Introduction to GIS

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McMaster University sits on the traditional Territories of the Mississauga and Haudenosaunee Nations, and within the lands protected by the Dish With One Spoon wampum agreement.

Overview

Intro to GIS

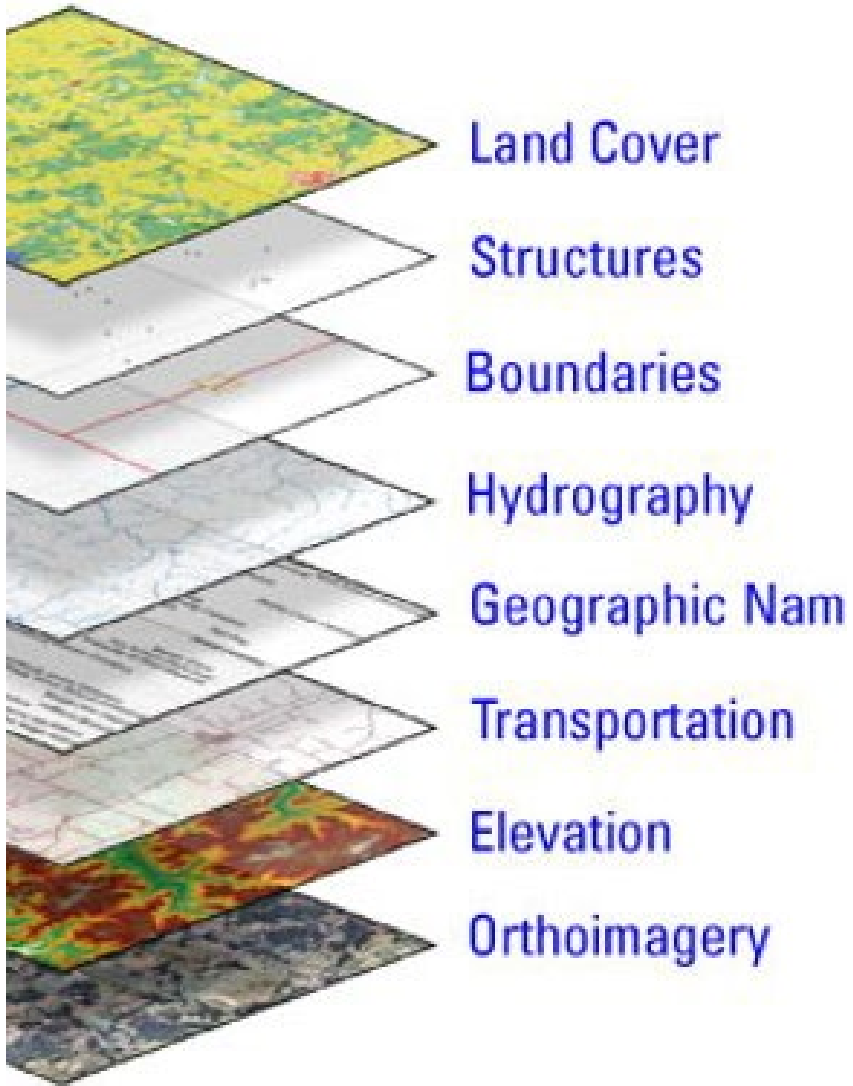Spatial Data Sources

GIS Software

Exercise

Q & A

Learning Objectives

- Have a better understanding of what GIS is and how it can be used

- Become familiar with common sources of geospatial data

- Learn the ArcGIS Online interface and be able to create a simple map

- Know where you can get additional help and resources

What is GIS?

