, corn and soybeans, and alfalfa and alfalfa mixtures. In Ontario, over one million farms grew winter wheat, and all other crops were grown by fewer than 21,000 farms. There was much less production of field crops in St. Marys and South Huron (numbers of farms and acreage) than in Ontario.

b. Farm Runoff: Nutrients and Bacteria

Livestock: One of the biggest contributors of nutrient and bacteria runoff is livestock. St. Marys had fewer farms reporting cattle and calves, pigs and hens and chickens when compared to South Huron. More farms in St. Marys raised sheep and lambs, horses and ponies, goats and turkeys than South Huron. In Ontario, there were over 20,000 farms that reported raising cattle and calves, as opposed to 58 farms in St. Marys and 73 farms in South Huron.

Because of the quota system set by the Chicken Farmers of Ontario, no farms in St. Marys have a quota, and are therefore limited to producing no more than 300 meat birds, 99 laying hens or 50 turkeys per operation. This means there are very small poultry operations in St. Marys versus Southern and Eastern Ontario, where farmers own a quota. Under the quota system, the poultry farms must produce 90,000 birds per year (14,000 units), making those farms and the manure production much more intensive.

Despite having fairly similar numbers of farms reporting livestock in St. Marys and South Huron, farms in South Huron reported a significantly higher number of animals, implying that those farms were more livestock intensive. For example, there were only 15 more farms that reported cattle and calves in South Huron than in St. Marys; however, farms in South Huron reported over 15,000 more animals than farms in St. Marys. The same differences were observed for hens and chickens. The total number of hens and chickens reported for Ontario was over 46 million, whereas only 2,018 were reported in St. Marys, and 248,038 were reported in South Huron. The only type of animal that farms reported more of in St. Marys than in South Huron was horses and ponies. The numbers of animals reported for St. Marys still represented less than 1% of Ontario's production in all categories.

Manure Management: The biggest risk associated with manure application is the potential leaching of nutrients and bacteria into surface water. Out of all types of manure (liquid, solid, composted), composted manure poses the least risk. In terms of application to fields, solid manure is more risky than composted, although it is still a fairly low risk. Liquid manure has the highest risk, due to its high amount of nitrogen and risk of runoff. Incorporating manure into the soil is a better management practice than leaving manure on the surface, where it is more subject to runoff. Incorporating manure reduces nutrient and bacteria movement towards surface water and positions the nutrients closer to the crops' roots.

In total, St. Marys had 70 livestock farms and 93 farms producing or using manure, versus South Huron where 116 livestock farms and 197 farms producing or using manure were reported. Despite the wide difference in numbers, more farms in St. Marys, South Huron and Ontario incorporated all types of manure into the soil than those that did not incorporate it, and more farms incorporated solid manure than composted manure. St. Marys has significantly fewer reports of liquid manure than South Huron. In South Huron, liquid manure was applied onto a greater number of acres. This implies manure

management in South Huron has a potentially greater risk because farms spread liquid manure over a greater area than in St. Marys, where liquid manure was the least common practice.

In 2006, rotational grazing was the second most common conservation measure reported in St. Marys, and it was the least practiced in South Huron. This percentage re-iterates that animals in South Huron may be raised in more intensive feedlots versus pasture, given the high number of animals reported for South Huron versus St. Marys, yet few farms reporting natural land for pasture and rotational grazing. A greater percentage of farms in St. Marys reported rotational grazing than farms in Ontario.

Commercial Fertilizer: Only 26% of farms in St. Marys reported using fertilizer, whereas in Ontario, it was reported by 54% of farms and 74% of farms in South Huron. Farms reported using fertilizer on over five million acres in Ontario, whereas fertilizer was used on 2,169 acres in St. Marys and 80,823 acres in South Huron. In both South Huron and Ontario, there have been huge increases in the amount spent on fertilizer and lime purchases between 2001 and 2011, whereas on St. Marys this amount has decreased. Aside from the use of lime, St. Marys farmers reported a significantly lower use of fertilizer than South Huron and Ontario. South Huron farmers reported the highest use of fertilizer, followed by Ontario and then St. Marys.

