

## Human Activity and the Environment 2015

### The changing landscape of Canadian metropolitan areas

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- . not available for any reference period
- .. not available for a specific reference period
- ... not applicable
- 0 true zero or a value rounded to zero
- 0<sup>s</sup> value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
- <sup>P</sup> preliminary
- <sup>r</sup> revised
- X suppressed to meet the confidentiality requirements of the *Statistics Act*
- <sup>E</sup> use with caution
- F too unreliable to be published
- \* significantly different from reference category ( $p < 0.05$ )

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# The changing landscape of Canadian metropolitan areas

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### **Data production, analysis and reporting were performed by:**

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### Highlights

- The total extent of **built-up** areas of Canadian **census metropolitan areas** (CMAs) was 14,546 square kilometres (km<sup>2</sup>) in 2011, up 157% from 5,651 km<sup>2</sup> in 1971.
- In 2011, the CMA of Toronto had the largest built-up area, with 2,184 km<sup>2</sup> of roads and **settled areas**. Other large CMAs included Montréal, ranked second with 1,571 km<sup>2</sup>, Edmonton with 1,094 km<sup>2</sup>, Vancouver with 995 km<sup>2</sup>, Calgary with 700 km<sup>2</sup> and Ottawa–Gatineau (Ont.)<sup>1</sup> with 635 km<sup>2</sup> of built-up area.
- The largest increases in built-up area from 1971 to 2011 were in Toronto (+1,189 km<sup>2</sup>), Montréal (+816 km<sup>2</sup>), Edmonton (+752 km<sup>2</sup>), Vancouver (+503 km<sup>2</sup>), Calgary (+427 km<sup>2</sup>) and Ottawa–Gatineau (Ont.) (+417 km<sup>2</sup>). Among these CMAs, the highest growth rates occurred in Edmonton (+220%) and Ottawa–Gatineau (Ont.) (+191%).
- Mid-sized and smaller CMAs also experienced considerable expansion of built-up area—for example, Halifax (+319 km<sup>2</sup>), Québec (+292 km<sup>2</sup>), Ottawa–Gatineau (Que.) (+261 km<sup>2</sup>) and London (+247 km<sup>2</sup>). Among them, Ottawa–Gatineau (Que.) had the highest growth rate, with built-up area increasing 391% from 1971 to 2011.
- In 2011, **population density** was highest in Toronto (3,368 persons/km<sup>2</sup>), Montréal (3,356 persons/km<sup>2</sup>), Vancouver (3,100 persons/km<sup>2</sup>) and Calgary (2,685 persons/km<sup>2</sup>)—an indicator that these CMAs had more compact forms of development. In 2011, **dwelling density** was highest in Montréal (1,490 dwellings/km<sup>2</sup>), Vancouver (1,273 dwellings/km<sup>2</sup>) and Toronto (1,255 dwellings/km<sup>2</sup>).
- From 1971 to 2011, the average CMA population density dropped from approximately 3,460 persons/km<sup>2</sup> to close to 2,250 persons/km<sup>2</sup>, although it increased from 2001 to 2011.<sup>2</sup> Average dwelling density also decreased, but to a lesser extent, falling from approximately 1,020 dwellings/km<sup>2</sup> in 1971 to 930 dwellings/km<sup>2</sup> in 2011.
- From 2001 to 2011, population density increased most in Toronto (+411 persons/km<sup>2</sup> or +14%), Vancouver (+327 persons/km<sup>2</sup> or +12%), Calgary (+290 persons/km<sup>2</sup> or +12%), Barrie (+258 persons/km<sup>2</sup> or +19%), Oshawa (+237 persons/km<sup>2</sup> or +13%) and Edmonton (+226 persons/km<sup>2</sup> or +16%).
- From 2001 to 2011, dwelling density increased most in Toronto (+200 dwellings/km<sup>2</sup> or +19%), Vancouver (+176 dwellings/km<sup>2</sup> or +16%), Calgary (+151 dwellings/km<sup>2</sup> or +16%), Barrie (+121 dwellings/km<sup>2</sup> or +23%), Edmonton (+121 dwellings/km<sup>2</sup> or +21%), Oshawa (+120 dwellings/km<sup>2</sup> or +18%) and Victoria (120 dwellings/km<sup>2</sup> or +14%).
- Comparing all **census metropolitan area-ecosystems** (CMA-Es), the amount of **arable land**—cropland, tame or seeded pasture and summerfallow—decreased most in Toronto (-1,063 km<sup>2</sup>), Regina (-975 km<sup>2</sup>), Saskatoon (-909 km<sup>2</sup>), Winnipeg (-615 km<sup>2</sup>), Ottawa–Gatineau (Ont.) (-584 km<sup>2</sup>) and Edmonton (-564 km<sup>2</sup>) between 1971 and 2011. The largest rates of change occurred in Kelowna (-52%), Greater Sudbury (-30%), Moncton (-29%) and Ottawa–Gatineau (Que.) (-27%).
- CMA-Es with the largest increases in settled area on arable land include those in the Golden Horseshoe—for example, Toronto CMA-E with 961 km<sup>2</sup>—as well as Montréal (+448 km<sup>2</sup>), Edmonton (+402 km<sup>2</sup>), Ottawa–Gatineau (Ont.) (+295 km<sup>2</sup>), London (+256 km<sup>2</sup>) and Calgary (+214 km<sup>2</sup>). CMA-Es with the highest proportion of settled area expansion occurring on arable land were located mainly in southern Ontario and the Prairies. The majority of the growth in settled area in Windsor (85% or +134 km<sup>2</sup>), London (73% or +256 km<sup>2</sup>), Hamilton (72% or +487 km<sup>2</sup>), Edmonton (70% or +402 km<sup>2</sup>) and Saskatoon (69% or +108 km<sup>2</sup>) occurred on land that had, in 1971, been classed as arable land.
- For many CMA-Es in southern Ontario, settled area expansion occurred largely on the highest quality farmland, also known as **dependable agricultural land**. In Toronto, London, St. Catharines–Niagara and Windsor, 85% of the land converted to settled area from 1971 to 2011 was on Class 1 to 3 agricultural land, accounting for 9% of the stock of dependable agricultural land in these CMA-Es.

