Mapping migration and commuting data

Resource Note #14

Community Social Profile Project

July 2008

Preface

- The Resource Note is intended to increase our understanding of and broaden our knowledge base on key subject areas that are fundamental in building our capacity in numeric and geographic analysis.
- It is not an in-depth or comprehensive discussion of the subject matter.
- It highlights certain relevant and important areas that deserve our attention and consideration
- It can also serve as a “how-to” guide with instructions to perform certain task
- It is intended to be informal and informative.

Introduction

- This is the 14th Resource Note, previous notes include:

1	Census Geography	11	Community Social Profile Template (part 1)
2	Census Data	12	Some quick ways to access census data
3	PCensus Database	13	Community Social Profile Template (part 2)
4	Geocoding		
5	Cartographic Principles		
6	Thematic Mapping		
7	2006 Census		
8	Population Pyramid		
9	PCensus DBX v8.5		
10	GIS Data and File Management		

Introduction

- This resource note describes the steps to access and map census data on migration and commuting
- The migration and commuting flow data are not available from PCensus datafile, in order to map the flow pattern, a separate datafile has to be constructed manually
- Migration flow data are available at the **CD (Census Division)** level for two time periods (5 years ago and 1 year ago) – the data capture the movement of people in terms of their place of residence over a period of 1 and 5 years
- Commuting flow data are available at the **CSD (Census Subdivision)** level for 2006 – the data capture the movement of the employed labour force between their place of residence and usual place of work
- All flow data have an origin (from) and destination (to)

Migration Flow

- The flow data were compiled from two census questions on mobility
  - Where did this person live 1 year ago, that is, on May 16, 2005?
  - Where did this person live 5 years ago, that is, on May 16, 2001?
- The respondent was asked to indicate
  - Lived at **same** address as now
  - Lived at a **different** address in the same city, town, village, township, municipality or Indian reserve
  - Lived in a **different** city, town, village, township, municipality or Indian reserve in Canada
    - Specify the name of city, town, village, township, municipality or Indian reserve and the postal code
  - Lived **outside Canada**
    - Specify name of county

Migration Flow

- The migration flow data are available from
  - Cat. No. 97-556-X2006014 (for 5 years ago)
  - Cat. No. 97-556-X2006015 (for 1 year ago)
- The following example is used to illustrate the steps to access and map the in-migration flows for the Region of Durham (2001-2006)
  - people who lived in other CDs 5 years ago and are living in Region of Durham
- The same process can be applied to map the out-migration flow
  - People who lived in Region of Durham 5 years ago and are living in other CDs

Step 1 Select current – CD of residence

- From 2006 Census home page, select 2006 Census>Data product> Topic-based tabulation
- http://www12.statcan.ca/english/census06/data/topics/ListProducts.cfm?Temporal=2006&APATH=3&THEME=71&FREE=0&SUB=712&GRP=1
- Click Mobility and Migration > Mobility Status 5 years ago > Census Division of Residence 5 Years Ago (289) for the Inter-Census Division Migrants Aged 5 Years and Over >Free
- The flow data have two parts:
  - 5 years ago – census division of residence
  - Current – census division of residence
- In the "Current-Census division residence (289)" window, search for "Durham" > Refresh

Step 1 Cont'd

Census Division of Residence 5 Years Ago (289) for the Inter-Census Division M Divisions, 2006 Census - 20% Sample Data

Select another dimension for this product:

Current - Census division of residence (289)

Durham | Refresh

5 years ago - Census division of residence (289)	Current - Census division of residence (289) Durham
Canada	74,110
Division No. 1, N.L.	315
Division No. 2, N.L.	10
Division No. 3, N.L.	0
Division No. 4, N.L.	40
Division No. 5, N.L.	25
Division No. 6, N.L.	60
Division No. 7, N.L.	40
Division No. 8, N.L.	135
Division No. 9, N.L.	15
Division No. 10, N.L.	20
Division No. 11, N.L.	0

Step 1 Cont'd

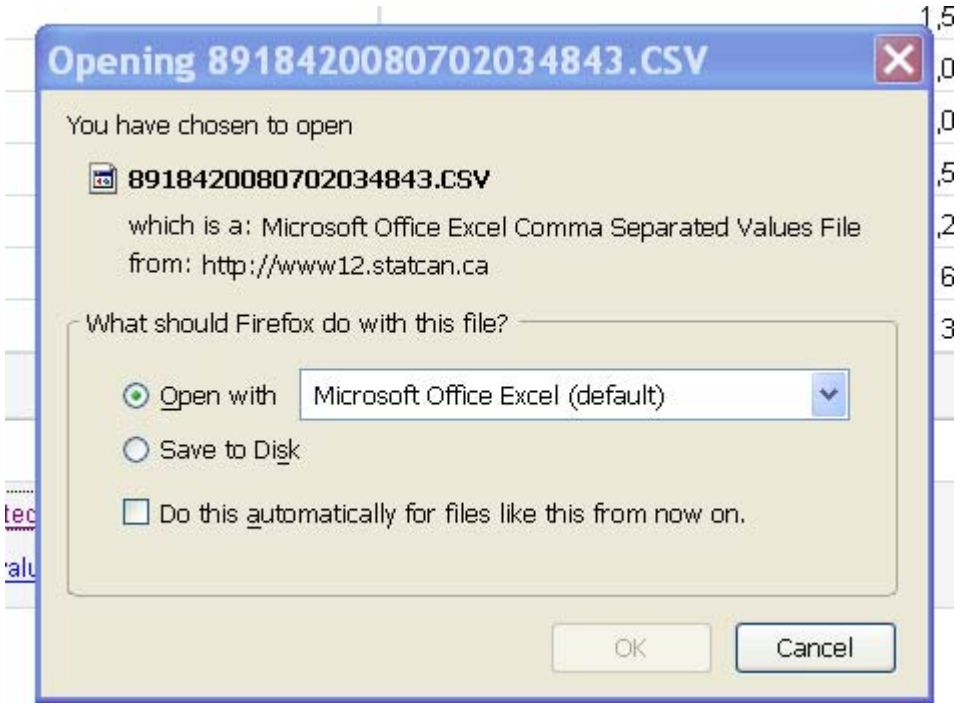
- The left hand column shows all the 5 years ago – CD of residence (where people lived 5 years ago)
- The right hand column shows the number of residents from the respective 5 years ago – CD of residence now living in the Region of Durham (Current – CD of residence)
  - For example, 315 persons lived in Divison No. 1 (Newfoundland) 5 years ago are now living in the Region of Durham

