Agricultural Ecumene Boundary File - Reference Guide

2021 Census of Agriculture

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Table of contents

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This reference guide is intended for users of the *2021 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.

What's new?

- As of 2020, all the boundaries maintained by Statistics Canada have been adjusted to the more current, accurate and consistent CanVec hydrographic features (Topographic Data of Canada – Natural Resources Canada), which comply with international geomatics standards seamlessly across Canada.
- The *2021 Agricultural Ecumene Boundary File* is now available in File Geodatabase (.gdb), Esri® REST and Web Mapping Service (WMS) formats.
- The *2021 Agricultural Ecumene Boundary File* is no longer available in MapInfo (.tab) format.

1. About this guide

This reference guide does not provide details on specific software packages that are available for use with the *2021 Agricultural Ecumene Boundary File*. Users are advised to contact the appropriate software vendor for information.

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2. Overview

The *2021 Agricultural Ecumene Boundary File* represents Canada's agricultural ecumene. Ecumene is a term used by geographers to indicate inhabited land, or utilized by humans. Statistics Canada applies this definition in agriculture to designate the regions where the country's main agricultural activities take place.

The product also includes a generalized cartographic boundary file of the census consolidated subdivisions (CCSs).

The *2021 Agricultural Ecumene Boundary File* is available for download or viewing, and is portrayed in Lambert conformal conic projection (North American Datum of 1983 [NAD83]).
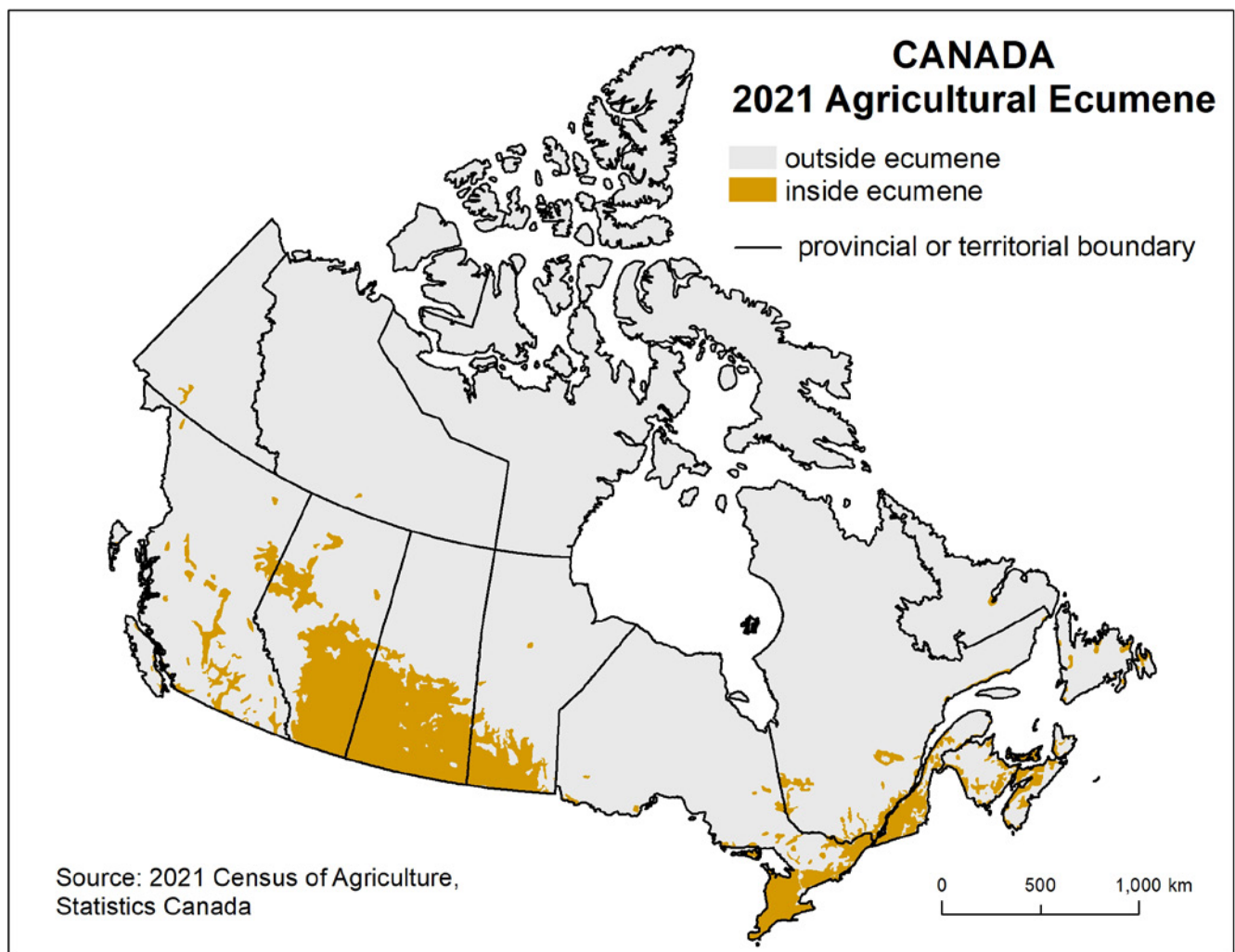
3. About this product