<sup>1</sup> The census metropolitan area (CMA) of Ottawa–Gatineau straddles a provincial boundary. This report presents data separately for the Ontario portion and Quebec portion of the CMA.

<sup>2</sup> Population and dwelling data for 2001 and 2011 is of a finer scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time. See [Appendix B](#) for more information.

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- CMA-Es with higher proportions of arable land, generally located in the Prairies and southern Ontario, had lower proportions of **natural and semi-natural land**,<sup>3</sup> while the opposite pattern occurred in other areas.
- Most natural and semi-natural land in CMA-Es was categorized as forest in 2011. CMA-Es where forest accounted for the largest share of natural and semi-natural land include Victoria (94%), Ottawa–Gatineau (Que.) (85%), Québec (82%) and Vancouver (81%).
- CMA-Es with the largest increases in settled area on natural and semi-natural land from 1971 to 2011 include Montréal (+462 km<sup>2</sup>), Toronto (+448 km<sup>2</sup>), Halifax (+297 km<sup>2</sup>) and Vancouver (+296 km<sup>2</sup>). Most natural and semi-natural land lost to settled area was forest or natural land for pasture.

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<sup>3</sup> The natural and semi-natural land cover class is the residual area remaining after subtracting built-up and arable land from the total area. The class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy.

### Section 1: Introduction

Nature provides many goods and services that support life and living standards. Some, like freshwater, carbon sequestration, climate regulation and nutrient cycling, are essential for survival. Others, like recreational opportunities and beautiful landscapes, can increase enjoyment, satisfaction and improve health. However, pressures on ecosystems from economic and social activities alter their capacity to deliver these goods and services.

Ecosystems are affected by changes in [land cover](#) and [land use](#). As urbanization progresses in Canada and elsewhere, so too does the interest in quantifying land cover and land use changes in and around cities, particularly from the perspective of [urban expansion](#) and [densification](#).

The expansion of built-up areas results in the loss of agricultural and natural land covers—cropland, grasslands, forests and wetlands are replaced by houses, apartment blocks, industrial parks, commercial strips, roads and parking lots. Densification may curb some of the pressure on agricultural and natural land, but is not without its own challenges including the loss of green space and other amenities within existing settlements.

*Human Activity and the Environment 2015: The changing landscape of Canadian metropolitan areas* provides an analysis of land cover and land use change in Canada's largest urbanized areas. The report applies a methodology developed within Statistics Canada using satellite data, population and agricultural statistics and other measures to describe land cover and land use in and around Canada's 33 [census metropolitan areas](#) (CMAs), a first comprehensive analysis of this sort. It also provides related statistics and links to relevant social, economic and health data.