Step 2 – Select origins

- In stead of mapping all the origins, you may be interested to show only those origins where most of the current residents migrated from 5 years ago,
- To select the top origins, sort the Current – CD residence, you can export the file to Excel by clicking at the bottom of the table
  - Alternate formats – CVS (Comma-separated-values) file

Step 2 Cont'd

- Open the file with Excel



Step 2 Cont'd

- Sort "count" in descending order

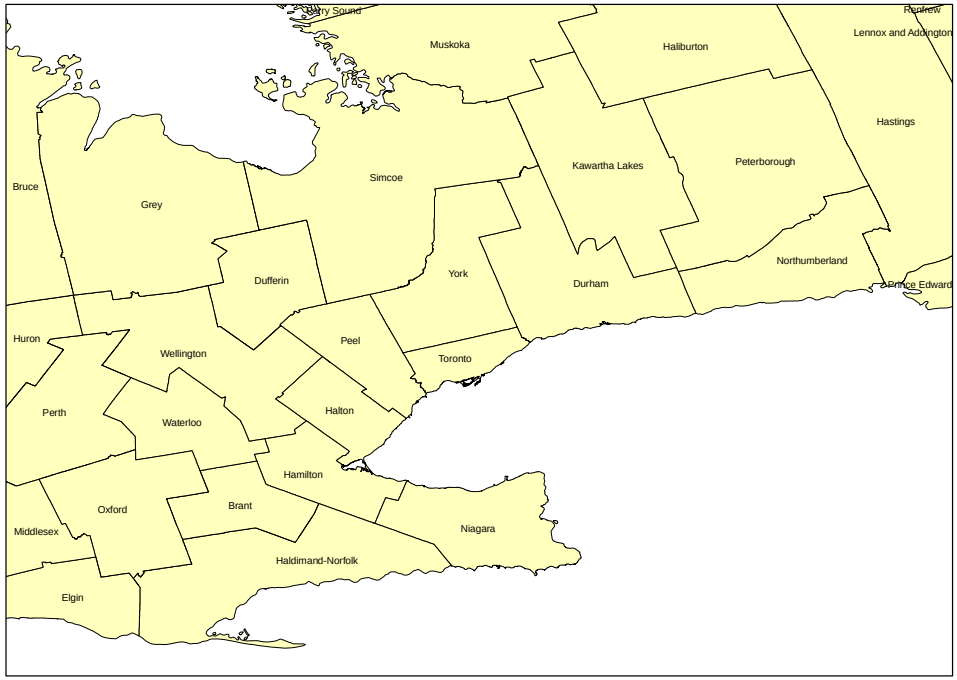
Census Division of Residence 5 Years Ago (289) for the Inter-Census Division Mig		
5 years ago - Census division of r	Current - Census division	Count
Canada	Durham	74110
Toronto	Durham	40440
York	Durham	7910
Peel	Durham	3135
Kawartha Lakes	Durham	1910
Simcoe	Durham	1490
Peterborough	Durham	1410
Northumberland	Durham	1365
Ottawa	Durham	1065
Hastings	Durham	885
Halton	Durham	825
Waterloo	Durham	820
Middlesex	Durham	735
Niagara	Durham	715
Greater Vancouver	Durham	670
Hamilton	Durham	585
Essex	Durham	575
Montréal	Durham	555
Greater Sudbury / Grand Sudbu	Durham	455
Frontenac	Durham	430
Halifax	Durham	380

Step 3 – Input flow data

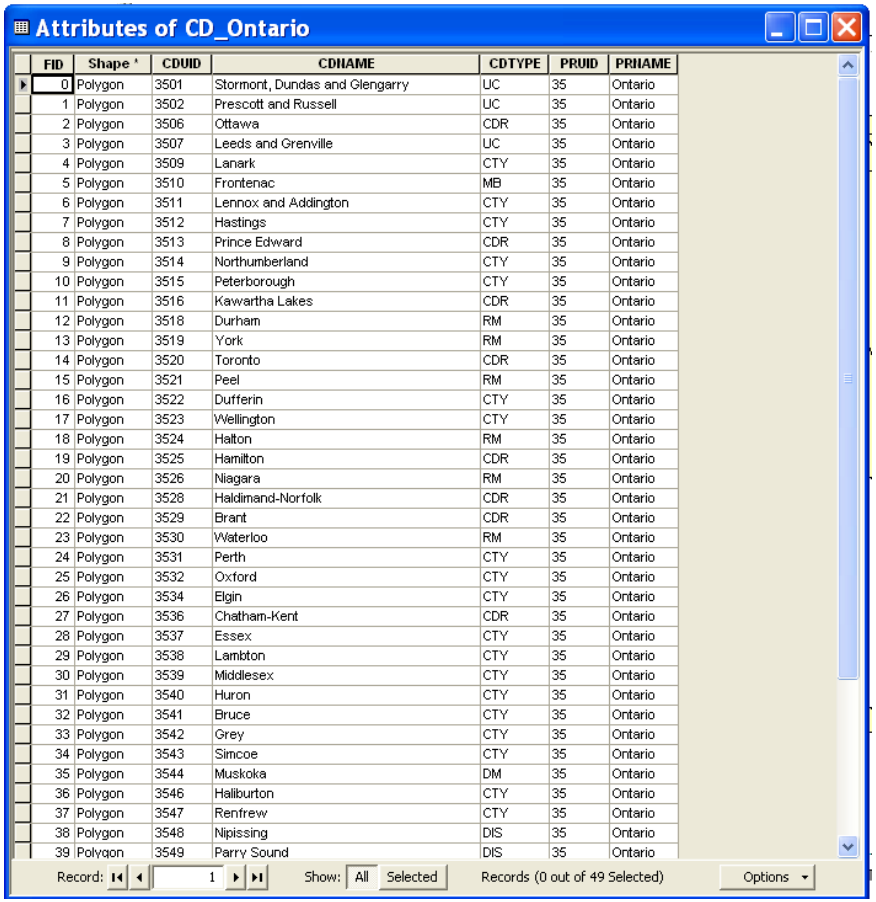
- Add the flow data to the attribute table
  - Open ArcMap
  - Add CD shapefile
  - Open CD shapefile

