Statistics Canada Statistique Canada

Current and future research for producing agricultural statistics using remote sensing and GIS technologies at Statistics Canada

www.statcan.gc.ca

Telling Canada's story in numbers

Remote Sensing and Geospatial Analysis
Agriculture Division
Economics Statistics Field

February 13th, 2018

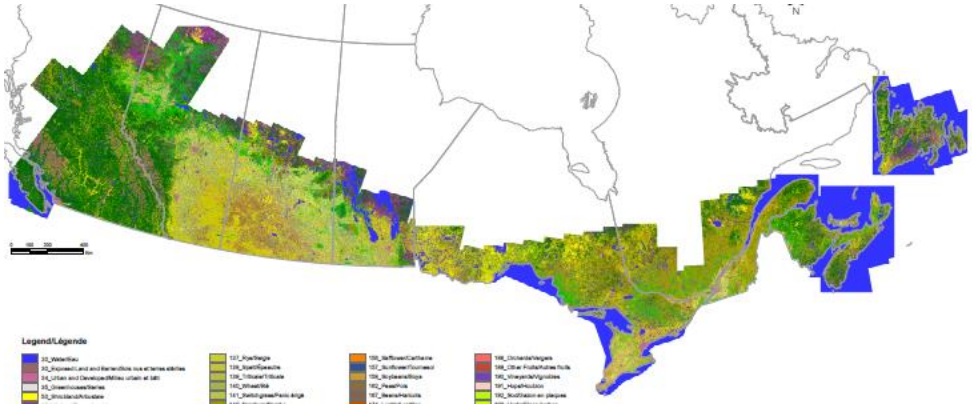
Canada

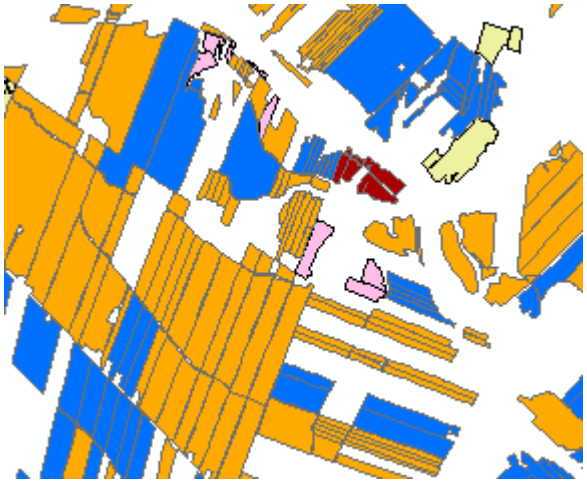
Statistics Canada – Agriculture Division – Remote Sensing and Geomatics Analysis Section

- Our mandate
  - Support the Agriculture Division of Statistics Canada using Geographic Information Systems and Earth Observation data
    - Mapping
    - Spatial Analysis
    - Support for the Census of Agriculture and crops surveys
      - Geocoding
      - Data validation
      - Map production
    - **Develop new methods for producing agricultural statistics – without contacts with farm operators**

Crop area estimation without contact with farmers

- Data sources
  1. Land cover / crop map from Earth observation data at 30 metres – Agriculture and Agri-Food Canada
  2. Crop insurance data from provincial agencies
  3. Data collected from the ground





Crop area estimation without contact with farmers

- General methodology
  - Adjust crop map pixel counts in two steps
    1. Total cropland adjustment
       - An area sample is used to compare area from digitizing using high resolution imagery and from the classification
    2. Crop by crop area adjustment
       - All available verification sites – from crop insurance data or ground data are used to produce a confusion matrix, which quantifies over- or under-estimation of each crop type

