Converting census data into GIS data

For those interested in analyzing Canadian demographics data, census data can be downloaded directly from ODESI or the Canadian Census Analyser. In order to use the data for spatial analysis, two additional steps are needed: download census boundary files from ADD DATA SOURCE (say come to geospatial centre, https://www12.statcan.gc.ca/census-recensement/2011/geo/bound-limit/bound-limit-eng.cfm), and join the census data with the census boundary shapefiles. This tutorial describes how to access census data and how to convert it into GIS data.

Accessing Census Data from ODESI

The Ontario Data Documentation, Extraction Service and Infrastructure (ODESI), is a web-based data exploration, extraction and analysis tool for social science data. This tool is available at the University of Waterloo Library and provides researchers the ability to search data from thousands of datasets.

1. Start at the University of Waterloo Library Homepage (http://www.lib.uwaterloo.ca/). On the top left corner, click on **FIND & USE RESOURCES**, then select **Statistics & numerical data** to open the Statistics & Data page.

2. In the **Key Links** section on the left side of the page, click on **ODESI Data Retrieval** to open the ODESI tool portal.
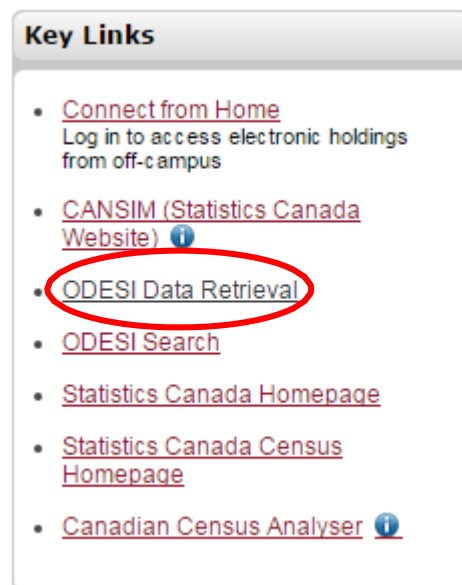

Figure 1: ODESI Data Retrieval Link

3. In the left section under ODESI, use the + icon to expand the **Census of Population** category, followed by **CANADA**, then **2011**. The three tabs listed, Population and Dwelling Counts, Profiles and Topic Based Tabulations (TBT) are series of tables presenting demographic variables by various levels of geography available for 2011.

Figure 2: Available demographic tables for 2011

4. Expand any of the tabs and click on the dataset name to access the data. The circled link, **Access data here,** will open a list of tables available for download in various formats and topics.
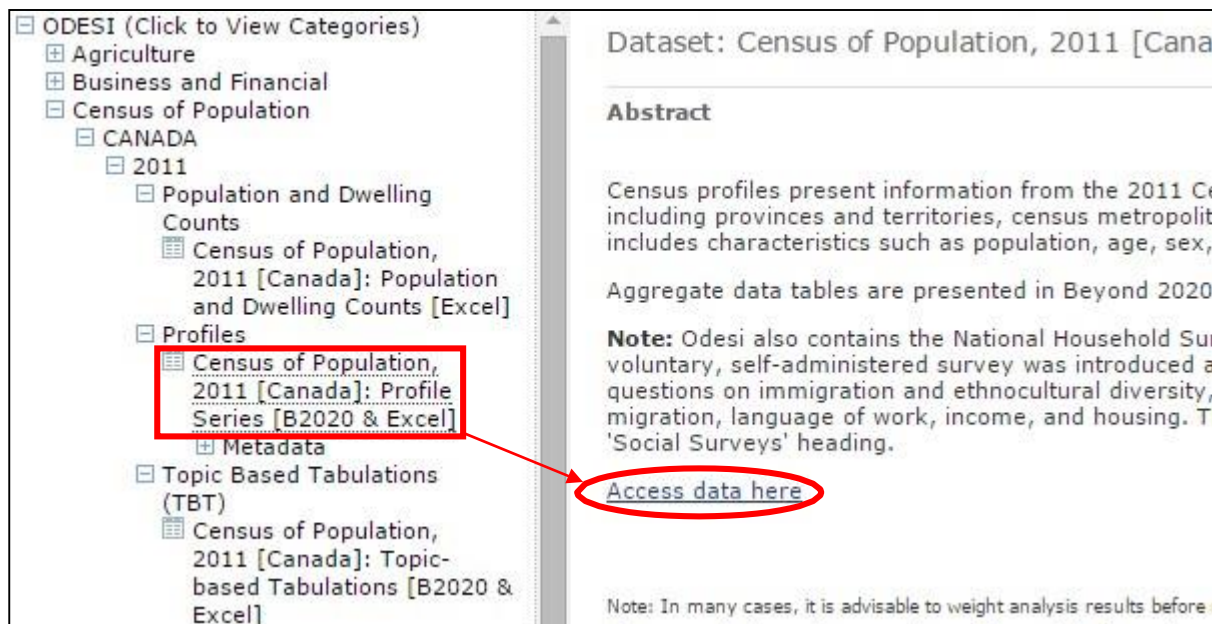