Step 3 Cont'd

- CD shapefile



Step 3 Cont'd



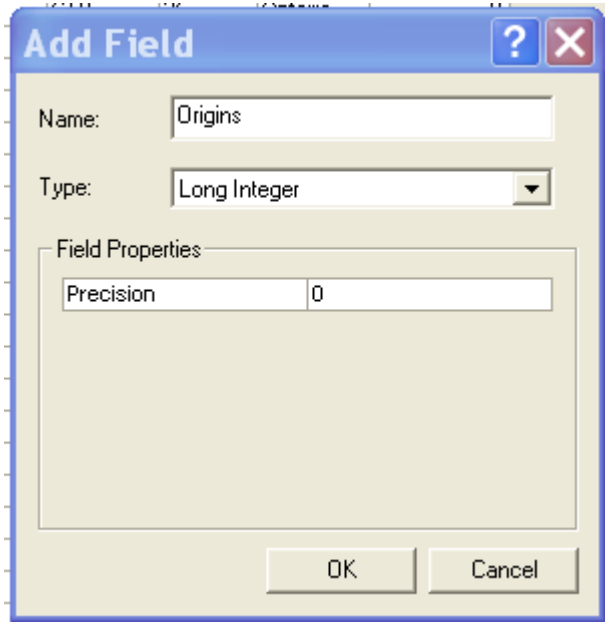
Attributes of CD_Ontario

FID	Shape *	CDUID	CDNAME	CDTYPE	PRUID	PRNAME
0	Polygon	3501	Stormont, Dundas and Glengarry	UC	35	Ontario
1	Polygon	3502	Prescott and Russell	UC	35	Ontario
2	Polygon	3506	Ottawa	CDR	35	Ontario
3	Polygon	3507	Leeds and Grenville	UC	35	Ontario
4	Polygon	3509	Lanark	CTY	35	Ontario
5	Polygon	3510	Frontenac	MB	35	Ontario
6	Polygon	3511	Lennox and Addington	CTY	35	Ontario
7	Polygon	3512	Hastings	CTY	35	Ontario
8	Polygon	3513	Prince Edward	CDR	35	Ontario
9	Polygon	3514	Northumberland	CTY	35	Ontario
10	Polygon	3515	Peterborough	CTY	35	Ontario
11	Polygon	3516	Kawartha Lakes	CDR	35	Ontario
12	Polygon	3518	Durham	RM	35	Ontario
13	Polygon	3519	York	RM	35	Ontario
14	Polygon	3520	Toronto	CDR	35	Ontario
15	Polygon	3521	Peel	RM	35	Ontario
16	Polygon	3522	Dufferin	CTY	35	Ontario
17	Polygon	3523	Wellington	CTY	35	Ontario
18	Polygon	3524	Halton	RM	35	Ontario
19	Polygon	3525	Hamilton	CDR	35	Ontario
20	Polygon	3526	Niagara	RM	35	Ontario
21	Polygon	3528	Haldimand-Norfolk	CDR	35	Ontario
22	Polygon	3529	Brant	CDR	35	Ontario
23	Polygon	3530	Waterloo	RM	35	Ontario
24	Polygon	3531	Perth	CTY	35	Ontario
25	Polygon	3532	Oxford	CTY	35	Ontario
26	Polygon	3534	Elgin	CTY	35	Ontario
27	Polygon	3536	Chatham-Kent	CDR	35	Ontario
28	Polygon	3537	Essex	CTY	35	Ontario
29	Polygon	3538	Lambton	CTY	35	Ontario
30	Polygon	3539	Middlesex	CTY	35	Ontario
31	Polygon	3540	Huron	CTY	35	Ontario
32	Polygon	3541	Bruce	CTY	35	Ontario
33	Polygon	3542	Grey	CTY	35	Ontario
34	Polygon	3543	Simcoe	CTY	35	Ontario
35	Polygon	3544	Muskoka	DM	35	Ontario
36	Polygon	3546	Haliburton	CTY	35	Ontario
37	Polygon	3547	Renfrew	CTY	35	Ontario
38	Polygon	3548	Nipissing	DIS	35	Ontario
39	Polygon	3549	Parry Sound	DIS	35	Ontario

Record: 1 Show: All Selected Records (0 out of 49 Selected) Options

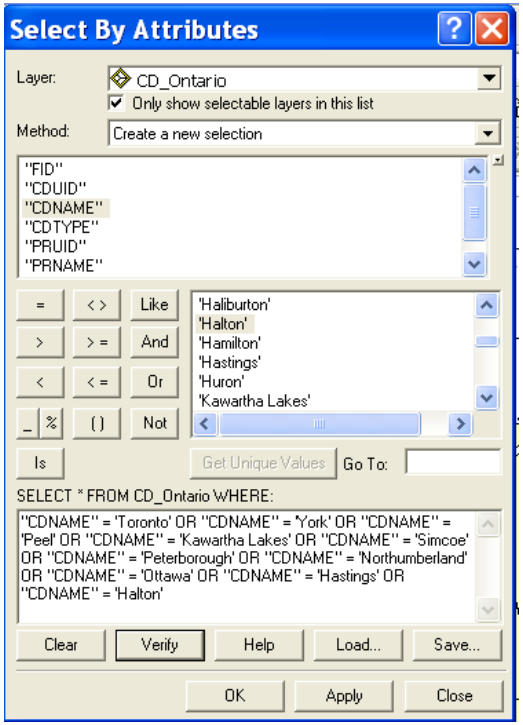
Step 4 - Add field

- To input flow data to the attribute table, a new field has to be added
- In attribute table, click Option> Add field
- Enter a name (origins) and change type to ‘Long Integer’

