Agricultural Ecumene Boundary File - Reference Guide

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What's new?

- This document is available in HTML and PDF.
- All 2016 Census files are portrayed in Lambert conformal conic projection (North American Datum of 1983 [NAD83]).
- All 2016 Census spatial files are available as national files.

1. About this guide

This reference guide is intended for users of the *Agricultural Ecumene Boundary File*. The guide provides an overview of the files, the general methodology used to create them, and important technical information for users.

This reference guide does not provide details on specific software packages that are available for use with the *Agricultural Ecumene Boundary File*. Users are advised to contact the appropriate software vendor for information.

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2. Overview

The *Agricultural Ecumene Boundary File* represent Canada's agricultural ecumene. Geographers use the term "ecumene" to describe the area inhabited or utilized by humans. Statistics Canada uses this definition in agriculture to designate the regions where the country's main agricultural activities take place.

The *Agricultural Ecumene Boundary File* is portrayed in Lambert conformal conic projection (North American Datum of 1983 [NAD83]). Figure 2.1 illustrates an example of a Lambert conformal conic projected cartographic boundary file and an unprojected file in latitude and longitude coordinates.

Figure 2.1
Example of a map projection and unprojected coordinates
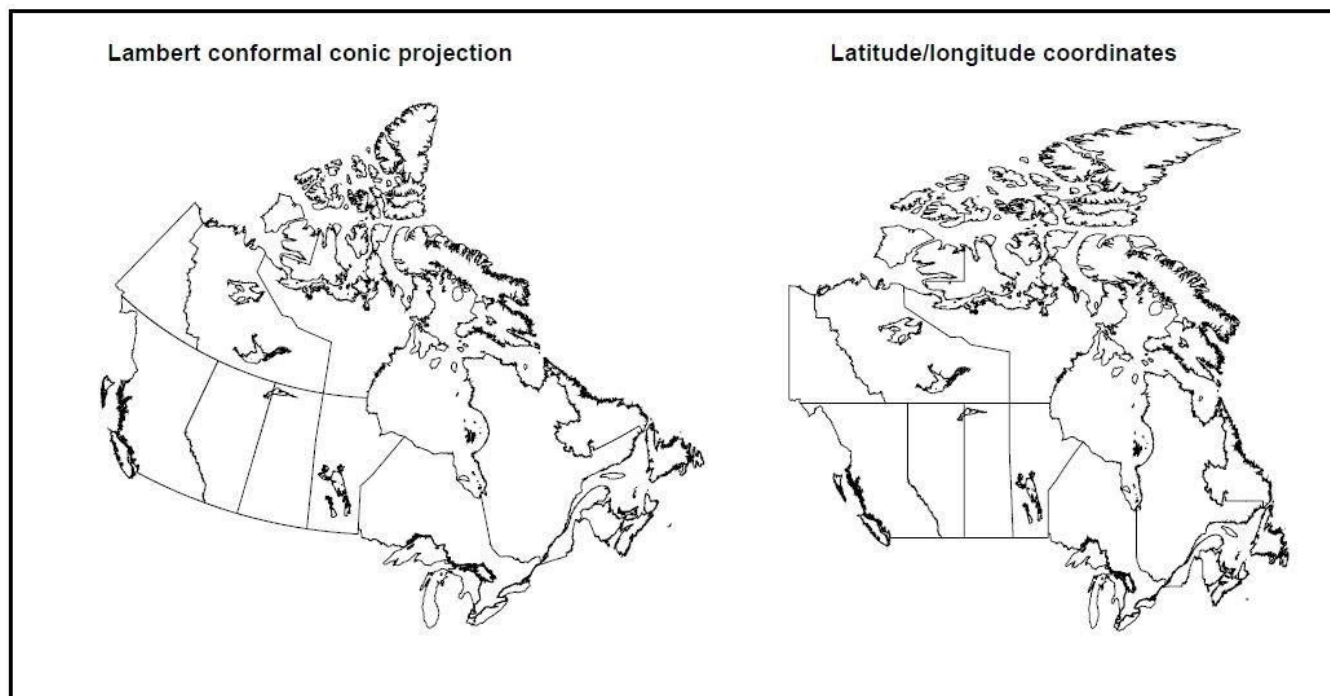
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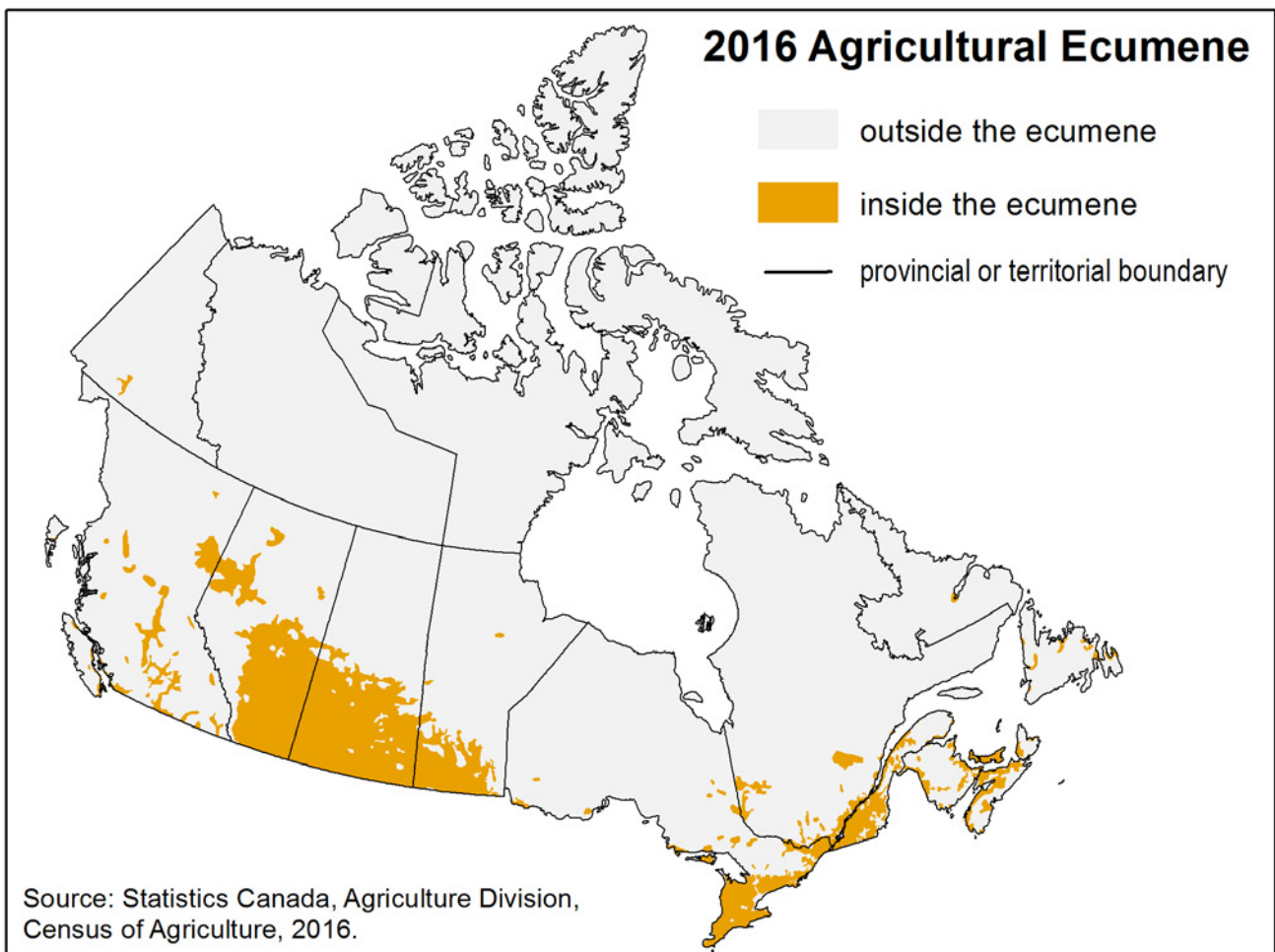
3. About this product

Purpose of the product

The agricultural ecumene is designed to assist users in thematically mapping data. By effectively masking ecumene areas of Canada, it enables users to display data in areas where agriculture is concentrated.