Figure 3: Data access link

Beyond 20/20 Professional Browser

Many datasets are available for use in .IVT format, which requires Beyond 20/20 Professional Browser software. Instructions to download and to use the software are as follows:

Download and install Beyond 20/20 Professional Browser software. If software is not installed on your computer, you will need to download and install the software. The software can be downloaded from Statistics Canada (http://www.statcan.gc.ca/eng/public/beyond20-20) or from ODESI (http://odesidownload.scholarsportal.info/documentation/Beyond2020/B2020download.html). System requirements and installation instructions are also listed through the both links.

Downloading a 2011 Profile Series Table

1. As outlined in Figure 3, access the **Census of Population, 2011 [Canada]: Profile Series [B2020 & Excel]** data. From this link, a list of both .IVT and .CSV file formats are made available.

Geographic level, .IVT

- Canada, provinces, territories, census divisions and census subdivisions - 98-314-XCB2011006
- Census metropolitan areas and census agglomerations - 98-314-XCB2011009
- Census metropolitan areas, tracted census agglomerations and census tracts - 98-314-XCB2011010
- Census metropolitan areas, census agglomerations and census subdivisions - 98-314-XCB2011011
- Canada, provinces, territories and federal electoral districts (2003 Representation Order) - 98-314-XCB2011012
- Canada, provinces, territories and federal electoral districts (2013 Representation Order) - 98-314-XCB2011054
- Designated places - 98-314-XCB2011013
- Population centres - 98-314-XCB2011014
- Canada, provinces, territories and economic regions - 98-314-XCB2011015
- Canada, provinces, territories, census divisions, census subdivisions and dissemination areas - 98-314-XCB2011007
- Dissolved census subdivisions - 98-314-XCB2011052
- Forward sortation areas© - 98-314-XCB2011008

Geographic level, .CSV (opens in Excel)

- Canada, provinces and territories - 98-316-XWE2011001-101
- Census divisions - 98-316-XWE2011001-701
- Census subdivisions - 98-316-XWE2011001-301
- Census metropolitan areas and census agglomerations - 98-316-XWE2011001-201
- Census tracts - 98-316-XWE2011001-401
- Federal electoral districts (2003 Representation Order) - 98-316-XWE2011001-501
- Federal electoral districts (2013 Representation Order) - 98-316-XWE2011001-511
- Economic regions - 98-316-XWE2011001-901
- Designated places - 98-316-XWE2011001-1301
- Population centres - 98-316-XWE2011001-801
- Dissemination areas - 98-316-XWE2011001-1501
- Dissolved census subdivisions - 98-316-XWE2011001-1401
- Forward sortation areas© - 98-316-XWE2011001-1601

Figure 4: List of available downloads in both .IVT and .CSV formats

2. Choose a desired (.IVT) dataset to convert to GIS data, then click on the file name to begin the download. Once downloaded, open the file with B2020 browser. The following prompt may appear, if so, click OK.
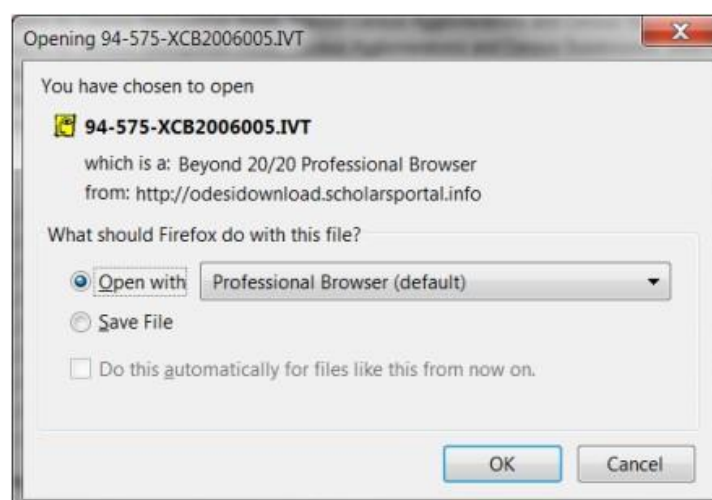

Figure 5: Download prompt for the table

Exploring the census table in Beyond 20/20

The 2011 Profile Series consists of three table dimensions: Geography, Profile of Census, and Sex. When a table is opened, it should look like Figure 6. The three dimensions are circled in red.