- **G**eographic **I**nformation **S**ystems

- Digital or computer-based mapping

- A system to assemble, store, manipulate, analyze, and present ***geographically referenced data***
  - Data associated with, or identified by, their location

- A digital representation of real-world geographic attributes:
  - Location
  - Attributes
  - Spatial relationships

- Allows us to view, understand, question, interpret, and visualize data in many ways that reveal relationships, patterns, and trends

Land Cover
Structures
Boundaries
Hydrography
Geographic Nam
Transportation
Elevation
Orthoimagery

USGS The National Map

Spatial Data

- Vector and raster data models used to represent the real world

- Data collection - GPS units, surveys, tablets, phones, crowdsourced

- Multiple datasets are stacked or joined together in GIS software

- Maps can be printed or made available online, resulting in rapid information and knowledge dissemination
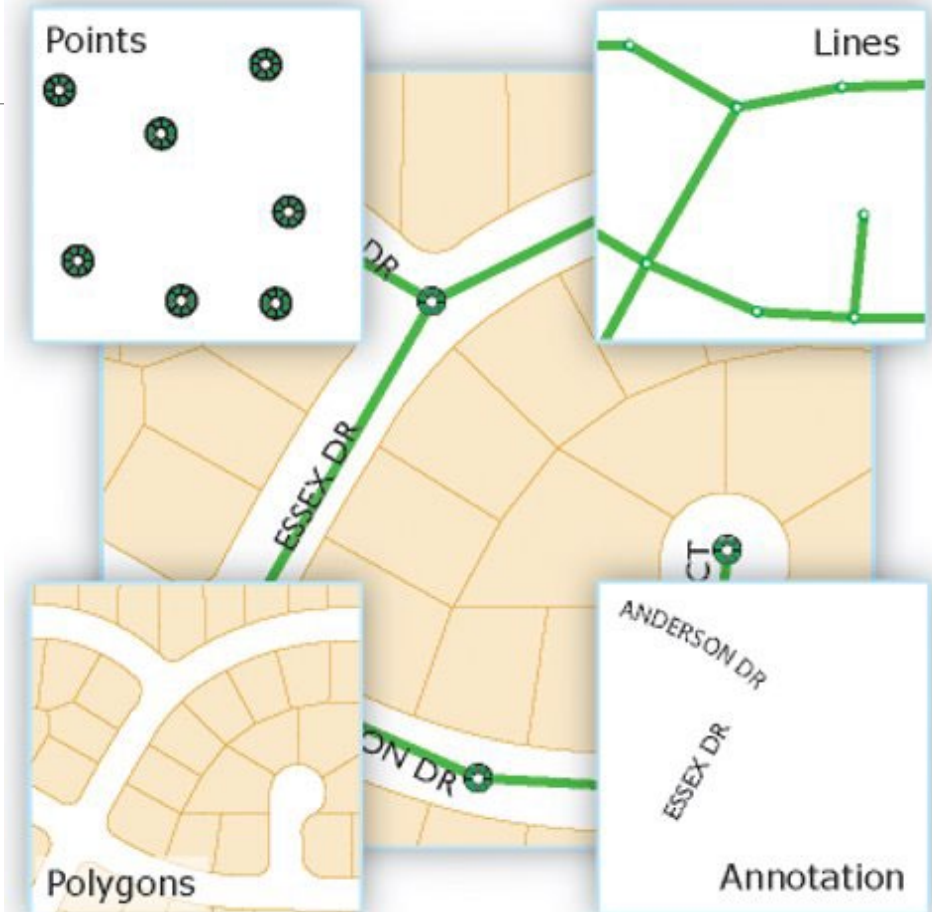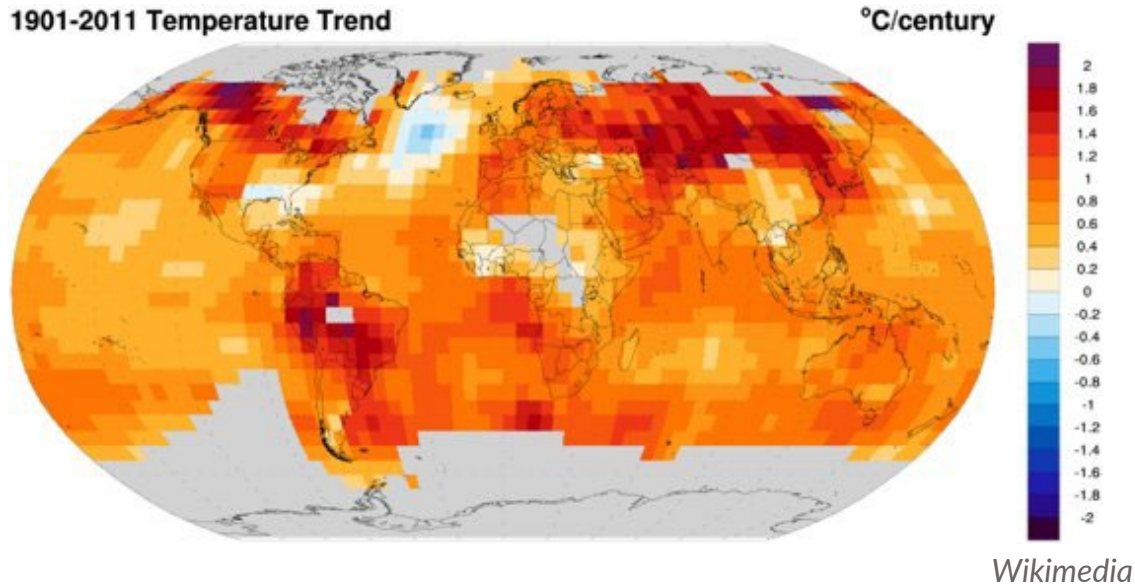
Vector Data

