Alberta Municipal Population Estimates

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Outline

- Census and population estimates (Overview)
- Introduction to population estimates
- Data Sources
- Methods of estimation
- Deliverables
- Other Considerations
- Going Forward

Census and Population Estimates

- **Census provides detailed information at a single point in time.**
  - Some people are not counted or may be counted more than once.
- **Statistics Canada conducts postcensal coverage studies.**
  - Results (i.e., net undercoverage) in combination with the census counts are used to produce population estimates.
- **Since estimates are adjusted for net undercoverage, they have a higher degree of accuracy.**
- **Estimates measure population growth between two points in time using components of change.**

Introduction

- **OSI developed a model to estimate census sub-divisions (CSDs) or municipalities.**

- ***Importance:***
  - Funding/resource allocation
  - Program planning
  - Decision making
  - Denominator for indicator measurement

Introduction

- **Method used to estimate the Census Subdivisions (CSDs) has been around for a long time.**
- **Some statistical agencies in other jurisdictions produce estimates.**
- **Estimates are derived from administrative and Statistics Canada data sources.**
- **Overall method is based on the *balancing equation*.**
- **Estimation of *usual residents* only, as defined in the federal census.**

Data Sources

Name	Source	Variables
Base Year CSD Population	STC	CSD Pop. by Age & Sex
Vital Statistics	Service Alberta	CSD Births and Deaths
Health Register	Alberta Health	CSD Migration
MOVES (Driver Abstracts)	Service Alberta	CSD Migration
T1FF, CCB	CRA	CSD Migration
Land Titles, CSD Boundaries, Postal Code Location	Service Alberta, STC, DMTI	CSD Migration, Boundary Changes, Location
CD Annual Estimates	STC	CD Pop., Births, Deaths & Migration

Methods

- **Population of CSD_i at time t + n is 'partially' solved by annual births, deaths and migration data.**

Pop. at time t+n, Base Pop., Births, Deaths, In Migrants, Out Migrants

$$P_{t+n}^{CSDi} = P_t^{CSDi} + B_{t,t+n}^{CSDi} - D_{t,t+n}^{CSDi} + \left[IM_{t,t+n}^{CSDi} - OM_{t,t+n}^{CSDi}\right] + \left[IN_{t,t+n}^{CSDi} - OUT_{t,t+n}^{CSDi}\right]$$

Intraprovincial In Migrants, Intraprovincial Out Migrants

- **If there are no events the equation reduces to:**

$$P_{t+n}^{CSDi} = P_t^{CSDi}$$

- **Population is aged by one year, accounting for natural increase and net migration.**

Methods

- **July 1, 2016 is the adjusted base year population.**
  - Includes any corrections to federal census counts.
  - Midyear is the average representation of calendar year period.
  - Consistent with standard demographic methods.
- **425 CSDs within 19 CDs.**
  - Using the standard geographic classification (SGC) from the 2016 federal census.
  - Boundaries and number of CSDs will be as of January 1st in any given year.
- **As the model becomes more developed, produce historical estimates.**

Methods

- ***Unique Feature* – population estimates for current boundaries.**
  - Geospatial capabilities allow for changing boundaries.

- **CSD boundaries can change each year, so to reflect reality, we have incorporated a geospatial method to reflect those changes in the production of the estimates.**