Figure 6: Initial view of 2011 Profile Series Table in Beyond 20/20

1. Click and drag the different dimension tabs to change the view of the browser. The initial view displays numbers for Total – Sex, Male, and Female populations in the specified geography ID 20000. Change the view to have the Geography tab represent the row headings and the Profile of Census to represent the column headings. Figure 7 shows how the browser appears with the change in columns.

Figure 7: View of browser with Geography as the row headings, Profile of Census as the column headings.

The content displayed is based on the browser is dependent on the dimension displayed in the top right corner of the window, in Figure 7, the dimension is Sex, displaying the Total – Sex variable. By clicking on the left and right arrow icons highlighted in blue in Figure 8, this variable can be changed to represent Male populations or Female populations as alternatives.
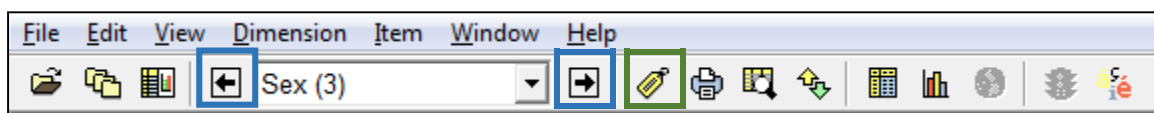

Figure 8: Beyond 2020 Browser Toolbar

2. To view geography by identifiers such as Census Division Unique ID (CDUID), click on the Geography, and once it is highlighted, click on the "Next Label" icon twice, highlighted in green in Figure 8, to change the label. The first click will change the label to names of the geographic areas, the second click should display geography codes. Another way to change labels is by highlighting the Geography dimension, then navigate to **Dimension** and click on **Change Labels**. This is shown in Figure 9. The number of digits in a geography code identifies the type of census level that is being shown. The window should look similar to Figure 10.
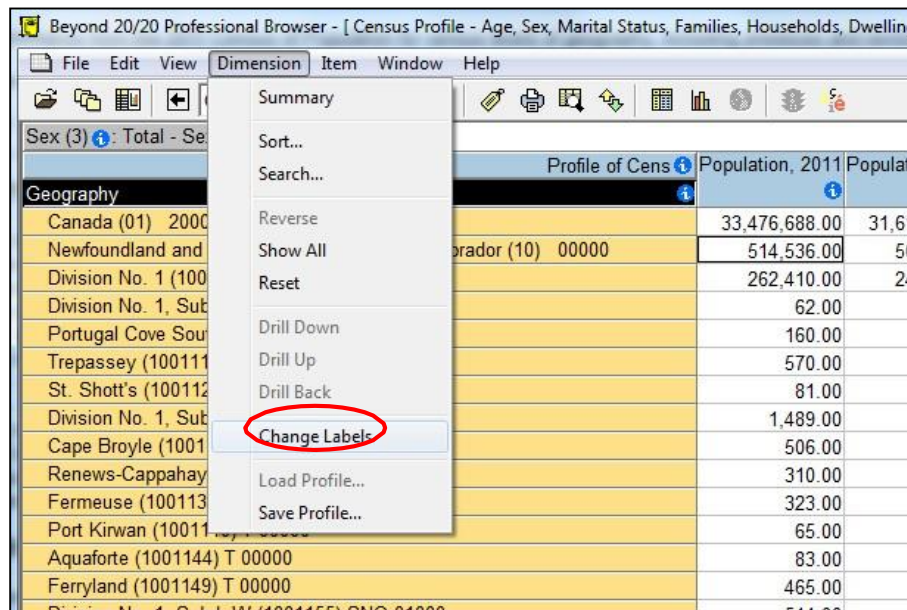

Figure 9: Navigation to Change Labels option

Figure 10: View of Geographic Codes

Creating a census dataset for GIS data creation

For this tutorial, a census subdivision dataset will be created. The census subdivision unique ID consists of 7 digits.