The report is organized as follows:

[Section 2: The census metropolitan area landscape](#) summarizes the state of land cover and land use for CMAs across Canada, as well as the changes that have occurred between 1971 and 2011.

[Section 3: Ecosystem accounts and statistics by census metropolitan area](#) provides a profile for each of Canada's 33 CMAs, including highlights, maps, charts, tables and links to other relevant social, economic and health information.

[Appendices](#) provide comprehensive CMA tables, information on methods and data sources used to produce these analyses, as well as a glossary.

See Textboxes [1.1](#) and [1.2](#) for information on the main geographic units and data sources used in this report and for an explanation of the differences between land cover and land use.

The report will help policy makers, researchers, land use planners, students and others visualize the extent of urban expansion in Canada's largest cities between 1971 and 2011. This, in turn, will lead to a better understanding of the impact of urban development on agricultural and natural land covers and [ecosystem goods and services](#).

The annual *Human Activity and the Environment* publications bring together data from many sources to present a statistical portrait of Canada's environment, with special emphasis on human activity and its relationship to natural elements—air, water, soil, plants and animals. Each issue provides accessible and relevant information on an environmental issue of concern to Canadians.

Statistics Canada will continue to update changes in land cover and land use for all of Canada's CMAs in its land use/land cover account.

### Textbox I.1 What you need to know about this study

The following analyses make use of two main geographic units—the census metropolitan area (CMA) (Map I.1) and the ‘census metropolitan area-ecosystem’ (CMA-E), a unit created for this report. For further information about data sets and methods see Appendix B. Data sources and methods.

#### What is a census metropolitan area (CMA)?

A census metropolitan area (CMA) is formed by one or more adjacent municipalities centred on a [population centre](#) (known as the core). A CMA must have a total population of at least 100,000 of which 50,000 or more must live in the [core](#). To be included in the CMA other adjacent municipalities must have a high degree of integration with the core, as measured by commuting flows derived from previous census place of work data. Once an area becomes a CMA, it is retained as a CMA even if its total population declines below 100,000 or the population of its core falls below 50,000.<sup>4</sup>

#### What is a census metropolitan area-ecosystem (CMA-E)?

The census metropolitan area-ecosystem (CMA-E) is a spatial unit that combines CMAs with an environmental geography—the Soil Landscapes of Canada (SLC).<sup>5</sup> The CMA-E combines any SLC polygon that is contained within or that intersects the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

SLC polygons delineate the major permanent natural attributes of soil and land. These attributes include soil type, surface form, slope, surface water and water table depth, and therefore provide information on some basic ecosystem characteristics. SLC polygons are the smallest element of the *National Ecological Framework for Canada*.<sup>6</sup> The SLC polygons included in CMA-Es vary in size from 7 km<sup>2</sup> to over 17,000 km<sup>2</sup>.

The CMA-E unit is not meant to delineate ecosystems as such, but instead was developed to help explore CMAs from an ecosystem perspective. It recognizes that cities, with their politically and administratively defined boundaries, depend on natural surroundings to provide ecosystem goods and services, as well as the physical space for urban expansion. Use of this unit allows for the development of a fuller picture of land use change and urban expansion around CMAs since urban expansion often depends on environmental assets including land located outside city boundaries. As well, the Census of Agriculture data used in this report are available by SLC polygons and provide insight on relationships between the environment and the economy.<sup>7</sup>

CMA-Es are not spatially mutually exclusive—they overlap where a SLC polygon crosses more than one CMA boundary, as is the case in Vancouver and Abbotsford–Mission or Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. For this reason, land use or population data for CMA-Es should not be summed to generate a total and caution should be used when comparing data. See maps in [Section 3: Ecosystem accounts and statistics by census metropolitan area](#) for a visual representation of the CMA-E boundaries.

4 Statistics Canada, 2012, *Census Dictionary*, Catalogue no. 98-301-X.

5 Agriculture and Agri-Food Canada, 2013, *Soil Landscapes of Canada (SLC) : Attribute Data*, <http://sis.agr.gc.ca/cansis/nsdb/slc/index.html> (accessed July 28, 2015).

