The Canadian Peoples / Les populations canadiennes Project

Historical Geographic Information System
Census Subdivisions
1851-1921

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The Canadian Peoples / Les populations canadiennes Project

The Canadian Peoples / Les populations canadiennes Project (TCP/LPC) is an integrated series of databases comprising 32 million records of Canadians enumerated in eight censuses from 1851 to 1921. TCP/LPC makes useable for research individual-level data describing personal, household, and community characteristics for virtually all people in Canada at ten-year intervals, from before Confederation to after the First World War. These data enable broad exploration of the experience of Canada's peoples during a formative era that set the patterns for subsequent generations. An interdisciplinary team of academic researchers from demography, geography, economics, and history, in collaboration with the private company Ancestry, digitized a 100% sample of the Canadian censuses across 70 years, enabling innovative research about inequality, family structures, migration, immigration, entrepreneurship, health, work, regional development, youth and aging, urbanization and many other topics. The project also created robust Geographic Information Systems (GIS) maps of all Census Subdivision (CSD) polygons for each of those census years, and attached matching CSD geolocation codes to every

individual record in the databases. Combined, these datasets make it possible to map the location of any individual or group of individuals to the CSD level in any of the eight census years between 1851 and 1921.

TCP/LPC was funded by the Canada Foundation for Innovation (CFI), with major matching contributions from Ancestry and from the partner universities listed below. It was based at University of Guelph, where Kris Inwood served as Principle Investigator. Other Investigators included Peter Baskerville (University of Alberta), Geoff Cunfer (University of Saskatchewan), Lisa Dillon and Alain Gagnon (Université de Montréal), Shari Eli (University of Toronto), Herbert Emery (University of New Brunswick), Chad Gaffield (University of Ottawa), Ian Keay (Queen's University), and Marc St-Hilaire (Université Laval).

Introduction to the TCP/LPC Historical GIS

Overview

This TCP_CANADA_CSD_202306 geodatabase is a Historical GIS dataset of polygon layers at the Census Subdivision level for all provinces and territories, designed for use with Canadian census data. Polygon map layers in the geodatabase correspond to the Canadian censuses of 1851, 1861, 1871, 1881, 1891, 1901, 1911, and 1921. The data are in an ESRI geodatabase format, in Lambert Conformal Conic projection, and are topologically correct. The map layers are designed to join with individual-level data created by The Canadian Peoples / Les populations canadiennes Project. In many cases they are also suitable to join with aggregate CSD-level tables from the published census volumes (but see important exceptions noted below).

The Historical GIS Lab at the University of Saskatchewan (hgis.usask.ca) and the Centre interuniversitaire d'études québécoises (CIEQ) at Université Laval (www.cieq.ca) worked together between 2018 and 2021 to create these Historical GIS layers[1]. The published census volumes did not include maps of Census Subdivisions, and original maps employed by the Canadian Statistics Bureau have not been located in the archives, despite considerable searching by many scholars over the years. This project re-creates the published census geography as established in each census year in a GIS format useful for historical analysis of both individual-level and aggregate census data.

Keywords

- Census of Canada
- The Canadian Peoples
- Les populations canadiennes
- TCP
- LPC
- Census Map
- Historical Census
- Historical GIS (HGIS)

[1] The first version was delivered in September 2021. After some minor corrections to some polygons in Québec, this second version was delivered in June 2023.

Format

The geographic data are contained in a File Geodatabase (.gdb) created with ESRI ArcMap software. Within the geodatabase, one CSD polygon Feature Class exists for each census year, named CANADA_YYYY_CSD. Two additional layers are provided for the 1911 census (see below).

Use and Citation

These HGIS data are publicly available under a Creative Commons Open Data license. Please cite as:

> The Canadian Peoples / Les populations canadiennes Project, "Census of Canada Historical GIS, CSD Polygons," CIEQ, Université Laval and HGIS Lab, University of Saskatchewan, 2023.