1. Begin by navigating to the **Item** menu and clicking on **Select All**, shown in Figure 11. This will highlight the entire table for export.
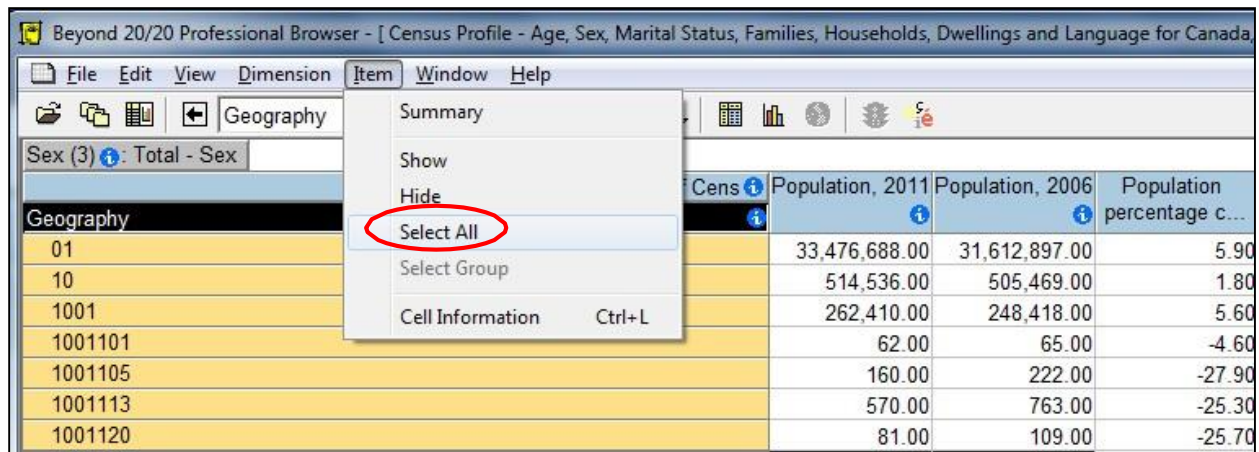

Figure 11: Navigation to Select All option

2. With the entire table highlighted, navigate to **File** and click on **Save As…** to export all the data from the table as shown in Figure 12.
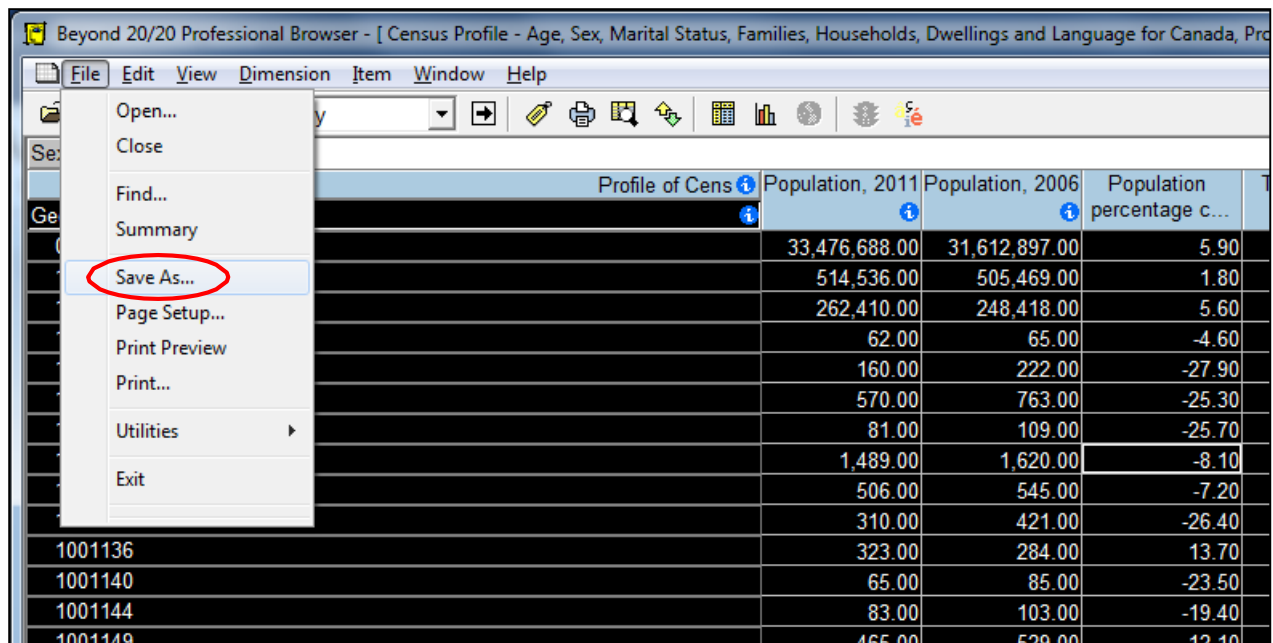