An ecumene mask is useful for dot and choropleth thematic mapping. In dot map applications, if an ecumene is not applied, the dots may be spread over the spatial extent of a geographic area. This approach defeats the main attributes of dot mapping (i.e., showing correct location, extent and density of various characteristics).

In choropleth map applications, one of the inherent limitations is that the statistical distribution is assumed to be homogeneous or uniformly spread over each geographic area, and is consequently represented by a single tone or colour covering the entire area. Using an ecumene limits the display to only those areas where population is found and results in a more accurate representation of the spatial distribution of data.

Figure 3.1
Example of an ecumene mask with the provinces and territories generalized cartographic boundary file

2016 Agricultural Ecumene

- outside the ecumene
- inside the ecumene
- provincial or territorial boundary

Source: Statistics Canada, Agriculture Division, Census of Agriculture, 2016.

Definitions and concepts

More details can be found in the *Farm and Farm Operator Data* page, under the *Census Dictionary* section (http://www.statcan.gc.ca/pub/95-640-x/95-640-x2016001-eng.htm).

Content

The *Agricultural Ecumene Boundary File* product consists of two spatial files:

1. Ecumene mask file

The ecumene mask consists of polygons flagged with a value: 1, being inside the ecumene; 0, outside the ecumene. There is at least one ecumene polygon in each census division in Canada where agricultural data were published for 2016, with the exception of the Northwest Territories, which has no significant concentration of agricultural activity.

2. Census division boundary file inside agricultural ecumene

The census division boundary file inside the agricultural ecumene includes the census division boundaries for which 2016 Census of Agriculture data were published (with the exception of the Northwest Territories, as previously mentioned), only for the areas inside the agricultural ecumene. Related attribute information is available for each census division polygon, including a unique identifier, name, type and provincial unique identifier and name.

General methodology

The National Geographic Database (NGD) is a joint Statistics Canada-Elections Canada initiative to develop and maintain a spatial database which serves the needs of both organizations. The focus of the NGD is the continual improvement of quality and currency of spatial coverage using updates from provinces, territories and local sources. The native files used for the creation of the 2016 Census agricultural ecumene spatial files reside on Statistics Canada's Spatial Data Infrastructure which was derived directly from data stored on the NGD environment.

To produce the files, the following processes were applied:

Creation of the Agricultural Ecumene Boundary File

(A) Ecumene mask file

The ecumene mask file was created using land area and 2016 Census of Agriculture data to calculate the importance of agricultural activity in each dissemination area (DA), the smallest geographic unit available for these data (unpublished data). Each DA was then classified as an agricultural ecumene area or a non-ecumene area (without significant agricultural activity), according to two variables derived from the Census of Agriculture: the sum of crop areas and pasture land, and total gross agricultural receipts. For each of these two variables, DAs belonging to the first 90% to 95% of each province's distribution were selected for one of the variables. For the census divisions with 2016 Census of Agriculture data but for which no DA was included in the initial ecumene mask selection, additional regions were added by selecting the DAs where agricultural activity was most significant within these census divisions, according to the above-mentioned criteria.

Given the highly variable shape of DAs, the distribution and size of which closely reflect the distribution of the population, adjustments were made to better reflect the actual limits of agricultural activities by using high- and medium-resolution satellite images as a base map, on which crop areas and pasture land can be easily identified.

Finally, the selected DAs were aggregated, and the resulting ecumene was smoothed and buffered to facilitate small-scale mapping.

(B) Creation of the generalized cartographic boundary files

To create the generalized cartographic boundary files, a subset of the full hydrography was created using the coastal layer as a starting point. The coastal hydrographic features were then used to erase the portions of census divisions that are covered by coastal waters.

Final data processing consisted of the conversion from the file geodatabase format, using FME® (Safe Software), into the following Geographic Information System (GIS) file formats: ArcGIS® (.shp), Geography Markup Language (.gml) and MapInfo® (.tab).

The ArcGIS®, Geography Markup Language and MapInfo® files were compressed into WinZip® files (file extension .zip) and made available for download from the Internet.

Limitations

The positional accuracy of these files does not support cadastral, surveying, digitizing or engineering applications.

The input data used to create the files were obtained from several sources having a wide range of scales.