Sediment Runoff: Tillage practices have a large influence on soil conservation. In general, frequent tilling can damage soil structure and increase the risk of soil erosion, which can then be flushed into watercourses. At the end of a farming season, some farmers leave their crops standing or leave the crop residue on the surface of the soil which helps to decrease the risk of soil erosion between late fall and spring. Another practice that reduces soil erosion is seeding without tilling. Planting windbreaks and shelterbelts help to minimize soil erosion.

Very few farms in St. Marys reported no-till or zero-till seeding, and most farms incorporated crop residue as opposed to leaving it on the surface. Only eight farms reported planting winter cover crops in 2011, and 23 farms reported windbreaks and shelterbelts. Out of all three areas, St. Marys had the lowest percentage of farms reporting all types of conservation practices, aside from rotational grazing, followed by Ontario and then by South Huron. St. Marys reported a significantly lower percentage of farms using winter cover crops and no-till/zero-till seeding than in South Huron or Ontario.

Pesticides (Herbicide, Insecticide, Fungicide): Of all pesticides, herbicide was the most reported, including that amount of acreage it was applied to and the amount that was spent purchasing it. A lower percentage of farms in St. Marys reported using insecticides and fungicides than Ontario and South Huron. Herbicide use was reported by 14% of farms in St. Marys, 49% of farms in Ontario and 70% of farms in South Huron. In both South Huron and Ontario, there have been huge increases in the amount spent on pesticide purchases between 2001 and 2011. In St. Marys, purchases of pesticides more than doubled between 2001 and 2006 but then decreased slightly in 2011, whereas purchases of pesticides in South Huron increased again in 2011. Based on the information available, significantly less acreage was treated with inputs in St. Marys than in South Huron and Ontario.

5.3. Other Considerations

The Sault Ste. Marie Region Source Protection Plan considered the impact of agricultural activities on the wellheads and surface water intakes in their Source Protection Area (SPA) which encompasses the Sault Ste. Marie census subdivision. In the SWP area there are six wells and one source water intake.

The prescribed list of drinking water threats to be considered included the following - the application of agricultural source material to land; the storage of agricultural source material; and, the management of agricultural source material (Sault Ste. Marie Region Source Protection Authority, 2011).

In their consideration of agricultural related impacts Approved Assessment Report concluded the following:

- Within the Source Protection Area, agriculture is of limited regional significance with little or no anticipated expansion.
- Present patterns of agricultural activity reflect the limited suitability and capability of both the land and the local market area to sustain a large integrated and economically viable farming community.
- The majority of the area falls under Class 4 to 7 (Canada Land Inventory) which are classes of soils with limited capability to be used for agricultural purposes. Only a small portion of the SPA is under class 3, described as undulating silts and clays with limitations of low fertility, cold climate and poorly drained soils.
- Regionally the number of farms and the amount of land area put into production has been declining since 1961 mainly as a result of the increased economic constraints being put on farming operations.
- Livestock density within the SPA is <0.5 nutrient units per acre, which is considered to be low.

With respect to the requirements of the *Nutrient Management Act*, there is only one farm in the whole AOC with a Nutrient Management Strategy (NMS), in St. Joseph Township. However, it should be noted that the NMS is only triggered by building permits, and if farms are not building, the *Nutrient Management Act* will not be triggered, meaning that there could be farms have over 300 nutrient units, but the NMA has not been triggered. Aside from that, creating a NMS is voluntary.

It is also important to note that farming is greatly influenced by market trends and pricing. While there is little field cropping in St. Marys currently, it may increase in the future. In addition, cattle and calf farming is starting to rebound from the BSE crash (OSCIA, 2014), and in the future, more farms in St. Marys may raise cattle and calves and/or existing operations may increase the number of animals. There is increasing pressure from farms in Algoma District to tile drain the land, which could have an impact on water quality and runoff from agriculture if completed. An 'Agricultural Tile Drainage and Storage Study' was carried out for Algoma District, which called for an investment of six and a half million dollars for agricultural infrastructure within the District. Algoma District has clay-based soils, and there are very few fields that are tile drained (15%), versus Southern Ontario, where almost half of the agricultural land has been tile drained. Eighty-four (84) of 317 registered farmers in Algoma reported that up to 20,000 acres would require tile drainage. The study identified that there was 81,000 acres of existing farmland within the District (Wawa-News, December 9, 2013). OMAFRA and the Ontario Soil and Crop Improvement Association (OSCIA) provide farmers with a list of BMPs that should be followed, and there are also free workshops for farms and financial incentives for farms to complete EFPs and BMPs. If the level of agriculture increased in the future in St. Marys, farms would likely have better management practices and a greater access to information than what farms have had, historically.