Figure 12: How to export all data from table

3. A **Save As** window will open, as shown in Figure 13. Click on the drop-down menu under **List Files of type:** scroll down to click on **dBase Files (*.dbf)**. In the file name field, type in "2011_CensusProfile.dbf". A folder will need to be selected to save the table under Directories. Select the appropriate location and click on **OK**.
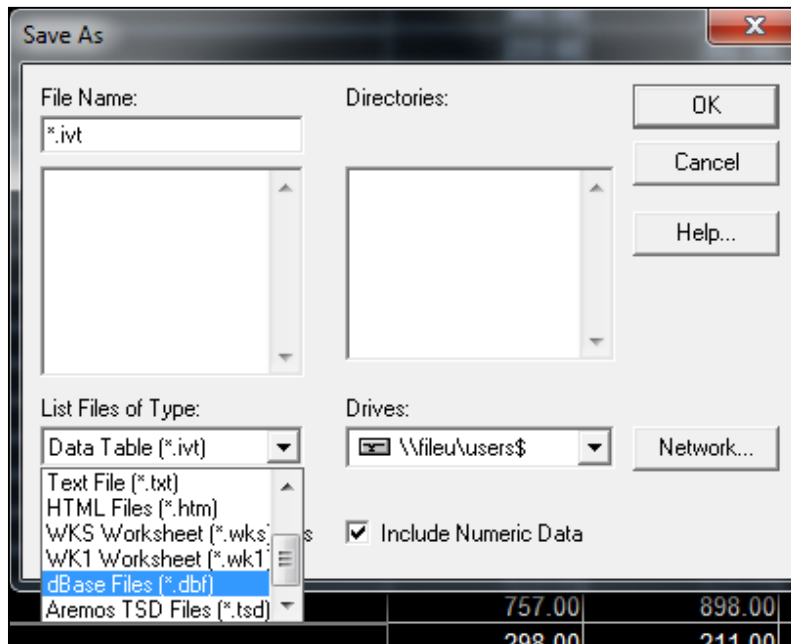

Figure 13: Save As window

4. Download a 2011 cartographic boundary file from Statistics Canada (https://www12.statcan.gc.ca/census-recensement/2011/geo/bound-limit/bound-limit-eng.cfm). From the provided link, click on the **2011** link under **Census year**. There are a number of options available for download. Choose the following options: **English** for Language, **ArcGIS (.shp)** for Format, and **Census Subdivisions** under Cartographic Boundary File. Finally, click on **Continue**. The last page will provide a link for download in a zipped format. Download this file and unzip it in an appropriate location.

5. Open ArcMap and import the downloaded 2011 cartographic boundary file and the .dbf data table extracted from Beyond 20/20. Use the 'Add Data' icon highlighted in Figure 14 to import the files.
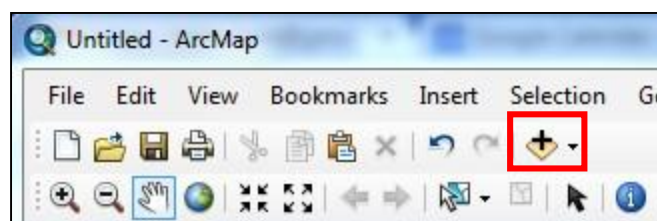