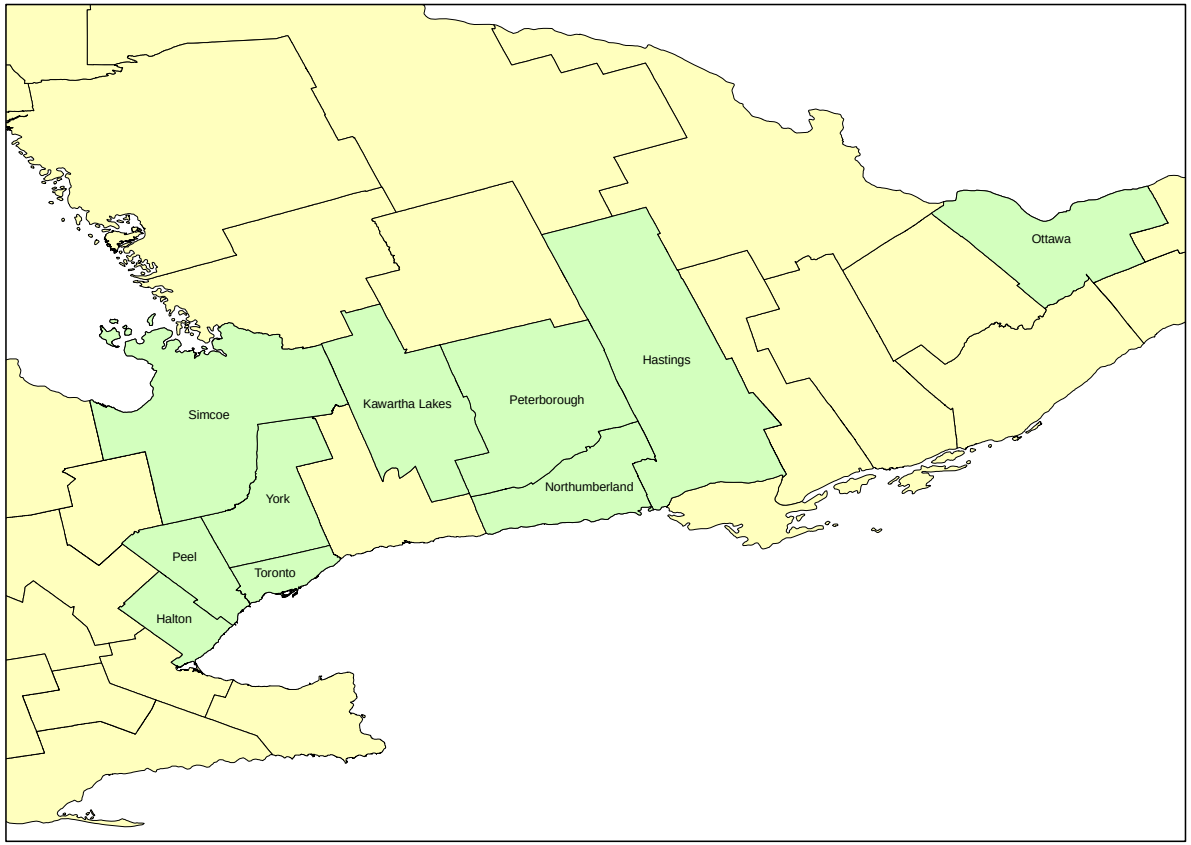


Step 5 – select top 10 origins

- Click Selection> select by attributes
- Enter “CDNAME” to be selected



Step 5 Cont'd


Ottawa
Hastings
Peterborough
Kawartha Lakes
Simcoe
Northumberland
York
Peel
Toronto
Halton

Step 5 Cont'd

- Create selected origin layer
  - Right click on CD_Ontario shapefile
  - Click Selection
  - Choose "create layer from selected features"