It is also interesting to note that the OSCIA had two commercial fertilizer spreading machines that farms in the area could rent. The rentals have declined by approximately 50%, and the volume of fertilizer that

the Co-op in the area sells. This reflects both a decline in the number of farms and a decline in fertilizer use. It may be an indication of improved manure management on dairy farms, in that they are now using their manure for fertilizer, as opposed to purchasing fertilizer (David Trivers, 2014).

5.4. Concluding Statement

Overall, agriculture in the St. Marys River AOC watershed appears to consist of smaller operations with few large farms. There is little field cropping. There have been drastic declines in the number of dairy farms, and there have also been declines in beef and hog operations (David Trivers, 2014). At the same time, there has been an increase in mixed animal and mixed crop farming. Although farms are producing and using manure, the majority is composted or solid manure, and very few farms produce or use liquid manure. Overall, impacts from agriculture in the St. Marys AOC watershed are low, especially if Best Management Practices are being followed.

In comparison with the South Huron census subdivision, St. Marys has significantly less agricultural activity, and therefore less potential to impact water quality, based on the following key findings:

- St. Marys has almost 50% fewer farms (141 farms) than South Huron (276 farms) and comprises 0.3 % of all farms in Ontario (51,950 farms).
- The total acreage of farms on St. Marys was 33,408 acres in 2006, which is less than one third of the area reported for South Huron (95,443 acres) and comprises less than 0.25% of total farm area in Ontario (13,310,216 acres).
- Total gross farm receipts reported for St. Marys was 7,203,000 dollars, which comprises only 5% of gross farm receipts reported for South Huron (146,001,000 dollars). Ninety-one percent (91%) of farms in St. Marys made 100,000 dollars or less, whereas 46% of farms in South Huron and 66% of farms in Ontario reported less than 100,000 dollars.
- The number of farms reporting cropland acres in St. Marys (113) was less than half of the number of farms in South Huron (243), which had 80% more acres in cropland production.
- St. Marys had the highest percentage of farms reporting Christmas tree production (5%), compared to South Huron (2%) and Ontario (1%).
- St. Marys had the highest percentage of farms reporting natural land for pasture (43%), compared to South Huron (33%), and Ontario (30%).
- St. Marys had fewer farms (58) reporting cattle and calves, pigs and hens and chickens when compared to South Huron (73) and Ontario (over 20,000 farms). Despite having fairly similar numbers of farms reporting livestock in St. Marys and South Huron, farms in South Huron reported a significantly higher number of animals (338,908) than St. Marys (6,272), implying that those farms were more livestock intensive.
- The total number of hens and chickens reported for Ontario was over 46 million, whereas only 2,018 were reported in St. Marys, and 248,038 were reported in South Huron.
- In total, St. Marys had 70 livestock farms and 93 farms producing or using manure, versus South Huron where 116 livestock farms and 197 farms producing or using manure were reported.
- Only 26% of farms in St. Marys reported using fertilizer, whereas in Ontario, it was reported by 54% of farms and 74% of farms in South Huron. Farms reported using fertilizer on over five million acres in Ontario, whereas fertilizer was used on 2,169 acres in St. Marys and 80,823 acres in South Huron. In both South Huron and Ontario, there have been huge increases in the amount

spent on fertilizer and lime purchases between 2001 and 2011, whereas on St. Marys this amount has decreased.

- Out of all three areas, St. Marys had the lowest percentage of farms reporting all types of conservation practices, aside from rotational grazing, followed by Ontario and then by South Huron. St. Marys reported a significantly lower percentage of farms using winter cover crops and no-till/zero-till seeding than in South Huron or Ontario.
- A lower percentage of farms in St. Marys reported using insecticides and fungicides than Ontario and South Huron. Herbicide use was reported by 14% of farms in St. Marys, 49% of farms in Ontario and 70% of farms in South Huron.
- Significantly less acreage was treated with inputs in St. Marys than in South Huron and Ontario.