6 Marshall, I.B., P.H. Schut and M. Ballard, 1999, *A National Ecological Framework for Canada*, Agriculture and Agri-Food Canada, Research Branch, Centre for Land and Biological Resources Research and Environment Canada, State of the Environment Directorate, Ecozone Analysis Branch, Ottawa/Hull, <http://sis.agr.gc.ca/cansis/nsdb/ecostrat/1999report/index.html> (accessed July 14, 2015).

7 The Interpolated Census of Agriculture reallocates farm areas to the SLC polygon. Some uncertainties exist since confidentiality procedures are applied to the data provided to Agriculture and Agri-Food Canada (AAFC) for the interpolation. As well, farm areas are assigned to the dissemination area (DA) where the farm headquarters is located rather than to their specific geographic location. See AAFC, 2013, *ISO 19131 Interpolated Census of Agriculture by Soil Landscapes of Canada: Revision A*, [www.agr.gc.ca/atlas/supportdocument\\_documentdesupport/interpolatedCoA/en/ISO\\_19131\\_Interpolated\\_Census\\_of\\_Agriculture\\_Data\\_Product\\_Specification.pdf](http://www.agr.gc.ca/atlas/supportdocument_documentdesupport/interpolatedCoA/en/ISO_19131_Interpolated_Census_of_Agriculture_Data_Product_Specification.pdf) (accessed August 7, 2015); Huffman, T., R. Ogston, T. Fiset, B. Daneshfar, P.-Y. Gasser, L. White, M. Maloley and R. Chenier, 2006, “Canadian agricultural land-use and land management data for Kyoto reporting,” *Canadian Journal of Soil Science*, Vol. 86, no. 3, p. 431–439.

### Principal data sources

This study combines data from the 1971, 1991, 2001 and 2011 Census of Population<sup>8</sup> and Interpolated Census of Agriculture<sup>9</sup> with spatial data sets providing information on land cover and land use, in order to analyze the evolution of built-up areas around CMAs.

The *Canada Land Inventory: Land Use (circa 1966)* (CLI: LU),<sup>10</sup> supplemented with the *Canada Land Inventory Monitoring Program (CLUMP): Land Use 1971*,<sup>11</sup> were used to estimate the 1971 built-up area. CLUMP coverage excludes the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission.

*Canada Land Inventory: Soil Capability for Agriculture, 1969*<sup>12</sup> provides information on the potential of a specific area for agricultural production. Despite the vintage of this product and the availability of more recent soil data for some areas, the soil capability interpretations are considered to be largely valid and they continue to be used for land planning purposes.<sup>13</sup>

Remote sensing imagery data are taken from Agriculture and Agri-Food Canada's *Land Use 1990, 2000 and 2010*.<sup>14</sup> These land use maps cover all of Canada south of 60°N at a spatial resolution of 30 m and were developed to meet international reporting requirements including for the *National Inventory Report* to the United Nations Framework Convention on Climate Change, the Agri-Environmental program of the Organisation for Economic Co-operation and Development (OECD) and the FAOSTAT component of the Food and Agricultural Organization of the United Nations (FAO).

Each data set is subject to limitations. In particular, the accuracy of land cover classification using spatial data sets depends on the resolution of the data and imagery dates and is also limited by the similarity of certain land covers when viewed from above and by cloud and tree canopy cover, which can obscure underlying land features.

This report uses a consistent methodology to compare urban development trends across the country, allowing inter-city comparison. However, it is recognized that this broad scale analysis does not capture the finer details that are required to assess all the environmental impacts of the development of cities.

For more information about sources and methods used here see Appendix B.

8 Statistics Canada, 2012, *GeoSuite, Census year 2011*, Catalogue no. 92-150-X; Statistics Canada, 2007, *GeoSuite, Census year 2006*, Catalogue no. 92-150-X; Statistics Canada, Census Program, Census of Population 1991 and 1971.

9 Statistics Canada, special tabulation, Census of Agriculture, Census Geographic Component Base 2011 and 2001 and Census of Agriculture, Regular Base 1991 and 1971.

10 Natural Resources Canada, Canada Centre for Remote Sensing, 1999, *Canada Land Inventory Level I Lat/Long Digital Data: CLI Land Use (circa 1966) (1:250,000)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015).

11 Natural Resources Canada, Canada Centre for Remote Sensing, 1999, *Canada Land Use Monitoring Program (CLUMP) UTM Digital Data: CLUMP Land Use (1971) (1:50,000)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015).