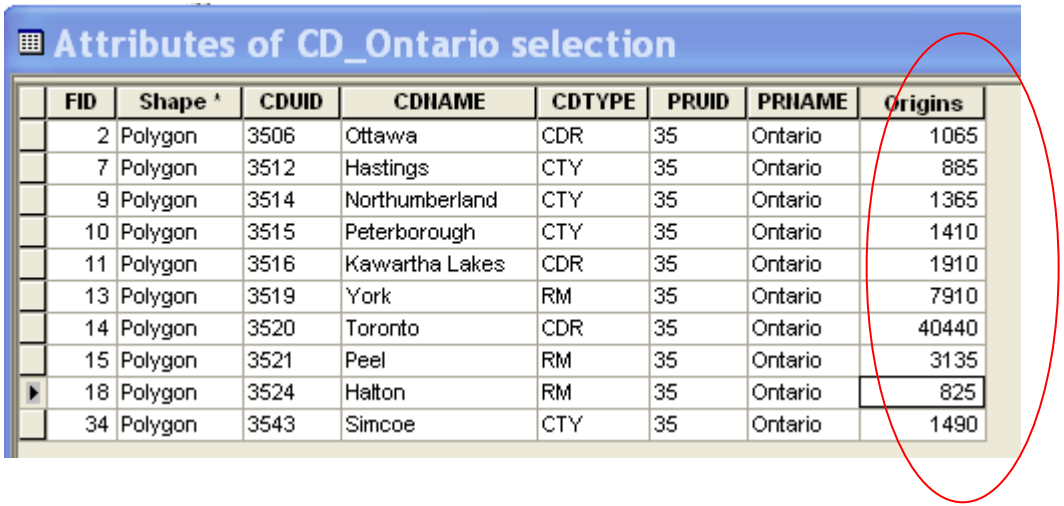
Step 6- Enter values

- Click Editor > Start editing
- Choose the file to be edited

- Enter the values to the “Origins” column

Step 6 – Cont'd

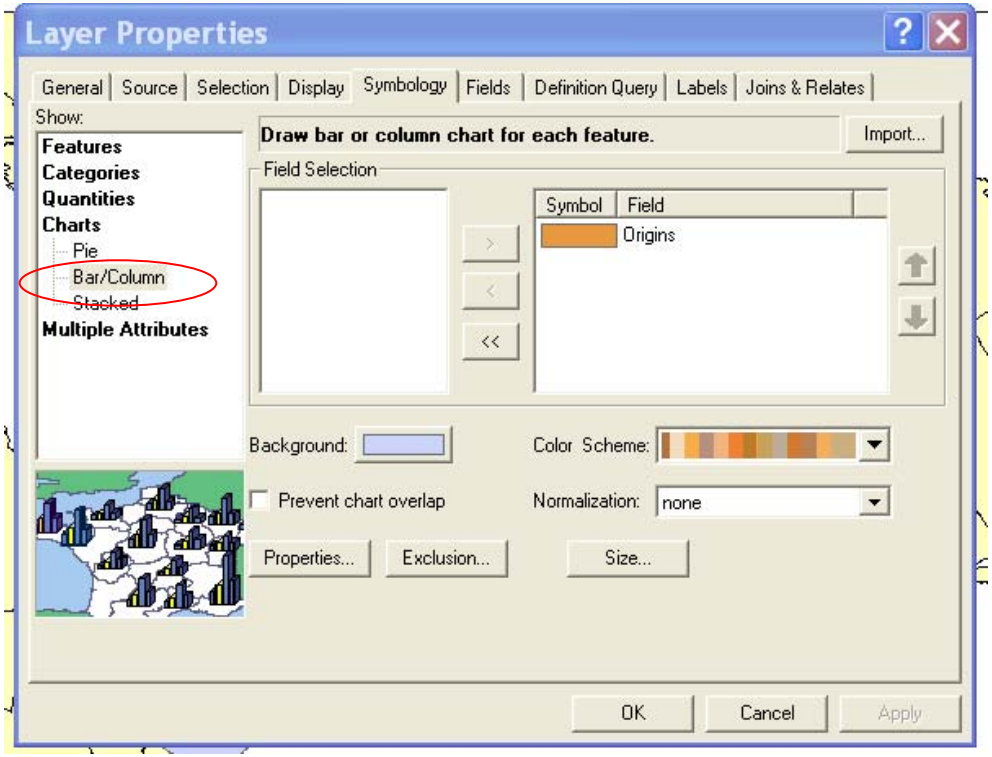
- After entering all the values to the Origins column > Click Editor> Save Edits> Stop Editing



FID	Shape *	CDUID	CDNAME	CDTYPE	PRUID	PRNAME	Origins
2	Polygon	3506	Ottawa	CDR	35	Ontario	1065
7	Polygon	3512	Hastings	CTY	35	Ontario	885
9	Polygon	3514	Northumberland	CTY	35	Ontario	1365
10	Polygon	3515	Peterborough	CTY	35	Ontario	1410
11	Polygon	3516	Kawartha Lakes	CDR	35	Ontario	1910
13	Polygon	3519	York	RM	35	Ontario	7910
14	Polygon	3520	Toronto	CDR	35	Ontario	40440
15	Polygon	3521	Peel	RM	35	Ontario	3135
18	Polygon	3524	Halton	RM	35	Ontario	825
34	Polygon	3543	Simcoe	CTY	35	Ontario	1490