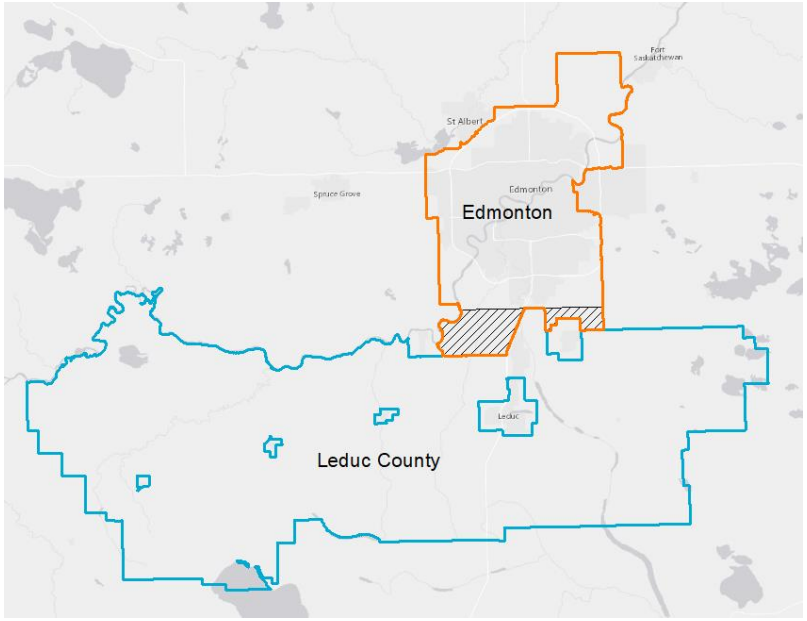
Methods

- **Intercensal CSD Boundaries (Reference date: Jan. 1)**
  - e.g., Geographic reference date for the 2020 CSD Boundary File is January 1, 2020. Changes to municipal boundaries, status and names from January 2, 2019 to January 1, 2020 are captured in the 2020 boundary file.

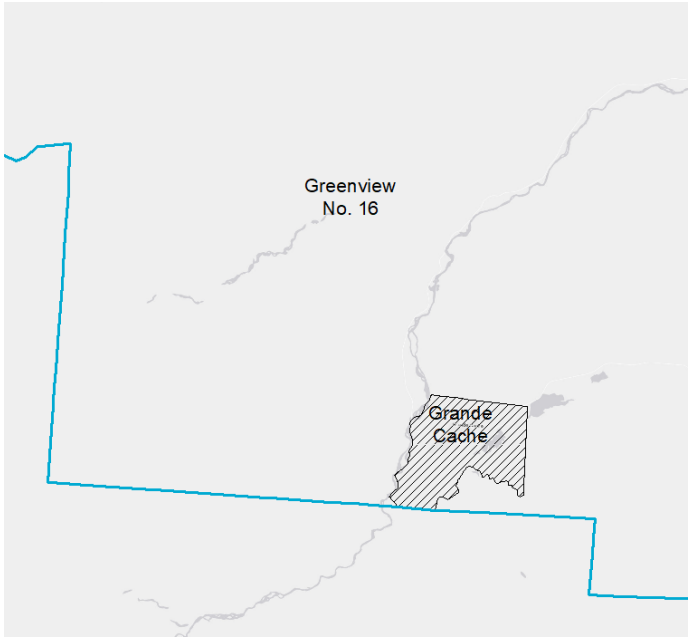
- **Source: *Interim List of Changes to Municipal Boundaries, Status, and Names***
  - Compiled from provincial gazettes and statutes, orders of the Municipal Board and special provincial acts.

Methods

- **Annexation**



- **Dissolution**



Methods

- **Syntax for processing data and for building the estimation model was developed with SAS 9.4.**

- **Algorithm for the prorate/raking tool was originally created by STC and the corresponding syntax for this model was developed and written at OSI in SAS Macro.**

Methods

- ***Processing data*** **– take number of events from admin. files (i.e., births, deaths, migration) by CSD, age and sex.**

- **Migration proportions are adjusted to the STC numbers to arrive at the CD totals or are the prorating mechanism to adjust the numbers.**