Projection Information

These datasets employ ESRI's Canada Lambert Conformal Conic projection (WKID: 102002 Authority: ESRI), with the following parameters:

Projection:	Lambert Conformal Conic
False Easting:	0.0
False Northing:	0.0
Central Meridian:	-96.0
Standard Parallel 1:	50.0
Standard Parallel 2:	70.0
Latitude of Origin:	40.0
Linear Unit:	Meter
Geographic Coordinate System:	GCS North American 1983
Datum:	D North American 1983
Prime Meridian:	Greenwich
Angular Unit:	Degree
Spheroid:	GRS 1980
Semimajor Axis:	6378137.0
Semiminor Axis:	6356752.314140356
Inverse Flattening:	298.257222101

Attributes

Attribute tables for each census year's Feature Class contain only identification variables, including name fields for Province (PR), Census Division (CD), and Census Subdivision (CSD), plus a unique ID code that combines those three geographies, useful for linking external datasets from TCP/LPC extracts or from aggregate census tables. Standard attributes include:

TCPUID_CSD_YYYY	Unique ID combining PR, CD, and CSD codes + year
PR_YYYY	Province abbreviation + year
	AB: Alberta
	BC: British Columbia
	MB: Manitoba
	NB: New Brunswick
	NS: Nova Scotia
	NT: Northwest Territories
	ON: Ontario
	PE: Prince Edward Island
	QC: Québec
	NL: Newfoundland and Labrador
	SK: Saskatchewan
	YT: Yukon Territory
NAME_CD_YYYY	Census Division name + year
NAME_CSD_YYYY	Census Subdivision name + year

For consistency through time, the TCP/LPC attribute tables use current provincial abbreviations for all census years, including in earlier times when those provincial names were not yet in use. For example, the database uses ON codes to represent Upper Canada or Canada West, and QC codes to represent Lower Canada or Canada East in the 1851 and 1861 census years. In addition, TCP/LPC presents the full boundaries of modern Canada in all census years.

Spatial Data Source

The polygons were generated from files created by the Canadian Century Research Infrastructure / Infrastructure de recherche sur le Canada au 20^{e} siècle (CCRI/IRCS) (https://ccri.library.ualberta.ca/). That project, in turn, used data from the "*Subdivisions Cartographic Boundary File. 2001 Census, Second Edition, 2002*" produced by the Statistics Canada Geography Division, as its primary reference. (This does not constitute an endorsement by Statistics Canada.)

The CCRI/IRCS Project created CSD-level polygon datasets[2] for the Canadian censuses from 1911-1951. TCP/LPC project began with CCRI/IRCS's 1911 CSD polygon layer and edited it to create the 1901 CSD layer. It then worked back in time, editing the maps to fit each previous census year, back to 1851. Thus, the TCP/LPC map layers for 1851-1901 began with

[2] Regarding the processing of census geography within the CCRI/IRCS project, see M. St-Hilaire, B. Moldofsky, L. Richard, and M. Beaudry (2007). "Geocoding and mapping historical census data: The geographical component of the Canadian Century Research Infrastructure". *Historical Methods*, 40:2, 76-91.

CCRI/IRCS datasets, but created new GIS polygon layers for earlier census years never before available to researchers.

For 1911 and 1921, TCP/LPC modified existing CCRI/IRCS datasets for those years to match the structure of the TCP/LPC's 100% sample of individual-level data, and made minor adjustments so that the geographic features and attributes of all TCP/LPC layers are similar in structure. The result is a unique set of CSD polygon layers specifically designed for use with TCP datasets, but whose core data originated with the CCRI/IRCS project. Detailed descriptions of each census year's map layer appear below.