12 Natural Resources Canada, Canada Centre for Remote Sensing, 1999, *Canada Land Inventory Level I Lat/Long Digital Data: Soil Capability for Agriculture (1969) (1:250,000 and 1:50,000)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/agriculture/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/agriculture/) and [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_50k/agriculture](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_50k/agriculture) (accessed October 16, 2015).

13 Agriculture and Agri-Food Canada, 2013, *ISO 19131 Canada Land Inventory (CLI)—Data Product Specification, Revision A—1:250,000—Land Capability for Agriculture*, [www.agr.gc.ca/atlas/supportdocument\\_documentdesupport/canadaLandInventory/en/ISO\\_19131\\_Canada\\_Land\\_Inventory\\_CLI\\_Data\\_Product\\_Specification.pdf](http://www.agr.gc.ca/atlas/supportdocument_documentdesupport/canadaLandInventory/en/ISO_19131_Canada_Land_Inventory_CLI_Data_Product_Specification.pdf) (accessed October 16, 2015).

14 Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).



### Textbox 1.2 Land cover and land use

Land is a distinct category of **natural capital**. This environmental asset is at the foundation of ecosystem services and economic activities, providing the space for these to occur. When measuring the extent, condition or quality of this asset, it is useful to distinguish between two land characteristics—land cover and land use.

Land cover refers to the observed physical and biological surface of the Earth and includes biotic (living, such as vegetation) and abiotic (non-living, such as rocks) surfaces. Built-up areas are human-produced and include both abiotic and biotic components, for example impervious surfaces like roads and buildings, as well as gardens, backyards, parks and playing fields. Land cover can be determined by field assessment and using aerial photography and satellite imagery.

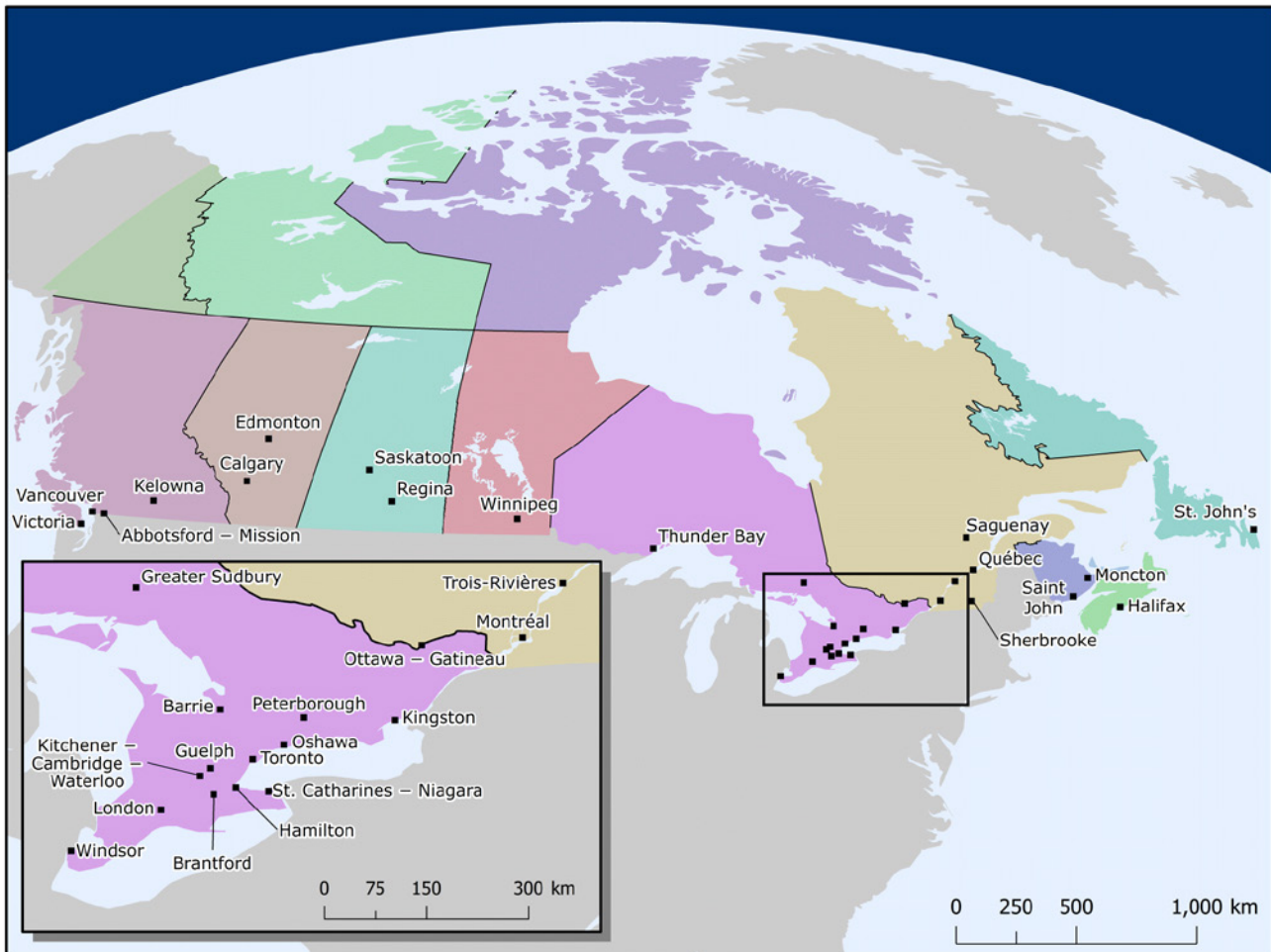
Land use, on the other hand, describes the economic and social functions of land to meet human demands, including activities and institutional arrangements to maintain or restore natural habitats. Typical land use classes include agriculture, settled areas and managed areas.<sup>15</sup>