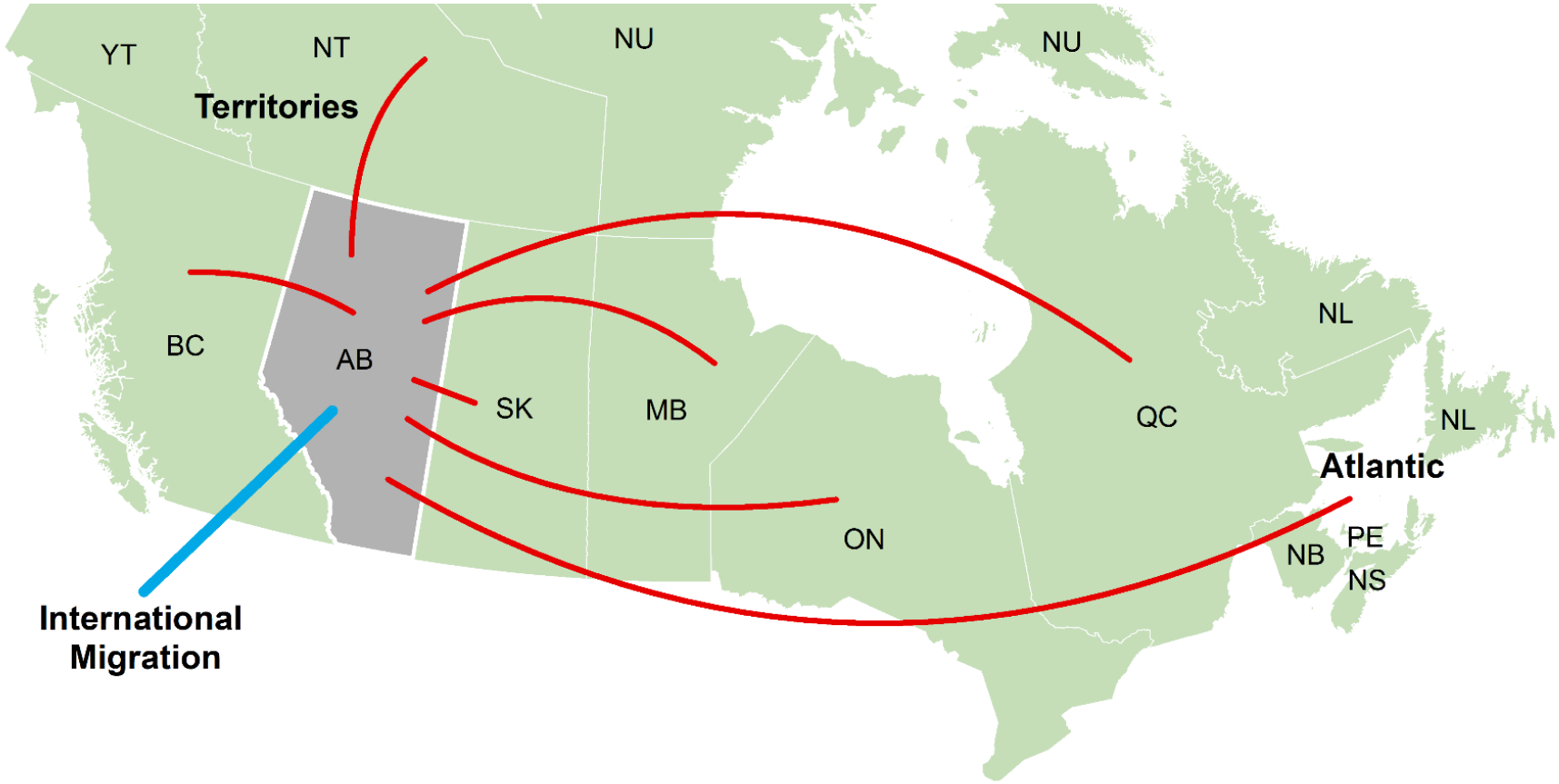
Methods

- ***Births*** **and** ***Deaths*** **generally have complete information (~95+%).**
- **Some CDs have lower coverage, as they share a border with another province (e.g., CD10 – hospital in Lloydminster is on Sask. side).**
- **Vital statistics include Alberta residents who were born or died in a different province (no adjustments required).**

Methods

- ***Migration*: requires most preparation and modeling.**
- **In migration numbers (~80%+) are more complete than Out migration (~40 - 50%).**
- ***In Migration* - number of interprovincial in migrants, immigrants, net non-permanent residents.**
- ***Out Migration* - number of interprovincial out migrants, number of emigrants, number of returning emigrants, Net temporary emigrants.**