Sources and Methods

The Canadian Statistics Bureau must have used many paper maps as it collected, aggregated, and published each decadal census, however almost none of these maps can be found in the Bureau's archival collections. Because Canada was a dynamic, rapidly growing nation in the second half of the nineteenth and early twentieth centuries, geographic boundaries changed frequently from decade to decade, at all geographic scales. From 1851 to 1921 provincial and territorial boundaries changed, completely new provinces were established, and then re-structured, including their internal jurisdictions. Even in the longer-settled parts of the country the Statistics Bureau lumped jurisdictions together or split them apart from time to time. These challenges explain why no definitive CSD-level maps or GIS boundary files have existed for the early Canadian censuses to date.

To complicate matters further, each Canadian census had two separate geographies. Census collectors divided territory into Enumeration Areas (EAs) and collected lists of the individuals living within each EA[3]. The microfilmed manuscript census documents now housed at Archives Canada, which formed the basis of TCP/LPC's 100% sample datasets, are organized in bundles from these named EAs. The Enumeration Areas make up the "input geography" of each Canadian census. Most EAs exist today only as named places, with little or no information about the exact boundaries of those places; almost no original maps of EA territories exist in the archives, making it virtually impossible to map EAs.

Once the Census Bureau collected bundles of manuscript forms from EAs across the country, and prepared to publish results, it re-arranged the nation's land area into a new "output geography," the Census Subdivisions (CSDs) that appear in the published volumes. Some CSDs were geographically identical to corresponding EAs. Sometimes the Bureau split EAs into two or more nested CSDs, especially in dense urban places. Other times, and quite frequently in the North, the West, or other sparsely settled places, it grouped multiple EAs into a single CSD. In some cases, the geography fractured in even more complicated ways. This HGIS dataset endeavours to re-create the CSD output geography for each census year, matching the published census volumes; it does not attempt to re-create the input geography of the Enumeration Areas.

In order to establish the boundaries of historical CSDs, researchers consulted numerous historical maps from library and archival collections, seeking information about boundaries and place names that could be linked to CSDs for each year. One important source was maps of Electoral Districts as they changed through time, since in many jurisdictions the Census Bureau followed existing voting boundaries. In the West, many of the CSDs followed the geography of

[3] Enumeration Area is a recent concept, which is equivalent to "Census Sub-district" in older censuses. When we are talking about geographical entities for collecting data, we prefer to use "EA" instead of "Census Sub-district", trying to avoid any confusion with "Census Subdivision" used to disseminate results in published volumes.

the public land survey, setting boundaries to match the meridian-township-range system that structured so much of rural life in the prairie provinces. In many cases CSD boundaries corresponded with places clearly indicated on contemporary maps. In some years the census reported the total area of each CSD, which served as a check on the accuracy of TCP/LPC boundary decisions. In places where population change was relatively stable from decade to decade, where CSD place names persisted through time, and where no other contradictory information from archival maps could be found, TCP/LPC assumed that boundaries remained the same. In the end, some boundaries are the result of our best guesses, guided by deep experience in the historical geography of the Canadian census. New scholarship, or the discovery of a lost trove of archival maps, may require future corrections; for now, the TCP/LPC geodatabase represents the best maps of historical census boundaries currently available.

Converting Point Locations to Polygons

Following precedent established by the previous CCRI Project, certain CSDs are represented in the TCP/LPC map layers by "symbolic geometry" (placeholders) in the form of standard-sized hexagons. These hexagons are 1km per side, creating a polygon area of approximately 624 acres (252 hectares). They are used to designate known settlement clusters embedded within much larger spatial regions. For example, in remote northern and western areas, CSDs may have been very large, but with extremely low population density. When researchers know from primary sources that virtually all population in these vast territories was concentrated around a small settlement, a hexagon substitutes for the otherwise unknown boundaries of that place. Typically, archival maps show such settlements only as a dot with a name. TCP/LPC places a standard-sized hexagon at the place of the dot to represent the CSD polygon of the same name. Hexagons thus represent places of clustered population (towns, villages, mine sites, etc.) where the location is known but detailed boundaries are either not available or not relevant at scale.