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 agricultural activities are found and results in a more accurate representation of the spatial distribution of data.

Figure 3.1
Example of the agricultural ecumene mask with the province and territory generalized cartographic boundary file

CANADA
2021 Agricultural Ecumene

outside ecumene
inside ecumene

— provincial or territorial boundary

Source: 2021 Census of Agriculture,
Statistics Canada

0   500   1,000 km

Definitions and concepts

Geographic terms and concepts are briefly defined in the *Dictionary, Census of Population, 2021*.

For more details on Farm and Farm Operator Data please consult the Census of Agriculture portal.

Content

The *2021 Agricultural Ecumene Boundary File* consists of two spatial files:

1. Agricultural Ecumene Mask File

The "Agricultural Ecumene Mask File" 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 of the 1,673 CCSs in Canada where Census of Agriculture data were published for 2021.

2. Census Consolidated Subdivision Generalized Cartographic Boundary File

The "Census Consolidated Subdivision Generalized Cartographic Boundary File" represents a simplified (smoothed) version of the 2021 CCSs boundaries. Shapes have been generalized at a spatial resolution of five kilometres, including the coastline. Related attribute information is available for each CCS polygon, including a unique identifier (CCSUID), a name (CCSNAME), dissemination geography unique identifier (DGUID), as well as province and territory unique identifier (PRUID). A CCS is the smallest level of geography for which Census of Agriculture data are available. Some of the subdivisions report no agricultural activity.

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 2021 Census agricultural ecumene spatial files reside on Statistics Canada's Spatial Data Infrastructure (SDI) which was derived directly from data stored on the NGD environment.

Creation of the *2021 Agricultural Ecumene Boundary File*

Agricultural Ecumene Mask File

The "Agricultural Ecumene Mask File" was created using two main sources of data: 1- 2021 Census of Agriculture data at the census subdivision (CSD) level (unpublished data) and 2- Agriculture and Agri-Food Canada Annual Crop Inventory.

1. **2021 Census of Agriculture data**
   For the 2021 edition of the Census of Agriculture, the main farm location was collected and assigned to a CSD. Information on the number of farms, area in crops, area in pasture and total farm capital was used to detect and locate the agricultural activity in the country. This information was not sufficient for building the agricultural ecumene, mainly because CSDs are often quite large and are not necessarily entirely covered with agricultural land, and their boundaries do not respect the geographic distribution of agricultural land. So Census of Agriculture data were combined with more precise land cover information for a more accurate end product (see next point).