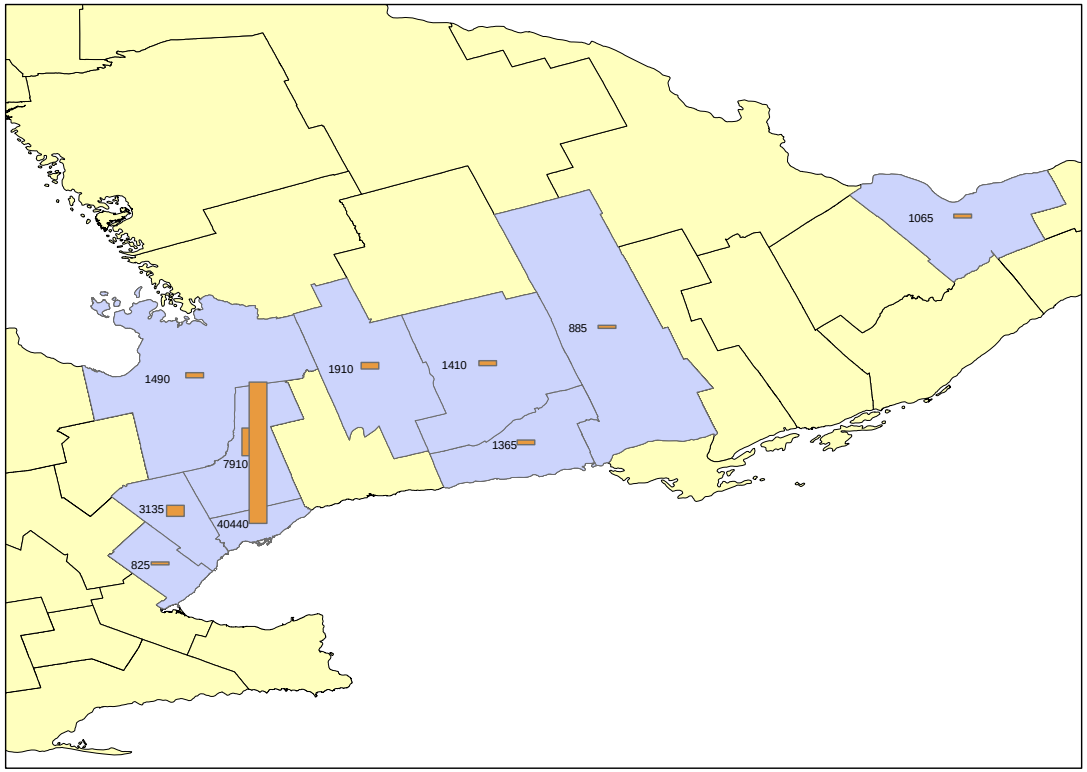
Step 7 – Display flow values

- In Layer Properties window : Click Symbology, select Charts>Bar/Column



Step 7 Cont'd

- You can also add the value to each bar by clicking Label>Label field> Origins



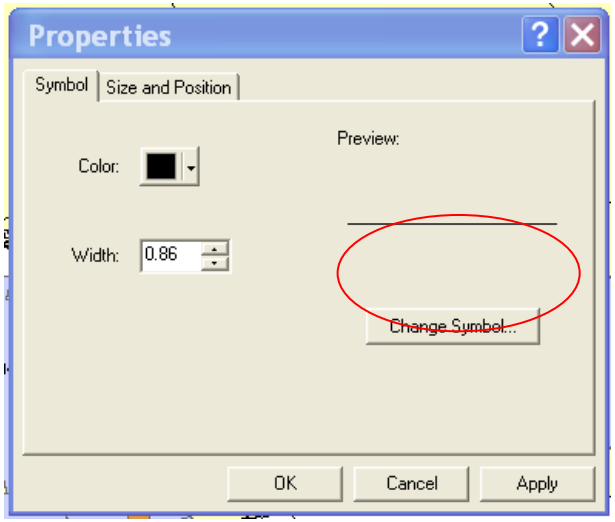
Step 8- Add flow arrows

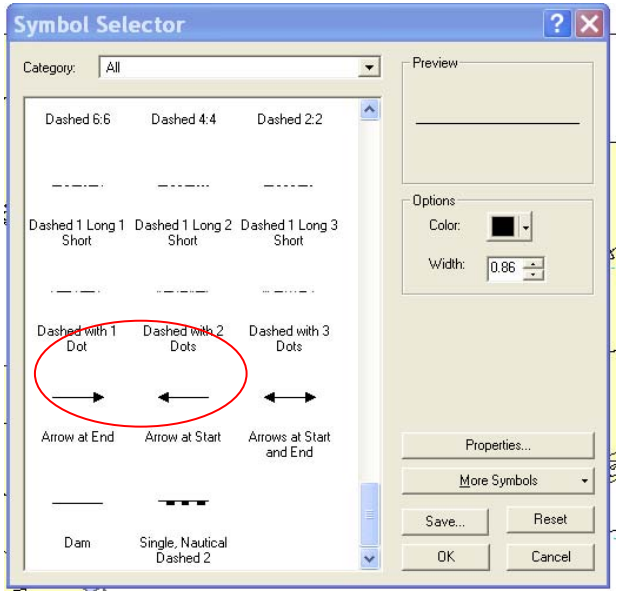
- In the Draw tool bar, select “draw a freehand line”

- Anchor the “+” at one of selected CD origins and drag the cursor to the destination CD – Durham – a line will be draw linking the origin to the destination
- Double click on the line and go to “properties”

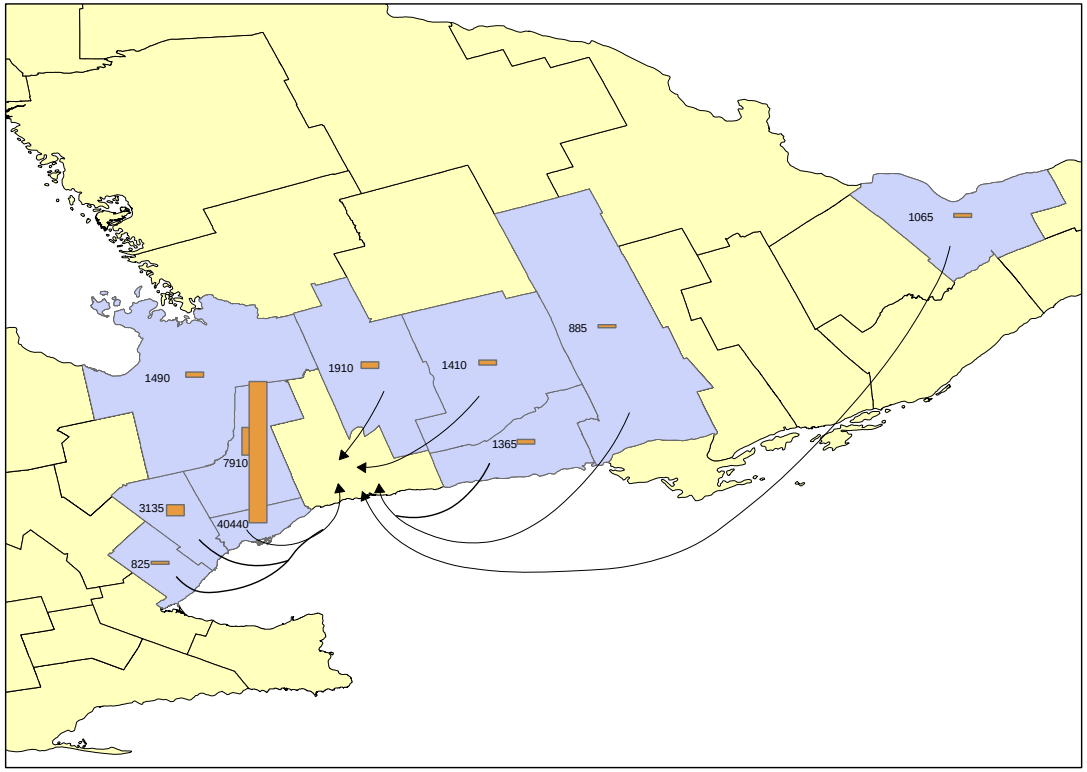
Step 8 Cont'd

- Click "Change Symbol" > "Symbol Selector" – select either "Arrow at End" or "Arrow at Start"
- The colour and width of the arrows can be changed