Key Tables

The definitive list of Census Subdivisions to be included derived from those CSDs listed in the tables presented in the published census volumes. However, that was not always a straightforward matter. In some years, the Census Bureau used different lists of CSDs for different tables in the published volumes. That is, the output census geography sometimes varied from one table to another, even within the same year. For example, in the 1911 census Volume 1, Table 1 includes 10,004 CSDs while Volume 2, Table 2 includes only 3,532 CSDs. Such discrepancies exist because the Census Bureau chose to group multiple areas together in some cases, and split them apart in others. Thus, each TCP/LPC polygon map is keyed to a specific table in the published census, and matches that table's list of CSDs. The Key Tables for the TCP/LPC GIS CSD layers are:

Census	Topic	Volume	Table
1921	Origin	1	16
1911	Population; Religion	A hybrid of Volume 1, Table 1 for NB, NS, PE, ON, QC; and Volume 2, Table 2 for AB, BC, MB, SK, NT, YT	
1901	Population	1	7
1891	Marital Status	1	3
1881	Population	1	1
1871	Population	1	1
1861	Origin	1	1 (Lower Canada/Canada East) 2 (Upper Canada/Canada West)
1851	Ages	1	3 Lower Canada/Canada East (Appendix 6) 3 Upper Canada/Canada West (Appendix 5)

An important consequence of this Key Table decision is that the TCP/LPC polygon map layers will be suitable for joining to some, but not all, of the published CSD-level census tables. Researchers will need to determine which tables can be appropriately joined to these maps, and which cannot. Detailed discussion of each census year's Key Table appears below.

TCP/LPC HGIS Polygons

1921 Census Subdivisions HGIS

Feature Class:	CANADA_1921_CSD
Number of CSD polygons:	5,363
Provinces and Territories:	AB, BC, MB, NB, NL, NS, NT, ON, PE, QC, SK, YT
Key Table:	1921 Volume 1, Table 16

This Historical GIS dataset is a polygon layer of Census Subdivisions for all provinces and territories in Canada, designed for use with the Sixth Census of Canada (1921). All CSDs listed in Volume 1, Table 16 of the published 1921 census are included.

The initial spatial data for this layer came from the Canadian Century Research Infrastructure/Infrastructure de recherche sur le Canada au 20e siècle (CCRI/IRCS) Historical GIS. TCP/LPC team members made some corrections to CCRI/IRCS polygons and made the layer consistent with TCP/LPC formats.

1911 Census Subdivisions HGIS

For 1911 TCP/LPC provides **three different polygon layers**: one matching the CSDs in Volume 1, Table 1; one matching the CSDs in Volume 2, Table 2; and one that is a hybrid of those two, each for different purposes. Users should read the Feature Class descriptions below to ensure they employ the correct layer for distinct purposes.

Feature Class:	CANADA_1911_CSD
Number of CSD polygons:	3,825
Provinces and Territories:	AB, BC, MB, NB, NL, NS, NT, ON, PE, QC, SK, YT
Key Tables:	A hybrid of 1911 Volume 1, Table 1 for NB, NS, PE, ON, QC; and 1911 Volume 2, Table 2 for AB, BC, MB, SK, NT, YT

This Historical GIS dataset is a polygon layer of Census Subdivisions for all provinces and territories in Canada, designed for use with the Fifth Census of Canada (1911). The initial spatial data for this layer came from the Canadian Century Research Infrastructure/Infrastructure de recherche sur le Canada au 20e siècle (CCRI/IRCS) Historical GIS. TCP/LPC team members made some corrections to CCRI/IRCS polygons and made the layer consistent with TCP/LPC formats.