The files will not be precise if plotted at a larger scale than the scale of the source material used in its creation. Maps created from the files included in the *Agricultural Ecumene Boundary File* should not be used to determine the precise location of boundaries. They are not intended to serve as a legal or cadastral representation of the geographic areas.

Comparisons to other products/versions

The agricultural ecumene mask of the 2016 Census of Agriculture file is generalized to render it suitable for cartographic display at a small scale (i.e., 1:20,000,000 to 1:25,000,000). Due to this generalization, the position of the shoreline is not necessarily consistent with the suite of census cartographic boundary files.

The files included in the *Agricultural Ecumene Boundary File* are similar but not necessarily consistent with ecumene boundary files released prior to the 2016 Census.

Using with other products

The files included in the *Agricultural Ecumene Boundary File* can be linked to other 2016 Census statistical data products using the unique identifier (UID) for each geographic area.

The files included in the *Agricultural Ecumene Boundary File* are generalized to render them suitable for cartographic display at a small scale. Due to this generalization, the position of the shorelines are not necessarily consistent with the suite of 2016 Census cartographic boundary files or 2016 Census *Road Network File*.

When considering using the files included in the *Agricultural Ecumene Boundary File*, users should be aware of the compatibility of these files with those that are available from other sources; however, they may not be consistent with Statistics Canada files.

Reference date

The geographic reference date is a date determined by Statistics Canada to finalize the geographic framework for which 2016 Census statistical data are collected, tabulated and reported. The reference date for 2016 Census standard geographic areas is January 1, 2016.

4. Technical specifications

Record layouts and data descriptions

Agricultural ecumene mask file

The agricultural ecumene mask file contains polygons for each ecumene and non-ecumene pocket, which combined, cover all of Canada.

Table 4.1
Agricultural ecumene mask file record layout

Attribute name	Data type	Description
FID	Object ID (4)	Specific to ArcGIS®
Shape	Geometry	Specific to ArcGIS®
CartographicBoundary	MultiPolygon PropertyType	Shape geometry; specific to Geography Markup Language
Ecumene	Integer (1)	A one-digit code indicating whether the polygon is part of the ecumene: 1 = in the ecumene; 0 = outside the ecumene

Census division boundary file inside the agricultural ecumene

The Census division boundary file inside the agricultural ecumene portrays the census division boundaries for which 2016 Census of Agriculture statistical data are disseminated, with the exception of the Northwest Territories (as previously explained). Census division (CD) is the general term for provincially legislated areas (such as county, *municipalité régionale de comté* and regional district) or their equivalents. In other provinces and the territories where laws do not provide for such areas, Statistics Canada defines equivalent areas for statistical reporting purposes in cooperation with these provinces and territories. The CD not covered by the Census of Agriculture are not part of this file.

Table 4.2
Census division boundary file inside the agricultural ecumene record layout

Attribute name	Data type	Description
FID	Object ID (4)	Specific to ArcGIS®
Shape	Geometry	Specific to ArcGIS®
CartographicBoundary	MultiPolygon PropertyType	Shape geometry; specific to Geography Markup Language
CDUID	Character (4)	Uniquely identifies a census division (composed of the two-digit province/territory unique identifier followed by the two-digit census division code)
CDNAME	Character (100)	Census division name
CDTYPE	Character (3)	Census division type
PRUID	Character (2)	Uniquely identifies a province or territory
PRNAME	Character (100)	Province or territory name

Table 4.3
Census division types by province and territory, 2016 Census

Census division type		Canada	Newfoundland and Labrador	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Yukon	Northwest Territories	Nunavut
CDR	Census division / Division de recensement	85	11	…	…	…	5	9	23	18	19	…	…	…	…
CT	County / Comté	15	…	…	…	15	…	…	…	…	…	…	…	…	…
CTY	County	41	…	3	18	…	…	20	…	…	…	…	…	…	…
DIS	District	10	…	…	…	…	…	10	…	…	…	…	…	…	…
DM	District municipality	1	…	…	…	…	…	1	…	…	…	…	…	…	…
MRC	Municipalité régionale de comté	81	…	…	…	…	81	…	…	…	…	…	…	…	…
RD	Regional district	28	…	…	…	…	…	…	…	…	…	28	…	…	…
REG	Region	10	…	…	…	…	…	…	…	…	…	1	…	6	3
RM	Regional municipality	6	…	…	…	…	…	6	…	…	…	…	…	…	…
TÉ	Territoire équivalent	12	…	…	…	…	12	…	…	…	…	…	…	…	…
TER	Territory / Territoire	1	…	…	…	…	…	…	…	…	…	…	1	…	…
UC	United counties	3	…	…	…	…	…	3	…	…	…	…	…	…	…
Total		**293**	**11**	**3**	**18**	**15**	**98**	**49**	**23**	**18**	**19**	**29**	**1**	**6**	**3**