When comparing the 4 census subdivisions within the St. Marys AOC watershed, Laird and St. Joseph census subdivisions were found to have the highest amount of agricultural activity, followed by MacDonald and Sault Ste. Marie census subdivisions, based on the following key findings:

- Laird Census Subdivision (Laird Township, Tarbutt and Tarbutt Additional Township): Out of all the consolidated census subdivisions, agricultural activities would potentially be the greatest from Laird. Although it had fewer farms than St. Joseph and Sault Ste. Marie, it had the second highest total acreage. There was more cattle/calf and grain cropping in Laird than vegetables and mixed livestock, and it had the highest number of cattle/calves, and the highest acreage where manure was applied. It had a significantly higher number of acres that were treated with commercial fertilizer and herbicide than the other census subdivisions. Although Laird has a higher agricultural impact than the other subdivisions, agricultural activity is still fairly low. Impacts on water quality would depend on the application of BMPs of the farms surrounding the Bar River and Shoefelt Creek.
- St. Joseph Census Subdivision (St. Joseph Township, Jocelyn Township): St. Joseph had the most farms and the greatest amount of total farm acreage, but total gross farm receipts have declined from 2001 to 2011. St. Joseph also had a lower reported use and acreage of commercial fertilizer, manure and herbicide application. Of the four consolidated census subdivisions, St. Joseph had the highest amount of agricultural activity and the highest diversity of farming. In comparison to the other subdivisions, there was a high amount of livestock farming and three dairy farms, but there was also a higher amount of vegetable and fruit cropping. St. Joseph Township is an island, and there could be a greater risk of runoff into the St. Marys River, depending on the distance of farms from the Two Tree River and the island shore, and if farms close to any watercourse applied BMPs (e.g., shoreline buffers).
- MacDonald Census Subdivision (MacDonald, Meredith and Aberdeen Additional Township): In MacDonald, the total number of farms has increased slightly each Census reporting year; however, it still had the lowest number of farms of all the census subdivisions, MacDonald had the lowest number of farms reporting fertilizer use, but the amount of acreage where it was applied was the third highest (3,321 acres). In MacDonald, use of herbicide was reported by the least amount of farms and on the least amount of acreage (59 acres). MacDonald reported the lowest amount of total gross farm receipts reported. Agricultural activities in MacDonald seemed to be fairly low, although despite a lower number of farms, it still had the second highest number of farms reporting cattle and calves. There were two larger beef farms that would potentially have a larger impact than the other farms. Overall, agricultural impacts from MacDonald, Meredith and Aberdeen Additional appeared to be low, aside from the one beef operation on the shoreline.

- Sault Ste. Marie Census Subdivision (City of Sault Ste. Marie): Sault Ste. Marie appeared to have the lowest potential farming impact of all four consolidated census subdivisions. Although it had a higher number of farms than Laird and MacDonald, it had the lowest number of acreage for applied manure and commercial fertilizer. Sault Ste. Marie also had the least amount of cattle and calf production, and cattle farming has declined. Farming in Sault Ste. Marie was mixed, with more farms reporting vegetable and fruit crops than in Laird and MacDonald. Sault Ste. Marie has five tributaries that flow into the St. Marys River. Given the type and intensity of farming, it would likely not have much impact on the water quality of the tributaries and in turn, the St. Marys River. Again, any impacts would come from individual farms without BMPs.

Agricultural activity in the St. Marys AOC watershed is considered to be fairly low, especially when compared to South Huron and Ontario. Based on the data available and from descriptions of farms in the area, farms in the St. Marys area would appear to have minimal impact on water quality in the St. Marys River. It appears that farm trends in the area consist more of mixed farming (diversity of livestock and crops) as opposed to more intensive livestock farms that are reported for South Huron and Ontario. Any impact on water quality would be from individual farms as opposed to the area, as a whole. Potential impacts from individual farms would be based on where livestock had access to a shoreline or waterbody, if there was a shoreline buffer, manure and fertilizer management, manure storage location and other factors.

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Appendix 1 – Terminology

(Source: Glossary, 2011 Census)

Agricultural products

Include any of the following products intended for sale:

- crops (hay, field crops, tree fruits or nuts, berries or grapes, vegetables, seed)
- livestock (cattle, pigs, sheep, horses, bison, deer, elk, llamas, alpacas, wild boars, goats, rabbits, etc.)
- poultry (hens, chickens, turkeys, chicks, ducks, geese, game birds, ostriches, emus, etc.), including eggs for supplying hatcheries
- animal products (milk or cream, eggs, wool, furs, meat, etc.)
- other agricultural products (Christmas trees, greenhouse or nursery products, mushrooms, sod, honey, bees, maple syrup products, etc.).