Points
- X / Y locations

Line
- Connected X / Y locations

Polygon (area)
- Connected X / Y locations forming a closed figure
- Good for representing clearly defined objects

Esri

Raster Data
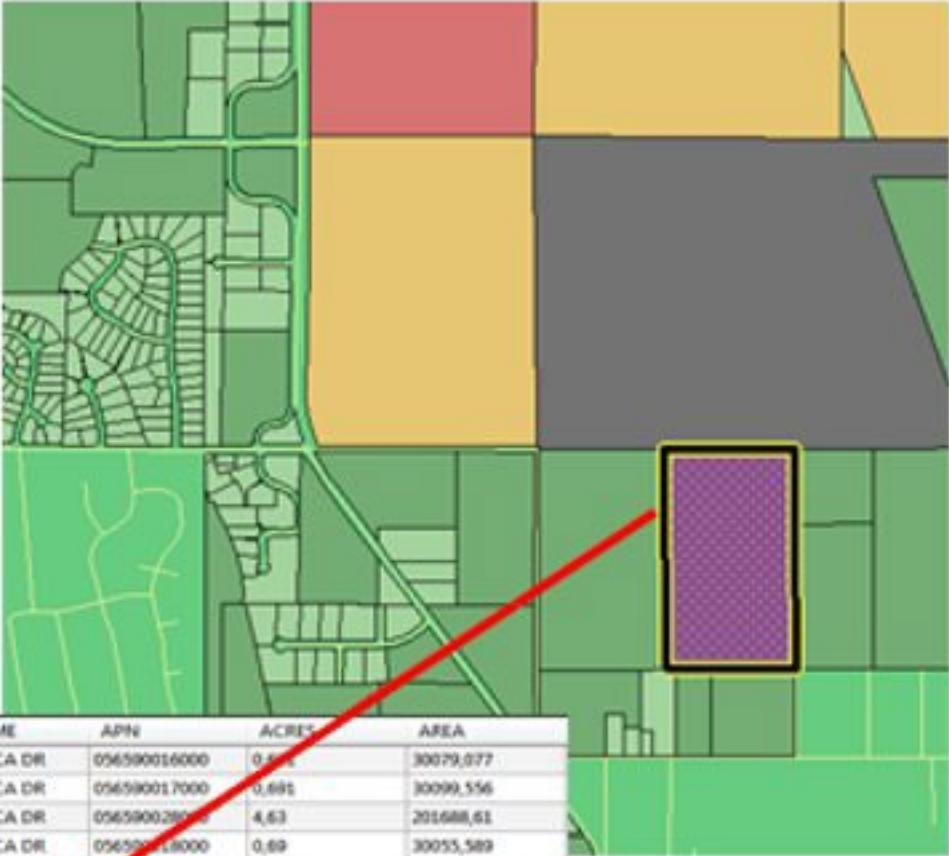

1901-2011 Temperature Trend °C/century

Wikimedia

- Grid of cells

- Numbers assigned to each cell representing data
    - Categorical - Land use, e.g.
    - Continuous - Temperature, elevation, e.g.