This main 1911 layer is a hybrid polygon layer created partly from the CSDs listed in Volume 1, Table 1 (Ontario and eastern regions) and partly from the CSDs listed in Volume 2, Table 2 (Manitoba and northwestern regions). Because the prairie provinces were only a few years old in 1911, their settlement geography was unstable. Volume 1, Table 1, which was the best option for Ontario and eastern Canada, included thousands of CSDs in western Canada, many with uncertain boundaries and no population. It was unworkable to use only a single key table for this year, given Canada's rapid geographical expansion at that moment in time, and so TCP/LPC opted to create this hybrid representation of the 1911 census geography. In consequence, it is not possible to link all of the information provided by either of those published

tables to this hybrid GIS layer. **Rather, this layer is designed to provide a framework for geolocation of individual records in the TCP/LPC microdata.**

Feature Class:	CANADA_1911_CSD_V1T1
Number of CSD polygons:	10,040
Provinces and Territories:	AB, BC, MB, NB, NL, NS, NT, ON, PE, QC, SK, YT
Aggregate Table:	1911 Volume 1, Table 1

This Historical GIS dataset is a polygon layer of Census Subdivisions for all provinces and territories in Canada, designed for use with the 1911 **Volume 1 Table 1 CSDs** published in the Fifth Census of Canada (1911). It is suitable for joining to the published aggregate data from that table, but not for use with individual-level microdata provided by TCP/LCP from the manuscript census forms.

Feature Class:	CANADA_1911_CSD_V2T2
Number of CSD polygons:	3,589
Provinces and Territories:	AB, BC, MB, NB, NL, NS, NT, ON, PE, QC, SK, YT
Aggregate Table:	1911 Volume 2, Table 2

This Historical GIS dataset is a polygon layer of Census Subdivisions for all provinces and territories in Canada, designed for use with the 1911 **Volume 2 Table 2 CSDs** published in the Fifth Census of Canada (1911). It is suitable for joining to the published aggregate data from that table, but not for use with individual-level microdata provided by TCP/LCP from the manuscript census forms.

1901 Census Subdivisions HGIS

Feature Class:	CANADA_1901_CSD
Number of CSD polygons:	3,220
Provinces and Territories:	BC, MB, NB, NL, NS, NT, ON, PE, QC
Key Table:	1901 Volume 1, Table 7

This Historical GIS dataset is a polygon layer of Census Subdivisions for all provinces and territories in Canada, designed for use with the Fourth Census of Canada (1901). All CSDs listed in Volume 1, Table 7 of the published 1901 census are included.

The initial spatial data for this layer came from the 1911 Canadian Century Research Infrastructure/Infrastructure de recherche sur le Canada au 20e siècle (CCRI/IRCS) Historical GIS. TCP/LPC team members began with the 1911 CCRI/IRCS polygons, and then edited them as needed to conform to the 1901 census geography. Use of split and merge functions in ArcGIS, rather than freely drawing polygons, ensured topological integrity of the new layer so there are no gaps or slivers in the polygon fabric. In these ways, TCP/LPC edited the polygon layer to adjust 1911 boundaries back in time or to create entirely new polygons that matched the 1901 census. In general, there were fewer changes to census geography in eastern Canada between 1901 and 1911, and more changes in western Canada, given the establishment of Alberta and Saskatchewan as new provinces in 1905 and considerable population growth in British Columbia and Manitoba during those years.

TCP/LPC georeferenced a number of archival maps created in the late nineteenth and early twentieth centuries as references to help locate historical place names and boundaries corresponding to 1901 CSD names. The 1895 and 1906 Electoral Atlas maps were especially helpful, as many census polygons appeared to match electoral districts in both name and approximate area. Many polygon boundaries were clear, while others required judgement calls based on the best available evidence. The 1901 census reported the total area of each CSD, which served as an important check on the size of corresponding polygons in the GIS. In some circumstances, textual description of limits were also used as reference for drawing polygons, especially for eastern provinces.