The two concepts—land cover and land use—are intertwined since some land uses depend on the type of land cover and land use also affects and changes land cover. This report presents data for both types of classifications—for example, forests, which reflects land cover, and arable land, which reflects land use.

<sup>15</sup> United Nations Statistics Division, European Commission, Food and Agriculture Organization of the United Nations, International Monetary Fund, Organisation for Economic Co-operation and Development and The World Bank, 2014, *System of Environmental-Economic Accounting 2012: Central Framework*, [http://unstats.un.org/unsd/envaccounting/seeaRev/SEEA\\_CF\\_Final\\_en.pdf](http://unstats.un.org/unsd/envaccounting/seeaRev/SEEA_CF_Final_en.pdf) (accessed July 28, 2015); Natural Resources Canada, 2013, *Land Cover and Land Use*, [www.nrcan.gc.ca/earth-sciences/geomatics/satellite-imagery-air-photos/satellite-imagery-products/educational-resources/9373](http://www.nrcan.gc.ca/earth-sciences/geomatics/satellite-imagery-air-photos/satellite-imagery-products/educational-resources/9373) (accessed July 28, 2015).

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Map 1.1  
Census metropolitan areas (CMAs), 2011



Source: Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016.

### Section 2: The census metropolitan area landscape

Landscape characteristics have historically been among the main determinants of the location and development of villages, towns and cities. Many early settlements were established on rich plains where residents benefitted from arable land for cultivation and forests for hunting and trapping. As well, waterways facilitated transportation and high ground provided a vantage point for defensive purposes—for example, Winnipeg, which has thrived at the confluence of trade routes, or Québec, built overlooking the St. Lawrence River.

Environmental features such as land cover contribute to the landscape and have fundamental implications for the availability of **natural capital** and the provision of **ecosystem goods and services**. For example, wetlands provide flood protection, wildlife habitat and water storage capacity, while forests, city parks and green space can improve air quality, moderate temperatures and provide social and health benefits such as education or recreation opportunities.

However, as land cover changes, so too does the suite of goods and services provided by the natural environment. The transformation from more natural covers to **built-up** landscapes, characterized by a high percentage of impervious surfaces including roadways, parking lots and roof tops, increases stormwater runoff, creates urban heat islands and reduces the number and diversity of animals and native plants.<sup>16</sup>

While Canada's built-up area represented only 0.1% of the country's total area in 2011,<sup>17</sup> urban expansion results in the loss of prime agricultural land because numerous communities across the country were originally established on fertile agricultural land.<sup>18</sup> The expansion and intensification of built-up area also results in the loss of green space and natural land covers. These changes are normally permanent—once agricultural or natural land is used for urban purposes, it is unlikely to return to a natural state.<sup>19</sup>

This section provides information on some of the factors that can influence land use in cities and summarizes the state of land cover and land use for CMAs across Canada, as well as the changes that have occurred between 1971 and 2011.