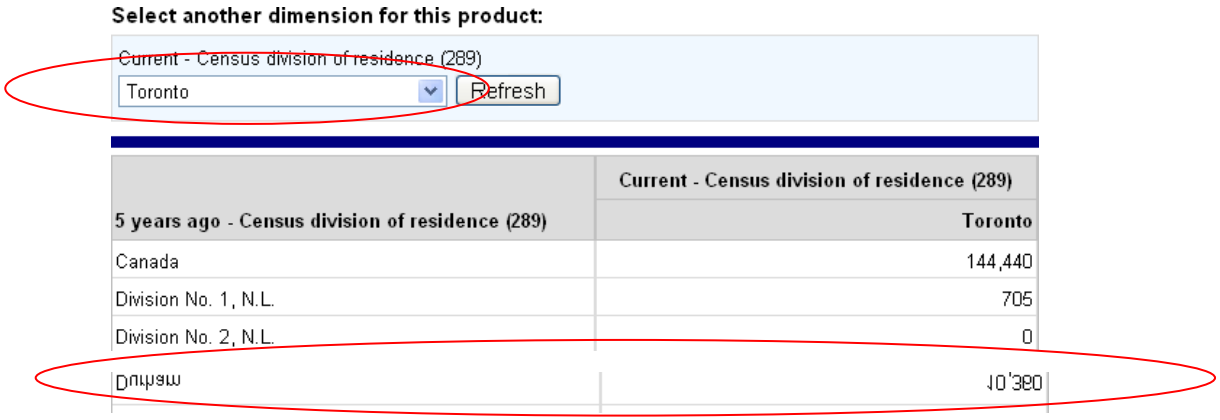


In-migration flows



Step 9 Out-migration flow

- In order to show the out-migration flow (destination of residents who lived in Durham 5 years ago), one has to change the Current – CD of residence to other CDs and search for the number of residents (5 years ago – CD of residence - Durham) in Step 1



Select another dimension for this product:

Current - Census division of residence (289)

Toronto | Refresh

5 years ago - Census division of residence (289)	Current - Census division of residence (289) Toronto
Canada	144,440
Division No. 1, N.L.	705
Division No. 2, N.L.	0
Durham	10,380

Step 10 – External Migrants

- Data on migrants from abroad (external migrants) are available from PCensus datafile – Mobility
- To include the data onto the map, a bar can be created manually by using the “new rectangle” tool in the Draw toolbar

Commuting Flow

- The flow data were compiled from the question on “at what address did this person usually work most of the time?”
- The respondent was asked to indicate
  - Worked at home (including farms)
  - Worked outside Canada
  - No fixed workplace address
  - **Worked at the address specified**
    - Street address
    - City, town, village, township, municipality or Indian reserve
    - Province/territory
    - Postal code

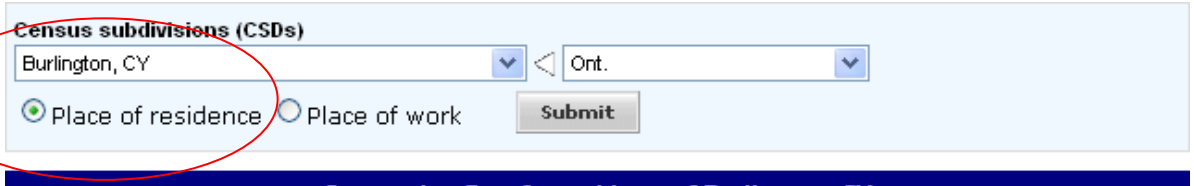
Commuting Flow

- The commuting flow data are available from
  - Cat. No. 97-561-X2006011
- The process to map the commuting flow is very similar to that of migration flow
- City of Burlington is selected as an illustration

Step 1

- From 2006 Census home page, select Data product> Topic-based tabulation
- http://www12.statcan.ca/english/census06/data/topics/ListProducts.cfm?Temporal=2006&APATH=3&THEME=76&FREE=0&GRP=1
- Click Place of Work and Commuting to work> Commuting Flow Census Subdivisions: Sex (3) for the Employed Labour Force 15 Years and Over Having a Usual Place of Work> Free
- The flow data have two parts:
  - Place of residence- CSD (origin)
  - Place of work = CSD (destination)

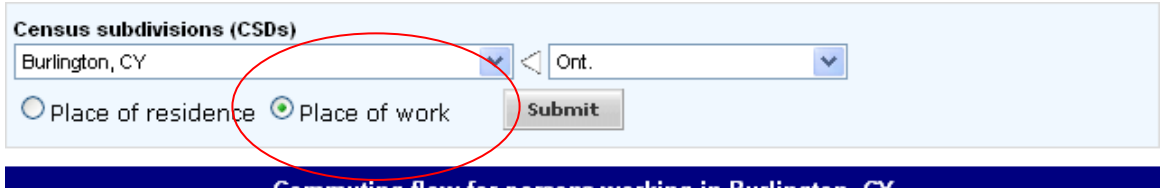
Step 2 – Select place of residence



Commuting flow for residents of Burlington, CY

Place of residence / Place of work[1]	Sex (3)		
	Total	Male	Female
Burlington (CY) / Burlington (CY)	32,665	13,875	18,790
Burlington (CY) / Oakville (T)	10,105	4,750	5,355
Burlington (CY) / Mississauga (CY)	8,605	5,050	3,555
Burlington (CY) / Toronto (C)	8,475	4,950	3,525
Burlington (CY) / Hamilton (C)	8,000	4,115	3,885
Burlington (CY) / Milton (T)	1,835	995	840
Burlington (CY) / Brampton (CY)	1,175	835	340
Burlington (CY) / Vaughan (CY)	420	325	95
Burlington (CY) / Brantford (CY)	285	185	90
Burlington (CY) / Halton Hills (T)	255	175	85
Burlington (CY) / Guelph (CY)	250	130	120
Burlington (CY) / Cambridge (CY)	215	185	30