2. **Agriculture and Agri-Food Canada Annual Crop Inventory**
   Since 2011, Agriculture and Agri-Food Canada has produced annually a complete land cover map of the southern portion of Canada, where the vast majority of agricultural land is located. This map is built using various sources of satellite imagery and is released at a spatial resolution of 30 metres. Classes 120 to 199 are related of agricultural land cover types and were isolated to overlay with the CSDs identified in previous step.

There are types of farms that are not associated with a specific land cover type, therefore that cannot be easily detected on satellite imagery, like a small greenhouse or a mushroom farm. Those entities with significant importance are detected using financial information (farm capital).

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

Generalized Census Consolidated Subdivisions Cartographic Boundary File

To create the "Generalized Census Consolidated Subdivisions Cartographic Boundary File", a generalization algorithm was used with a spatial resolution of five kilometres to smooth or simplify the full resolution CCSs.

Post-processing

The files were verified for the spatial and attribute content, translated into French and English, and appropriately named according to the file naming convention. 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: Shapefile (.shp), Geography Markup Language (.gml) and File Geodatabase (.gdb).

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

Limitations

The input data used to create the files were originally 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 *2021 Agricultural Ecumene Boundary File* should not be used to determine the precise location of boundaries.

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

Comparison to other products or versions

The *2021 Agriculture Ecumene Boundary File* is generalized to render it suitable for cartographic display at a small scale (i.e., 1:20,000,000 or 1:25,000,000). Due to this generalization, the position of the shoreline is not necessarily consistent with the suite of 2021 Census cartographic boundary files or the *2021 Road Network File*.

The files included in the *2021 Agricultural Ecumene Boundary File* are similar but not necessarily consistent with ecumene boundary files released prior to the 2021 Census.

Use with other products

The generalized cartographic boundary file included in the *2021 Agricultural Ecumene Boundary File* can be linked to other 2021 Census statistical data products using the DGUIDs.

When considering using the files included in the *2021 Agricultural Ecumene Boundary File*, users should be aware of the compatibility of these files with those that are available from other sources. They may not be consistent with Statistics Canada files.

Reference dates

Census of Agriculture data

The Census of Agriculture data used to create the *2021 Agricultural Ecumene Boundary File* refer to the 2021 Census of Agriculture which was conducted on May 11, 2021.

Agriculture and Agri-Food Canada Annual Crop Inventory

The land cover information in this product used the 2021 growing season as the reference date. A few regions used also the growing season of 2020 as a proxy, in particular the province of Alberta, which was not available in time for the creation of this product. Year 2020 was also used for a few other small regions where coverage was inaccurate or incomplete for year 2021.

Standard geographic areas

The geographic reference date is a date determined by Statistics Canada to finalize the geographic framework for which census data are collected. The reference date for 2021 Census standard geographic areas is January 1, 2021.

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
Record layout - Agricultural ecumene mask file

Attribute name	Data type	Description
ECUMENE	Integer (1)	A one-digit code indicating whether the polygon is part of the ecumene: 1 = in the ecumene; 0 = outside the ecumene.

For more information on ecumenes, refer to the "Ecumene" definition from the *Dictionary, Census of Population, 2021*.

Census Consolidated Subdivision Generalized Cartographic Boundary File

The "Census Consolidated Subdivision Generalized Cartographic Boundary File" portrays the CCS simplified boundaries for which 2021 Census of Agriculture statistical data are disseminated.

Table 4.2
Record layout - Census consolidated subdivision generalized cartographic boundary file

Attribute name	Data type	Description
CCSUID	Character (7)	Uniquely identifies a census consolidated subdivision (composed of the two-digit province/territory unique identifier followed by the two-digit census division code, and a three-digit census consolidated subdivision code).
CCSNAME	Character (100)	Census consolidated subdivision name.
PRUID	Character (2)	Uniquely identifies a province or territory code.
DGUID	Character (24)	Dissemination Geography Unique Identifier.[1]

1. For further information please refer to the "Dissemination Geography Unique Identifier (DGUID)" definition from the *Dictionary, Census of Population, 2021*.