- Good for representing continuously changing attributes
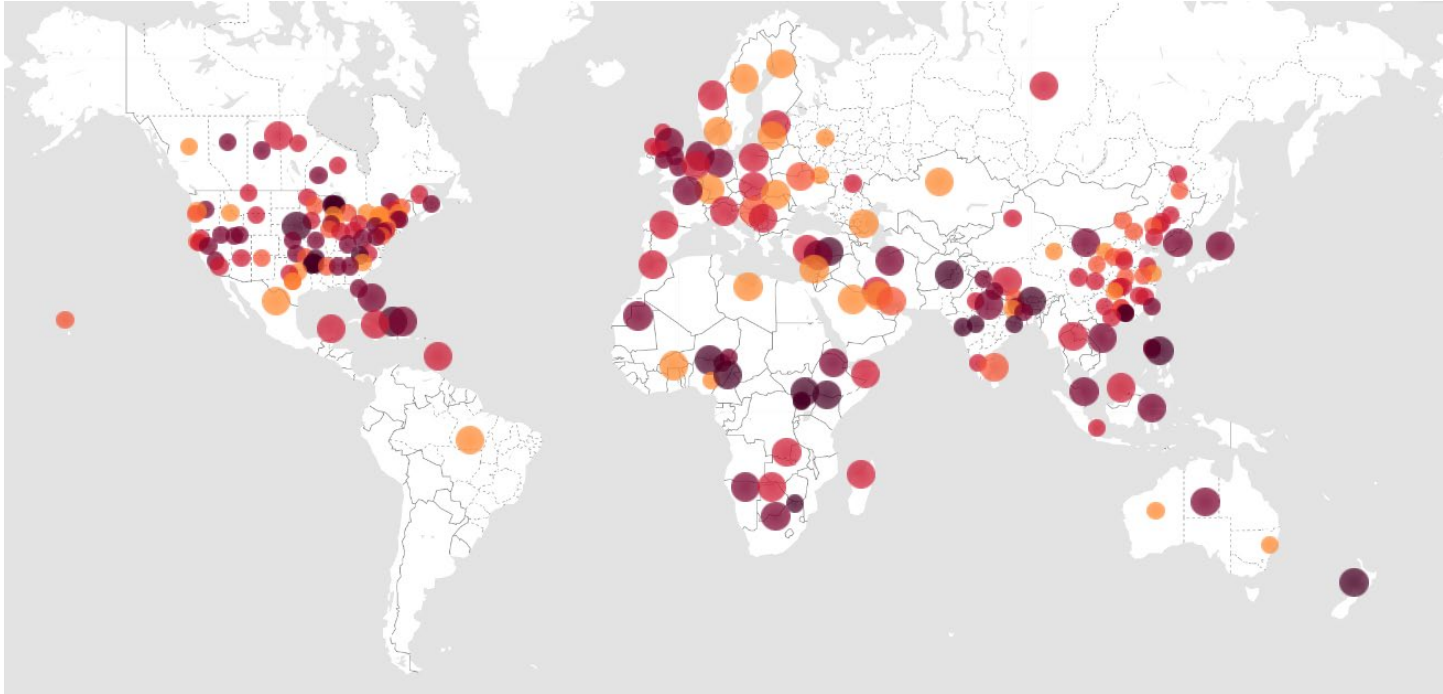
Attributes

- Tabular data appended to spatial data providing contextual information

- The spatial data is the where, and the attribute data is the *what*, *where*, and *why* (GIS Lounge)

Representing Data on a Map

HealthMap

Numerical Data

Figure 1-6 Age-standardized self-reported prevalence of arthritis (in quartiles), by health regions, household population aged 15 years and older, Canada, 2007-2008