#### Land use patterns in cities

Land use in cities has many economic, environmental, health and social impacts. At the time of the industrial revolution, cities were compact and walkable, and were clustered around port and rail hubs. However, the adoption of cars as the main mode of transport, along with a wide range of political, social and cultural factors, led to the development of low density housing in the periphery of cities—a phenomenon often termed 'sprawl.' This type of dispersed development has become the prevailing pattern for city growth throughout much of North America.<sup>20</sup>

More recently, larger metropolitan regions have developed complex polycentric forms characterized by suburban business districts, also known as 'edge cities.'<sup>21</sup> Workplaces have become more decentralized—in recent years, job growth in Canada has occurred more rapidly in peripheral municipalities than in central municipalities.<sup>22</sup>

16 Alberti, M., 2005, "The effects of urban patterns on ecosystem function," *International Regional Science Review*, Vol. 28, no. 2, p. 168–192.

17 Statistics Canada, 2013, "Measuring ecosystem goods and services in Canada," *Human Activity and the Environment*, Catalogue no. 16-201-X.

18 Statistics Canada, 2014, "Agriculture in Canada," *Human Activity and the Environment*, Catalogue no. 16-201-X; Hofmann, N., A. Elgaraway, H. Larocque, G. Filoso and T. Dennis, 2010, "A new research project on Canadian settlements: Initial geographic results," *EnviroStats*, Vol. 4, no. 1, Statistics Canada Catalogue no. 16-002-X.

19 Hofmann, N., G. Filoso and M. Schofield, 2005, "The loss of dependable agricultural land in Canada," *Rural and Small Town Canada Analysis Bulletin*, Vol. 6, no. 1, Statistics Canada Catalogue no. 21-006-X.

20 Glaeser, E.L. and M.E. Kahn, 2003, "Sprawl and urban growth," *NBER Working Paper Series*, Working Paper 9733, [www.nber.org/papers/w9733](http://www.nber.org/papers/w9733) (accessed June 30, 2015); Donnan, J., 2008, *Economic Implications and Consequences of Population Growth, Land Use Trends and Urban Sprawl in Southern Ontario*, <http://eco.on.ca/wp-content/uploads/2015/03/2008-sprawl.pdf> (accessed June 30, 2015).

21 Meijers, E.J. and M.J. Burger, 2010, "Spatial structure and productivity in US metropolitan areas," *Environment and Planning A*, Vol. 42, p. 1383–1402; Mieszkowski, P. and E.S. Mills, 1993, "The causes of metropolitan suburbanization," *Journal of Economic Perspectives*, Vol. 7, no. 3, p. 135–147; Anas, A., R. Arnott and K. Small, 1998, "Urban spatial structure," *Journal of Economic Literature*, Vol. 36, no. 3, p. 1426–1464.

22 Statistics Canada, 2008, *Commuting Patterns and Places of Work of Canadians, 2006 Census*, Catalogue no. 97-561-XIE2006001; Heisz, A. and S. LaRochelle-Côté, 2005, "Work and commuting in census metropolitan areas, 1996-2001," *Trends and Conditions in Census Metropolitan Areas*, no. 7, Statistics Canada Catalogue no. 89-613-M.

## The changing landscape of Canadian metropolitan areas

Land use patterns can affect the availability, diversity and value of housing, commercial buildings and industrial sites. Differences in physical activity,<sup>23</sup> perception and occurrence of problem behaviours (e.g., vandalism, littering, noise, vagrancy, drunkenness and prostitution)<sup>24</sup> and strength of social connections<sup>25</sup> have all been attributed, at least in part, to land use patterns in cities, such as whether people live in urban or suburban, central or peripheral, or high-density or low-density neighbourhoods.

Land use patterns also affect transportation including commute times and modes of travel. For example, in Toronto, Montréal and Vancouver census metropolitan areas (CMAs), residents of central municipalities are more likely to use public transit, while residents of neighbouring municipalities are more likely to drive their personal vehicle. At the same time, CMA resident workers living in newer homes generally have to travel farther to get to work compared to those living in older homes.<sup>26</sup> These trends have an impact on the environment—motor vehicle use by households is responsible for more than half of household greenhouse gas emissions, accounting for one tenth of Canada's total greenhouse gas emissions.<sup>27</sup>

Although the main direction of urban growth has been outward, with lower population densities in the periphery of cities, in some cases there has been an effort to increase density.<sup>28</sup> Higher density mixed use development is a key aspect of 'smart growth,' a set of land use and development practices recommended by many land use planners and others that can be applied in urban, suburban and rural areas.<sup>29</sup> More compact forms of development can help create walkable and transit friendly neighbourhoods, reduce pressure to convert agricultural and natural land in the periphery of cities and reduce the need for new roads, other infrastructure and community amenities.<sup>30</sup>