For more information on census consolidated subdivisions, refer to the "Census consolidated subdivision (CCS)" definition from the *Dictionary, Census of Population, 2021*

File specifications

Not applicable

Software formats

The *2021 Agricultural Ecumene Boundary File* is available for download from the Statistics Canada website in the following formats:

- Shapefile
  File extension: .shp
- Geography Markup Language version 3.1.1
  File extension: .gml
- File Geodatabase format
  File extension: .gdb

The *2021 Agricultural Ecumene Boundary File* is also available as a map service from the Statistics Canada website in the following formats:

- Esri® REST service

- Web Map Service (WMS)

This reference guide does not provide details on specific software packages available for use with the *2021 Agricultural Ecumene Boundary File*. Users should contact the appropriate software vendor for such information.

File extension and accented character information

The Shapefile, Geography Markup Language and File Geodatabase files are compressed into WinZip® files (file extension .zip).

The *2021 Agricultural Ecumene Boundary File* contains attributes with accented characters. They were successfully tested on desktop versions of ArcGIS® 10.5.1, File Geodatabase and FME Data Inspector 2015.1.

Metadata

The downloadable compressed packages (.zip) include a metadata file (.xml) that describes and validates the structure and content of the *2021 Agricultural Ecumene Boundary File*.

The same metadata are applied to the Esri® REST service and Web Map Service.

Geographic representation

The *2021 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 *2021 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 display objectives.

File naming convention

Spatial product file names follow a file naming convention. The file projection, the geographic level, geographic coverage, file type, geographic reference date, file format 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.

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

- ccs - generalized census consolidated subdivision
- eca - agricultural ecumene

Next three characters: geographic code of coverage

- 000 - Canada

Next character: file type

- e - ecumene

Next two characters: geographic reference date

The geographic reference date is a date determined by Statistics Canada for the purpose of finalizing the geographic framework for which census data are collected, tabulated and reported. For 2021 Census products, the geographic reference date is January 1, 2021.

- 21 - geographic reference date is 2021

Next character: file format

- a - Shapefile (.shp)
- f - File Geodatabase (.gdb)
- g - Geography Markup Language (.gml)
- s - Services (Esri® REST and Web Map Service [WMS])

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 2021 Census standard geographic area UID, DGUID, name, type, and the relationships among the various geographic levels are found on Statistics Canada's 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 NGD 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 NGD respect the limits of the administrative entities that they represent (e.g., CSD) 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 NGD is considered when positioning the limits of the standard geographic areas.

Attribute accuracy

Attribute accuracy refers to the accuracy of the quantitative and qualitative information attached to each feature (e.g., CCSNAME, CCSUID).

As noted under Lineage, the attributes (names, types and UIDs) for all geographic areas are sourced from the Statistics Canada's SDI. The names and types for administrative areas have been updated for the 2021 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 SDI and found to accurately reflect them.

Logical consistency

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

The *2021 Agricultural Ecumene Boundary File* was verified to ensure that every CCS with Census of Agriculture data contains an ecumene pocket. All CCSs contained in the file have been verified to have a UID that is valid for the 2021 Census.

Consistency with other products

As a result of the generalization of the shoreline, the boundaries in the CCS file of this product are not necessarily consistent with the shoreline of the "2021 Census Cartographic Census Consolidated Subdivision Boundary File".

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 CSDs.

The *2021 Agricultural Ecumene Boundary File* contains a standard geographic area boundary file that is generalized: the boundary file for CCSs. This file includes all 1,757 CCSs of Canada, for which 82 do not contain any 2021 Census of Agriculture data.

Appendices

See Figure 1.1, "Hierarchy of standard geographic areas for dissemination, 2021 Census," from the *Dictionary, Census of Population, 2021*.

See Table 1.1, "Geographic areas by province and territory, 2021 Census," from the *Dictionary, Census of Population, 2021*.