Crop area estimation without contact with farmers

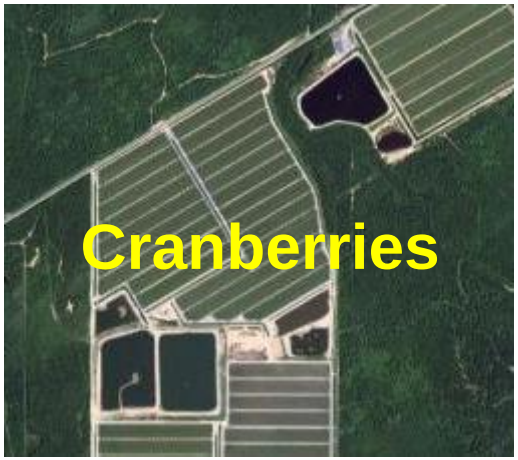
- Schedule
  - 2016-2018 Methodology development
    - 2016: Provinces of Saskatchewan and Prince Edward Island
    - 2017: Provinces of Manitoba and Québec
    - 2018: All remaining provinces (5)
  - 2019 Parallel run, release in December (as for the traditional crops survey)

Census of Agriculture 2021 - 2026

- Find and test alternate ways to collect agricultural data to replace traditional methods (paper or electronic questionnaires)
  - Administrative data
  - Earth observation data

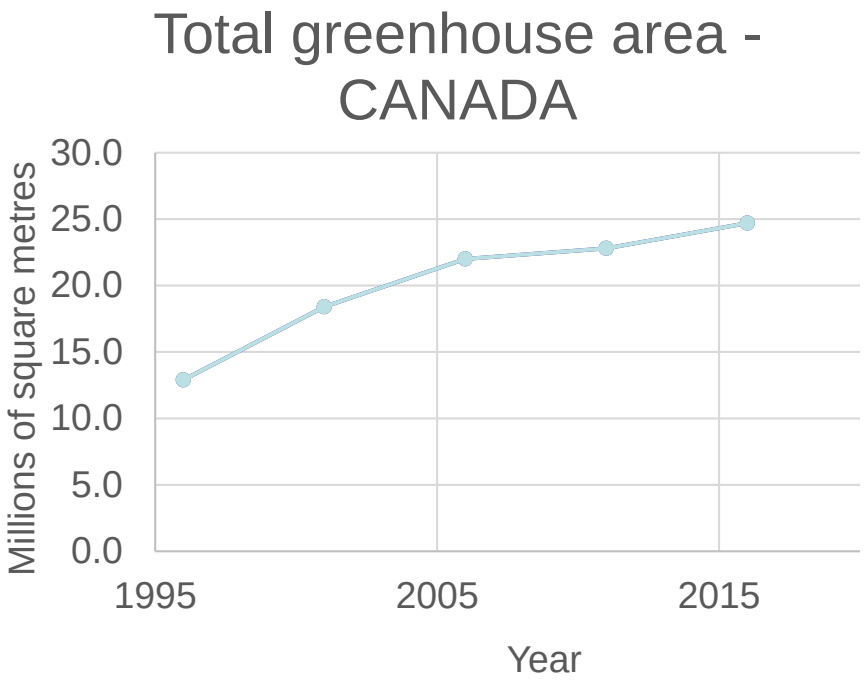
Census of Agriculture 2021 - 2026

- Fruit operations
  - Automatic detection and area extraction from high resolution imagery
    - Spectral characteristics
    - Lidar data
    - Spatial organization



Greenhouse detection

- Greenhouse production is showing rapid growth in Canada
  - 91% increase in last 20 years (1996 to 2016)
- Need to update business register on a more frequent basis to validate annual survey and adjust survey parameters



Greenhouse detection

- Supervised classification using high resolution Earth Observation data - challenges
  - Possible confusion with other building types
  - Out of business operations
  - Confusion with cultivated areas under tunnels
  - Varying spectral characteristics
- Possibility of coupling image characteristics with energy consumption data

High resolution – 5 m
RapidEye image (2011)

Precision agriculture data

- Medium-term objective
  - Acquire data collected by operators at the farm level using different technologies
    - Drones
    - Automated machinery
    - GIS data
    - GPS data

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For more information about …

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