… not applicable
Source: Statistics Canada, 2016 Census of Population.

Attribute domain values

CDTYPE	CD description
CDR	Census division / Division de recensement
CT	County / Comté
CTY	County
DIS	District
DM	District municipality
MRC	Municipalité régionale de comté
RD	Regional district
REG	Region
RM	Regional municipality
TÉ	Territoire équivalent
TER	Territory / Territoire
UC	United counties

File specifications

Not applicable

Software formats

The *Agricultural Ecumene Boundary File* is available for download from the Statistics Canada website in the following formats:

- ArcGIS® format
  File extension: .shp
- Geography Markup Language version 3.1.1
  File extension: .gml
- MapInfo® format
  File extension: .tab

This reference guide does not provide details on specific software packages that are available for use with the *Agricultural Ecumene Boundary File*. Users are advised to contact the appropriate software vendor for information.

System requirements

Not applicable

File extension and accented character information

The ArcGIS®, Geography Markup Language and MapInfo® files are compressed into WinZip® files (file extension .zip).

An XML schema file (.xsd) is included to describe and validate the structure and content of the .gml files.

Some *Agricultural Ecumene Boundary File* contain attributes with accented characters. They were successfully tested on desktop versions of ArcGIS® 10.2.2, MapInfo® 12.0 and FME Data Inspector 2015.1.

Geographic representation

The *Agricultural Ecumene Boundary File* is available on the Statistics Canada website in the following geographic representation:

- Projection: Lambert conformal conic
- False easting: 6200000.000000
- False northing: 3000000.000000
- Central meridian: -91.866667
- Standard parallel 1: 49.000000
- Standard parallel 2: 77.000000
- Latitude of origin: 63.390675
- Linear unit: metre (1.000000)
- Datum: North American 1983 (NAD83)
- Prime meridian: Greenwich
- Angular unit: degree
- Spheroid: GRS 1980

The North American Datum of 1983 (NAD83) is an adjustment of the 1927 datum (NAD27) that reflects the higher accuracy of geodetic surveying.

Users of the *Agricultural Ecumene Boundary File* can transform the files into the representation that best satisfies their needs, knowing the effects these representations have on angles, areas, distances and direction. Users have the option to choose the best projection in concert with mapping objectives.

File naming convention

Spatial product file names follow a file naming convention. The standard geographic area and code, file type, geographic reference date, software type and language are embedded within the file name. Standardizing the names of the files facilitates the storage of compressed files, all having the extension .zip.

Each file name is 13 characters in length. All alphabetic characters are in lower case to maintain consistency.

First character: projection of file

- l — projection in Lambert conformal conic

Next characters: primary geographic level of file

- cdagecu — census division inside agricultural ecumene
- agecu — agricultural ecumene

Next three numbers: geographic code of coverage

- 000 — Canada

Next character: file type

- e — ecumene

Next two numbers: geographic reference date

The geographic reference date is a date determined by Statistics Canada for the purpose of finalizing the geographic framework for which 2016 Census statistical data are collected, tabulated and reported. For 2016 Census products, the geographic reference date is January 1, 2016.

- 16 — geographic reference date is 2016

Next character: file format

- a — ArcGIS® (.shp)
- g — Geography Markup Language (.gml)
- m — MapInfo® (.tab)

Final two characters: language

- _e — English
- _f — French

5. Data quality

Spatial data quality elements provide information on the fitness-for-use of a spatial database by describing why, when and how the data are created, and how accurate the data are. The elements include information on the lineage, positional accuracy, attribute accuracy, logical consistency and completeness. This information is provided to users for all spatial data products disseminated for the census.