Step 3 – select place of work



Commuting flow for persons working in Burlington, CY

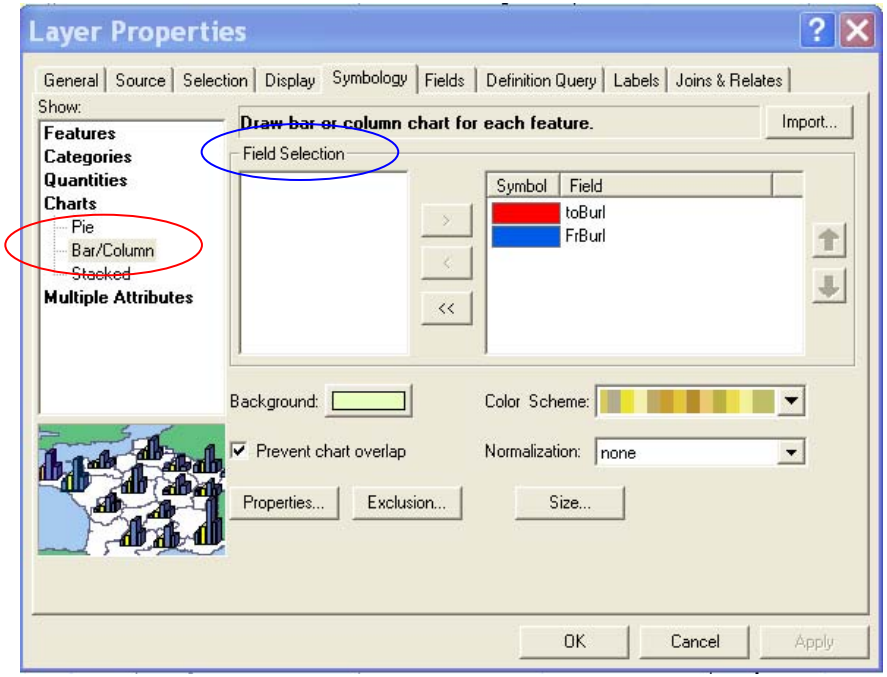
Place of residence / Place of work[1]	Sex (3)		
	Total	Male	Female
Burlington (CY) / Burlington (CY)	32,665	13,875	18,790
Hamilton (C) / Burlington (CY)	24,270	12,980	11,285
Oakville (T) / Burlington (CY)	3,920	1,930	1,990
Mississauga (CY) / Burlington (CY)	2,555	1,525	1,030
Toronto (C) / Burlington (CY)	1,345	975	370
Milton (T) / Burlington (CY)	885	440	445
Grimsby (T) / Burlington (CY)	870	440	430
Haldimand County (CY) / Burlington (CY)	710	440	270
Brantford (CY) / Burlington (CY)	585	335	255
St. Catharines (CY) / Burlington (CY)	540	350	190
Brampton (CY) / Burlington (CY)	535	365	170
Lincoln (T) / Burlington (CY)	440	230	215

Step 4 Mapping commuting flows

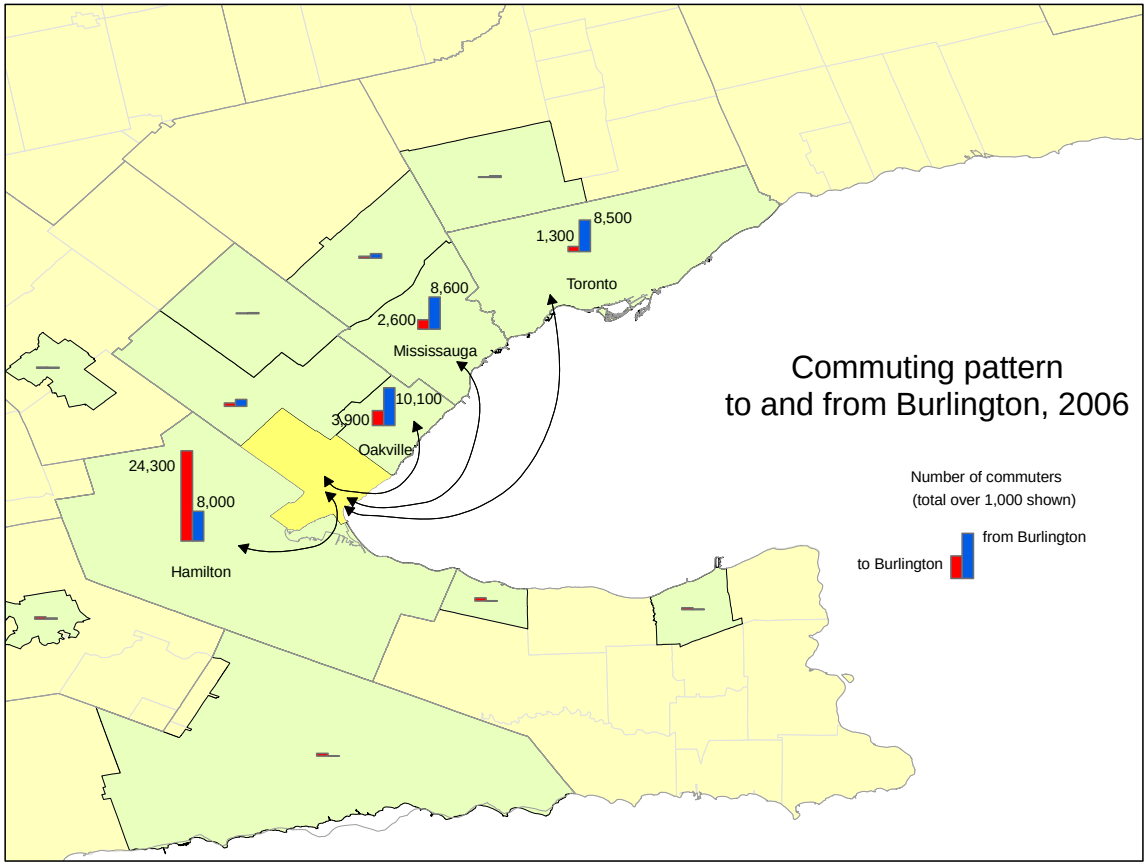
- Depending on the amount of information you would like to show, you could include both origins and destinations on one map
- Two bars (origin and destination) can be shown side by side

Step 4 Cont'd

- In Layer Properties window : Click Symbology, select Charts>Bar/Column
- Select the origin and destination fields



Commuting pattern



Source: Statistics Canada, 2006 Census

Any questions or comments?

Please contact me at:
Richard Lau
GIS Project Coordinator
Community Social Profile Project
Email: richard.lau@spno.ca
Phone: 905-632-1975, 878-0955
Fax: 905-632-0778

Thank You

This project is funded by the Ontario Trillium Foundation