Methods



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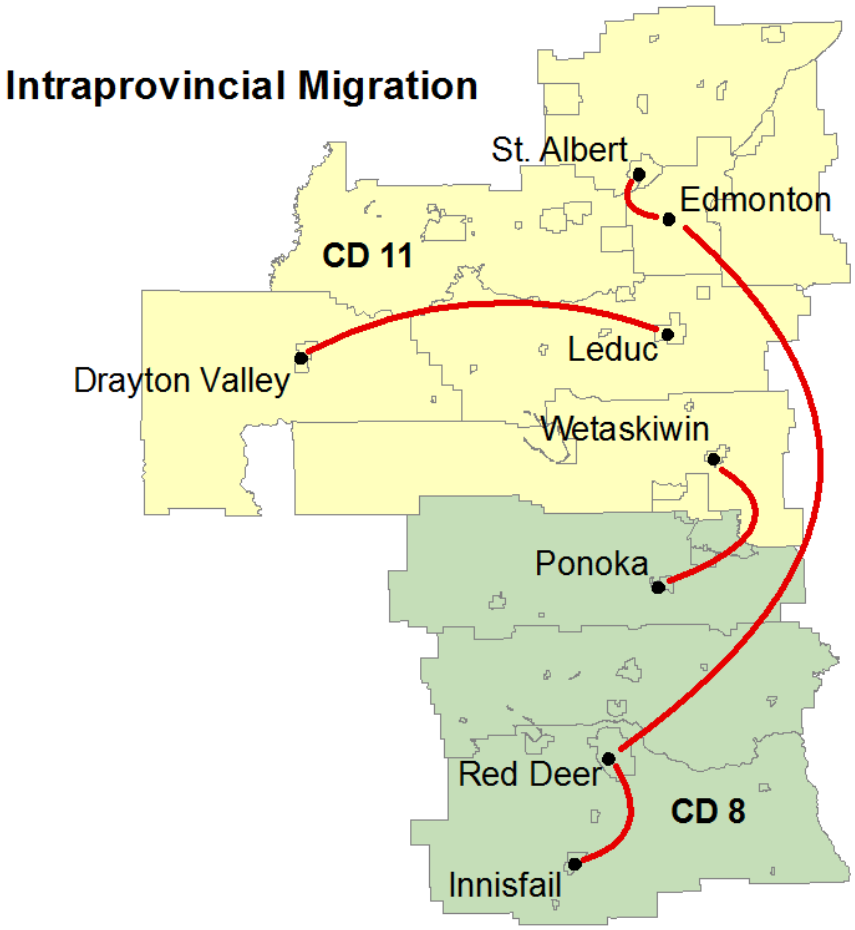
Methods

- ***Intraprovincial Migration* is another type of movement taken into consideration.**

- **It is divided into *2 subsets* for the model:**
  - People moving from one CSD to another in a different CD.
  - People moving between CSDs within the same CD.

Methods



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Methods

- ***Goal:*** **make the sum of all CSDs equal the corresponding CD total by age and sex.**

- ***Issue:*** **Data pulled from Admin. records are incomplete, so when the components are summed they would not equal the CD total.**
  - Adjustments are needed to make each component equal sum to the CD total.

Methods

- ***Raking/Prorating*** **– sum of the CSD estimates equal the total of its corresponding CD.**
- **Two Stages: 1) adjust each component (i.e., mostly migration) to its respective CD total; 2) rake the preliminary estimates to the CD population total (final step).**
- **A *key* step, as it ensures consistency with STC estimates for Alberta and other sub provincial areas.**

Methods

- **When all processes are complete, the population of CD_i at time t+n will equal the sum of the corresponding CSDs:**

$$P_{t+n}^{CDi} = \sum_{i}^{j} [\left(P_t^{CSDi} + B_{t,t+n}^{CSDi} - D_{t,t+n}^{CSDi} + \left[I_{t,t+n}^{CSDi} - O_{t,t+n}^{CSDi}\right] + \left[IN_{t,t+n}^{CSDi} - OUT_{t,t+n}^{CSDi}\right]\right) + \cdots \left(P_{t,t+n}^{CSDj} + B_{t,t+n}^{CSDj} - D_{t,t+n}^{CSDj} + \left[I_{t,t+n}^{CSDj} - O_{t,t+n}^{CSDj}\right] + \left[IN_{t,t+n}^{CSDj} - OUT_{t,t+n}^{CSDj}\right]\right)]$$

Deliverables

- Automated model
- Annual CSD estimates by age and sex
- Technical Methods Paper
- Publications

Other Considerations

- **Metis Settlements**
  - April Meeting with Chief, Demographic Estimates (STC) to discuss methodology.

- **Shadow Population**
  - Exploring the issue.

Going Forward

- **We will have open line of communication with municipalities.**
  - Contact us with any feedback questions, concerns about the estimation method and/or estimates.

- **Contacts:**

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Thank you