Prevalence of Arthritis

- 7.7 - 13.9
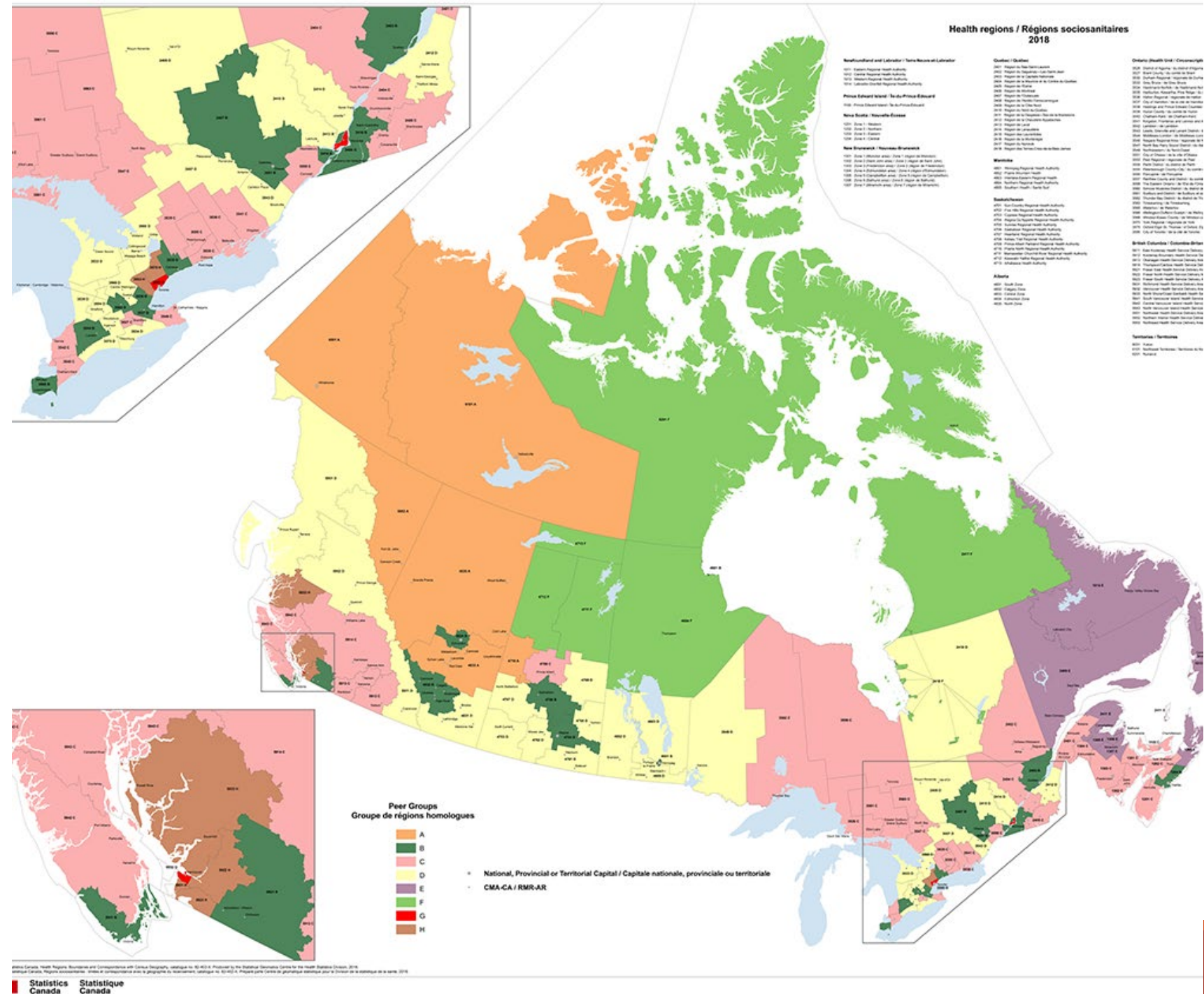- 14.0 - 15.8
- 16.1 - 18.4
- 18.5 - 23.2
- 2007 Health Region Boundaries
- Information not available (Terres-Cries-de-la-Baie-James)