NOTE: For the Yukon, Nunavut and the Northwest Territories agricultural products also include wild animals (that have been herded, such as caribou and muskox); sled dogs kept for breeding; horses kept for outfitting and rigging; indigenous plants and berries harvested from the wild.

Composted manure

Animal dung or urine, often mixed with straw or other organic matter, which has decomposed into a stable humus.

Crop residues

Materials left in a field after the crop has been harvested. They may be baled and removed or be burned, left to decompose or plowed into the soil. These residues include straw from small grains and oilseeds, and corn stalks.

Crop rotation

Changing the type of crop grown on the same land from year to year or periodically to control weeds, insects, disease, and replenish soil nutrients or reduce erosion.

Field crops

Includes hay, alfalfa and alfalfa mixtures; wheat (spring, durum, winter); oats; barley; mixed grains; corn (grain and silage); rye (fall and spring); canola; soybeans; flaxseed; dry field peas; chick peas; lentils; beans (dry white and other beans); forage seed; potatoes; mustard seed; sunflowers; canary seed; ginseng; buckwheat; sugar beets; caraway seed; triticale; and other field crops such as tobacco, hemp, spelt, coriander and other spices, etc.

Fodder crops

Includes alfalfa, barley, clover, corn and sorghum and any other crops in which the whole plant is used to feed cattle, sheep and other ruminants.

Forage seed

Seed from fodder crops grown commercially for seed. Includes timothy, fescue, clover, alfalfa, wheat grass, and turf grass seed.

Fungicide

A chemical used to control, suppress or kill fungi that severely interrupt normal plant growth.

Green manure crops

Young green plants, such as buckwheat and red clover, incorporated into the soil to improve fertility. Usually grown only to improve the soil. Plowing down green crops: when a crop such as winter wheat, fall rye, buckwheat or red clover is planted but "plowed under" before it can be harvested.

Gross Farm Receipts

Receipts, prior to deducting expenses, from all agricultural and forest products sold, program payments and custom work. It does not include the sale of capital items or receipts from sale of goods purchased only for retail sales.

Herbicide

A chemical used to control, suppress, or kill plants or severely interrupt their normal growth.

Insecticide

A substance or mixture of substances intended to prevent, destroy, repel or minimize the effect of any insects that may be present.

Natural land for pasture

Areas used for pasture that have not been cultivated and seeded, or drained, irrigated or fertilized. Includes native pasture/hay (indigenous grass suitable as feed for livestock and game); rangeland (land with natural plant cover, principally native grasses or shrubs valuable for forage); grazeable bush (forest land and bushy areas used for grazing, not land cultivated for crops or with dense forest), etc.

Non-workable land

Includes natural pastureland, woodland, wetlands, ponds, bogs, sloughs, etc., barnyards, lanes, etc., and land on which farm buildings are located.

Pesticide

Any chemical used for controlling, suppressing or killing insects, weeds or fungi. Includes fungicides, herbicides, and insecticides.

Rotational grazing

A practice allowing forages to recover after each grazing period. Includes alternating two or more pastures at regular intervals or using temporary fences within pastures to prevent overgrazing.

Summerfallow

Involves keeping normally cultivated land free of vegetation throughout one growing season by cultivating (plowing, discing, etc.) and/or applying chemicals to destroy weeds, insects and soil-borne diseases and allow a buildup of soil moisture reserves for the next crop year. Includes chemfallow, tillage, and/or a combination of chemical and tillage weed control on the same land. Part of the crop rotation system in Western Canada. Rarely found in Eastern Canada.

Summerfallow land

Land on which no crops will be grown during the year but on which weeds will be controlled by cultivation or application of chemicals.

Tame or seeded pasture

Grazeable land that has been improved from its natural state by seeding, draining, irrigating, fertilizing or weed control. **Does not include** areas of land harvested for hay, silage or seed.

Winter cover crop

A crop, such as red clover, fall rye, etc., seeded in the fall to protect the soil from water and wind erosion during the winter and from heavy rains and run-off in the spring.

Workable land

All arable or cleared lands including area in hay, crops, summerfallow, and tame or seeded pasture land.

Appendix 2 – Contacts

Environment Canada

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