Figure 14: Add Data Icon

6. Right-click on the cartographic boundary file to join the census data. Navigate to **Joins and Relates** then click on **Join…** as shown in Figure 15. This will open up the **Join Data** window.
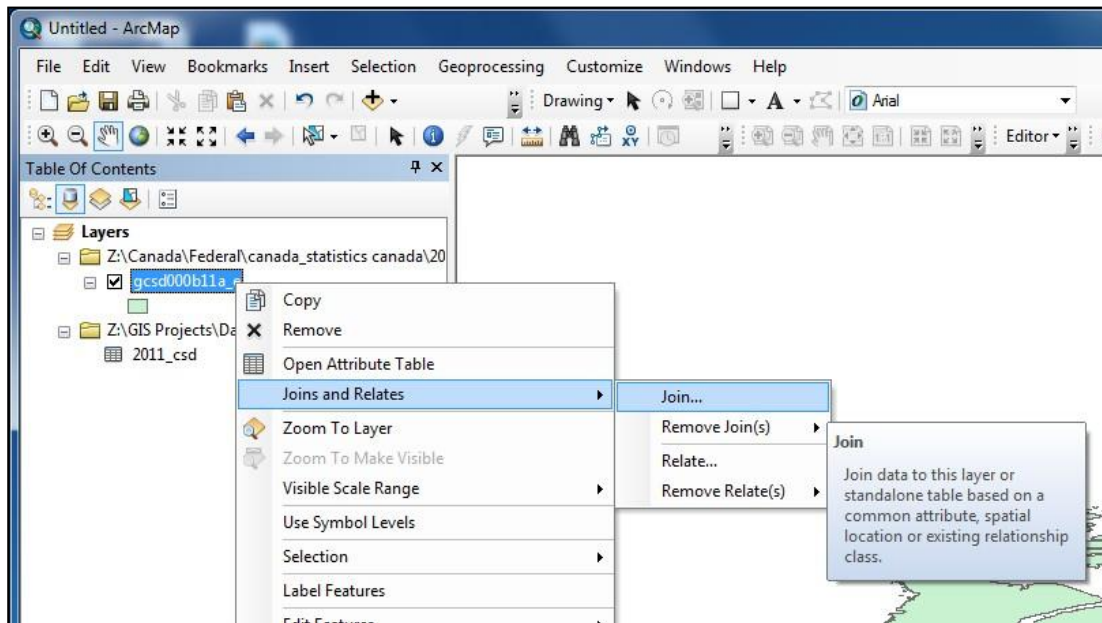

Figure 15: Navigation to Join options

7. Fill the highlighted options in Figure 16 as follows. Select **CSDUID** for the field in the layer that the join will be based on, have the data table be the table to join to the layer, and have **GEOGRAPHY** as the field in the table to base the join on. Under **Join Options**, select **Keep only matching records**. Click **OK**.
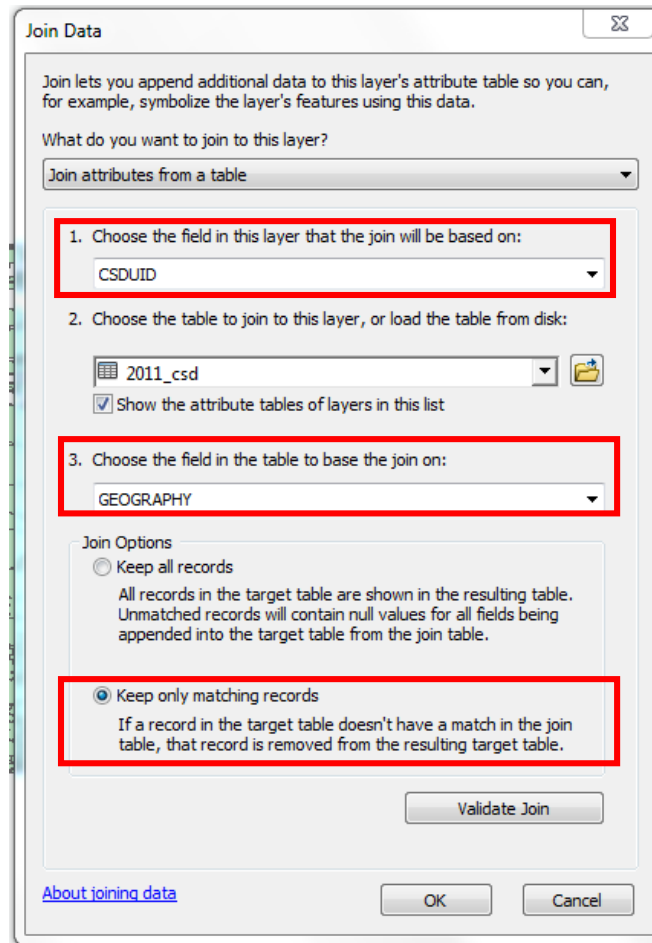
Figure 16: Join Data Window

8. Right-click the census boundary file under Table of Contents and click on **Open Attribute Table** to view the joined table. Confirm the census profiles are now joined with the spatial census information.

9. Right-click the census-boundary file under Table of Contents and navigate to **Data** and click on **Export Data…**. Save the file as a shapefile for use.

For Help

For help provided by Ivision, click on Browser Help under the Help tab within the Beyond 20/20 browser.