Source: Public Health Agency of Canada, using Canadian Community Health Survey, 2007-2008, Statistics Canada.
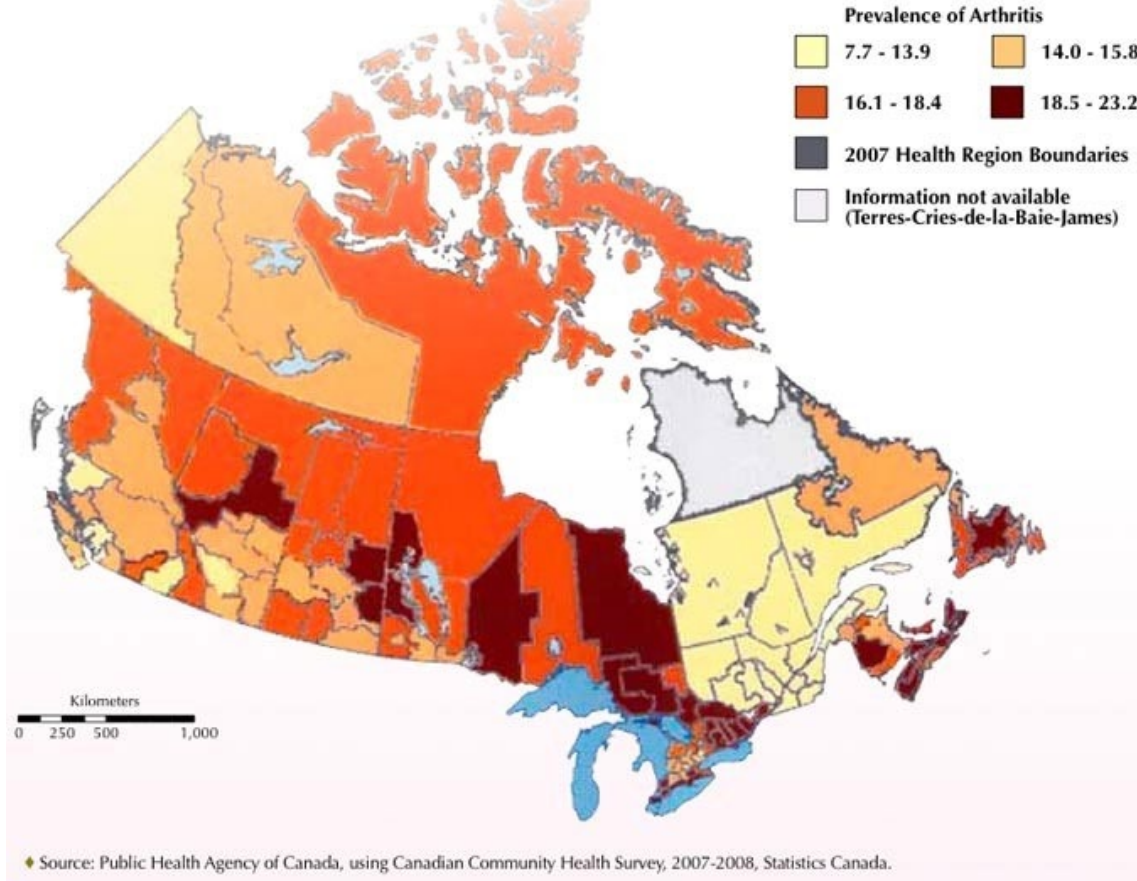
Numerical Data