Lineage

Lineage describes the history of the spatial data, including descriptions of the source material from which the data were derived, and the methods of derivation. It also contains the dates of the source material, and all transformations involved in producing the final digital files.

The 2016 Census standard geographic area unique identifier, name, type, and the relationships among the various geographic levels are found on Statistics Canada's Spatial Data Infrastructure (SDI). The data for administrative areas are updated using information from provincial and territorial sources.

Positional accuracy

Positional accuracy refers to the absolute and relative accuracy of the positions of geographic features. Absolute accuracy is the closeness of the coordinate values in a dataset to values accepted as or being true. Relative accuracy is the closeness of the relative positions of features to their respective relative positions accepted as or being true. Descriptions of positional accuracy include the quality of the final file or product after all transformations.

The Spatial Data Infrastructure is not fully Global Positioning Systems (GPS)-compliant. However, every possible attempt is made to ensure that the standard geographic area boundaries maintained in the Spatial Data Infrastructure respect the limits of the administrative entities that they represent (e.g., census division and census subdivision) or on which they are based (e.g., census metropolitan area or census agglomeration). The positional accuracy of these limits is dependent upon source materials used by Statistics Canada to identify the location of limits. In addition, due to the importance placed on relative positional accuracy, the positional accuracy of other geographic data (e.g., road network data and hydrographic data) that are stored within the Spatial Data Infrastructure is considered when positioning the limits of the geographic areas.

Attribute accuracy

Attribute accuracy refers to the accuracy of the quantitative and qualitative information attached to each feature (e.g., census division name, unique identifier).

As noted under Lineage, the attributes (names, types and unique identifiers) for all geographic areas are sourced from the Spatial Data Infrastructure. The names and types for administrative areas have been updated for the 2016 Census using source materials from provincial, territorial and municipal authorities.

The attribute data associated with the polygons in the boundary files were independently verified against the data in the Spatial Data Infrastructure and found to be accurate.

Logical consistency

Logical consistency describes the fidelity of relationships encoded in the data structure of the digital spatial data.

All geographic areas contained in the two files have been verified to have a unique identifier that is valid for the 2016 Census.

The agricultural ecumene mask boundary file was verified to ensure that every census division with Census of agriculture data contains an ecumene pocket, with the exception of the Northwest Territories.

Consistency with other products

As a result of the generalization of the shoreline, the boundaries in the province and territory and census division files of this product are not necessarily consistent with the shoreline of the 2016 Census Cartographic Census Division Boundary files.

Topology checks were performed with the *Road Network File* and boundary files to measure the degree of integration amongst these products. The results indicated the degree of integration was within the default tolerance parameters as defined below.

XY Resolution: 0.000005 metres
XY Tolerance: 0.00001 metres

Completeness

Completeness refers to the degree to which geographic features, their attributes and their relationships are included or omitted in a dataset. It also includes information on selection criteria, definitions used and other relevant mapping rules.

The ecumene mask covers over 98% of the agricultural activity of Canada, based on the buffered dissemination area.

The *Agricultural Ecumene Boundary File* contains a standard geographic area boundary file that is generalized: the boundary file for census divisions inside the agricultural ecumene. This file includes the 278 census divisions for which 2016 Census of Agriculture data was disseminated, with the exception of the Northwest Territories, and excludes 15 census divisions without significant agricultural activity.

Appendices

See definitions of the geography universe from the *Dictionary, Census of Population, 2016*. http://www12.statcan.gc.ca/census-recensement/2016/ref/dict/index-eng.cfm

See Figure 1.1, Hierarchy of standard geographic areas for dissemination, 2016 Census from the Dictionary, Census of Population, 2016. http://www12.statcan.gc.ca/census-recensement/2016/ref/dict/figures/f1_1-eng.cfm

See Table 1.1, Geographic areas by province and territory, 2016 Census from the *Dictionary, Census of Population*, 2016. http://www12.statcan.gc.ca/census-recensement/2016/ref/dict/tab/t1_1-eng.cfm

See section *Census Dictionary from the page Farm and Farm Operator Data* of the 2016 Census of Agriculture. http://www.statcan.gc.ca/pub/95-640-x/95-640-x2016001-eng.htm