1891 Census Subdivisions HGIS

Feature Class:	CANADA_1891_CSD
Number of CSD polygons:	2,508
Provinces and Territories:	BC, MB, NB, NL, NS, NT, ON, PE, QC
Key Table:	1891 Volume 1, Table 3

This Historical GIS dataset is a polygon layer of Census Subdivisions for all provinces and territories in Canada, designed for use with the Third Census of Canada (1891). All CSDs listed in Volume 1, Table 3 of the published 1891 census are included.

The initial spatial data for this layer came from the TCP/LPC 1901 HGIS described above. Researchers used the same techniques to edit the 1901 CSD polygons back in time to fit the 1891 census geography. Once again, Electoral Atlas maps were very helpful. Many changes occurred in the prairie provinces between 1891 and 1901. Creating the 1891 CSDs for the prairies was typically a matter of merging the 1901 polygons into larger and less numerous polygons for 1891. For instance, the Census District of Saskatchewan had 67 CSDs in 1901, but only 3 in 1891. This decade was a period of substantial and rapid geographical and settlement change in Canada, when many places in the West and North appeared in the census for the first time. In addition, the 1891 census did not report the total area of CSDs, removing an important check on accuracy. For these reasons, the 1891 TCP/LPC map layer is more uncertain about the exact location of some CSD boundaries than in any of the other census years in the project. This is especially true for northwestern regions.

1881 Census Subdivisions HGIS

Feature Class:	CANADA_1881_CSD
Number of CSD polygons:	2,173
Provinces and Territories:	BC, MB, NB, NS, NT, ON, PE, QC
Key Table:	1881 Volume 1, Table 1

This Historical GIS dataset is a polygon layer of Census Subdivisions for all provinces and territories in Canada, designed for use with the Second Census of Canada (1881). All CSDs listed in Volume 1, Table 1 of the published 1881 census are included. The 1881 feature class was created using the same methodology as other layers.

1871 Census Subdivisions HGIS

Feature Class:	CANADA_1871_CSD
Number of CSD polygons:	1,818
Provinces and Territories:	BC, MB, NB, NS, NT, ON, PE*, QC
Key Table:	1871 Volume 1, Table 1

This Historical GIS dataset is a polygon layer of Census Subdivisions for all provinces and territories in Canada, plus Prince Edward Island, designed for use with the First Census of Canada (1871). The 1871 feature class was created using the same methodology as other layers.

Despite the fact that PEI joined the Dominion of Canada only in 1873, TCP/LPC provides polygons for Prince Edward Island in 1871based upon the list of CSDs shown in PEI census returns (Volume 1, Table 1). No individual-level microdata records are available to TCP/LPC for PEI, therefore it was not possible to do any geolocation connected to the PEI 1871 census.

1861 Census Subdivisions HGIS

Feature Class:	CANADA_1861_CSD
Number of CSD polygons:	1,202
Provinces and Territories:	NT, ON, QC
Key Tables:	1861 Volume 1, Tables 1 and 2

This Historical GIS dataset is a polygon layer of Census Subdivisions for Lower Canada/Canada East and Upper Canada/Canada West in the 1861 census. All CSDs listed in Volume 1, Tables 1 and 2 of the published 1861 census are included. The 1861 feature class was created using the same methodology as other layers. In the context of this pre-Confederation census, the codes used for Provinces and Territories in the polygon UIDs are those of subsequent Canadian censuses (ON, QC, NT).

1851 Census Subdivisions HGIS

Feature Class:	CANADA_1851_CSD
Number of CSD polygons:	935
Provinces and Territories:	NT, ON, QC
Key Tables:	1851 Volume 1, Table 3 (Appendices 5 and 6)

This Historical GIS dataset is a polygon layer of Census Subdivisions for Lower Canada/Canada East and Upper Canada/Canada West in the 1851 census. All CSDs listed in Volume 1, Table 3 of the published 1851 census are included. The 1851 feature class was created using the same methodology as other layers. In the context of this pre-Confederation census, the codes used for Provinces and Territories in the polygon UIDs are those of subsequent Canadian censuses (ON, QC, NT).

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