Categorical Data

Statistics Canada

Peer Groups
Groupe de régions homologues
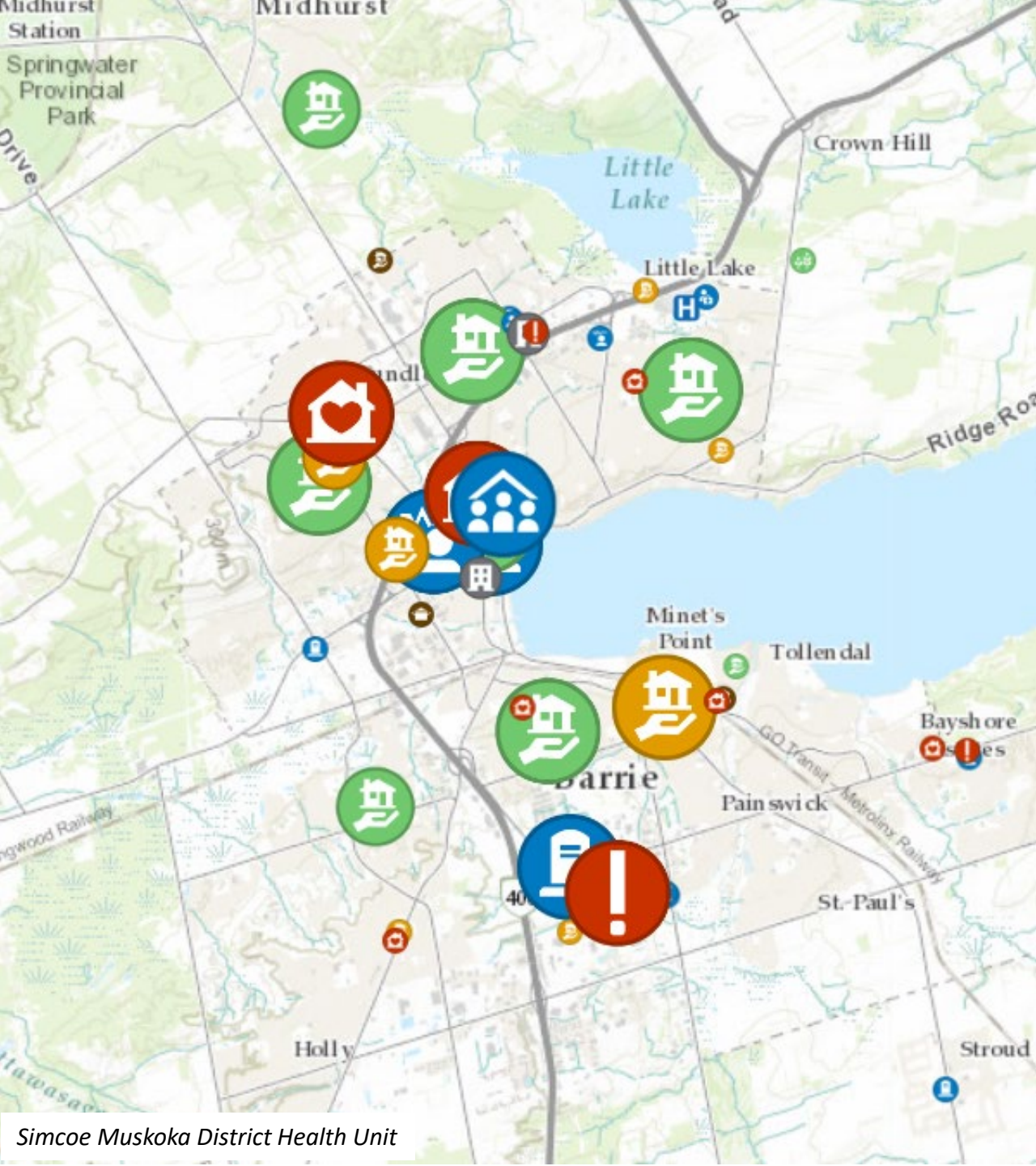
Categorical Data

Source: CBC

Considerations

- What message are you trying to convey?
  - Is it clear to the reader?

- Symbology, labels, map elements

- Generalization

- Is the data available?

- What map projection should you use?

Spatial Data Sources

Where can I get data?

- McMaster University Library
  - https://library.mcmaster.ca/collections/geospatial-data

- Scholars GeoPortal
  - http://geo.scholarsportal.info/

- City of Hamilton
  - http://open.hamilton.ca/

- Ontario GeoHub
  - https://geohub.lio.gov.on.ca/

- Canada's Open Government Portal
  - https://open.canada.ca/en/open-data

Where can I get data?

- **Research data**
  - Surveys
  - Interviews
  - Field data collection
  - Dataverse / Borealis
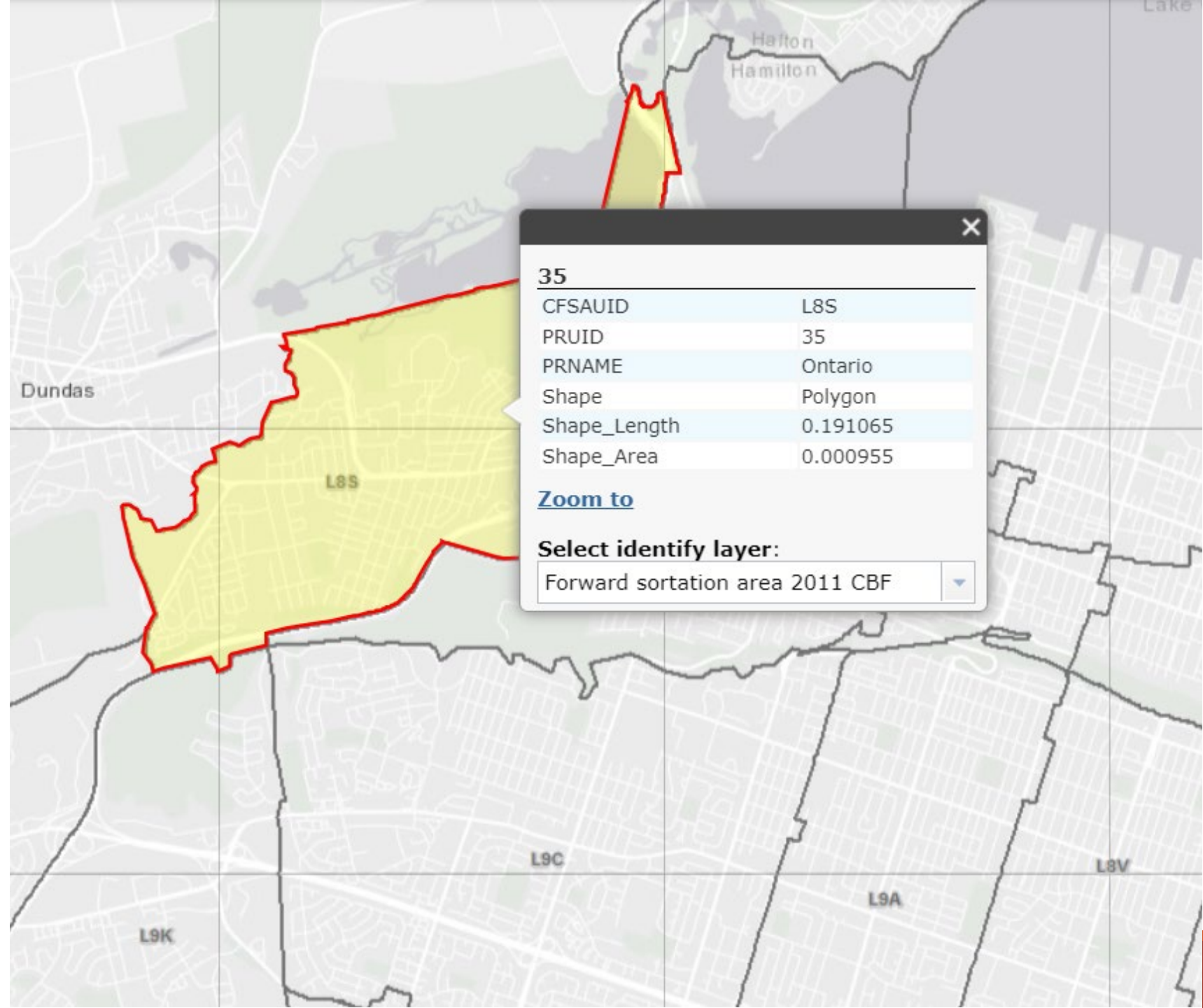
GIS Software

Esri / ArcGIS

Available free of charge to *current* students, staff, and faculty at McMaster University.

Products (incomplete list):
- Desktop – ArcGIS Pro
- Specialized – Business Analyst Online; Community Analyst Online
- Web-based – ArcGIS Online
- App development – App Studio; Experience Builder; Storymaps

https://library.mcmaster.ca/services/gis

Tutorials and Online Resources

SCDS Online Learning Catalogue

https://scds.ca/searchable-online-learning/

Data Analysis Support Hub (DASH)
https://library.mcmaster.ca/services/dash

Esri Canada Education and Research Resources
https://hed.esri.ca/resourcefinder/

Learn ArcGIS

https://learn-arcgis-learngis.hub.arcgis.com/

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Questions about GIS and Geospatial Data?

EMAIL US →

Exercise
Mapping COVID-19 cases in Hamilton

Questions?

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