Densification can be seen today in the new condominium towers dotting major cities and the townhouse developments replacing single family homes. The addition of duplexes, secondary suites and other infill development can increase density in existing neighbourhoods while minimizing changes to neighbourhood character. However these changes can also be contentious due to concerns about the increased number of people and their effects on traffic, parking, parks and other community infrastructure, as well as the increased height and density of buildings and effects on privacy, views, shading, tree canopy, city heritage and loss of affordable rental stock.<sup>31</sup>

Both expansion and intensification can happen at the same time, with development outward in the periphery and upward and infill growth in the city centres—as can be seen, for example, in some CMAs in the Greater Golden Horseshoe area around Toronto. As well, new residential development in outlying areas can be low-density—characterized by single detached homes and large lots—or high density, with a higher proportion of apartments or townhouses.

23 Turcotte, M., 2009, "Life in Metropolitan Areas: Are suburban residents really less physically active?," *Canadian Social Trends*, Statistics Canada Catalogue no. 11-008-X.

24 Keown, L.-A., 2008, "Life in metropolitan areas: A profile of perceptions of incivility in the metropolitan landscape," *Canadian Social Trends*, Statistics Canada Catalogue no. 11-008-X.

25 Leyden, K., 2003, "Social capital and the built environment: The importance of walkable neighbourhoods," *American Journal of Public Health*, Vol. 93, no. 9, p. 1546–1551; City of Vancouver, 2015, *Social Indicators and Trends 2014: Cultivating Connections*, <http://vancouver.ca/files/cov/factsheet7-cultivating-connections.PDF> (accessed July 14, 2015).

26 Statistics Canada, 2008, *Commuting Patterns and Places of Work of Canadians, 2006 Census*, Catalogue no. 97-561-XIE2006001.

27 Based on household use of "Motor fuels and lubricants" in Statistics Canada, CANSIM Table 153-0114 (accessed July 29, 2015).

28 Canada Mortgage Housing Corporation, 1995, "Resettling cities: Canadian residential intensification initiatives," *Research & Development Highlights*, Socio-economic Series, Issue 20, [www.cmhc-schl.gc.ca/publications/en/rh-pr/socio/socio020.pdf](http://www.cmhc-schl.gc.ca/publications/en/rh-pr/socio/socio020.pdf) (accessed November 17, 2015).

29 Litman, T., 2015, *Evaluating Transportation Land Use Impacts: Considering the Impacts, Benefits and Costs of Different Land Use Development Patterns*, Victoria Transport Policy Institute, [www.vtpi.org/landuse.pdf](http://www.vtpi.org/landuse.pdf) (accessed July 8, 2015).

30 Taylor, Z. and J. Van Nostrand, 2008, *Shaping the Toronto Region, Past, Present, and Future: An exploration of the potential effectiveness of changes to the planning policies governing Greenfield development in the Greater Golden Horseshoe*, Neptis Foundation, [www.neptis.org/sites/default/files/toronto\\_metropolitan\\_region\\_shaping\\_the\\_toronto\\_region/shaping\\_report\\_web\\_20080902\\_0.pdf](http://www.neptis.org/sites/default/files/toronto_metropolitan_region_shaping_the_toronto_region/shaping_report_web_20080902_0.pdf) (accessed July 20, 2015).

31 King, R.L., 2015, "The dirty on 'density creep'," *The Toronto Star*, May 29, [www.thestar.com/news/gta/2015/05/29/the-dirty-on-density-creep.print.html](http://www.thestar.com/news/gta/2015/05/29/the-dirty-on-density-creep.print.html) (accessed July 22, 2015); Federation of Canadian Municipalities, 2009, *Housing in My Backyard: A Municipal Guide for Responding to NIMBY*, [www.fcm.ca/Documents/tools/ACT/Housing\\_In\\_My\\_Backyard\\_A\\_Municipal\\_Guide\\_For\\_Responding\\_To\\_NIMBY\\_EN.pdf](http://www.fcm.ca/Documents/tools/ACT/Housing_In_My_Backyard_A_Municipal_Guide_For_Responding_To_NIMBY_EN.pdf) (accessed July 22, 2015); Quastel, N., M. Moos and N. Lynch, 2012, "Sustainability-as-density and the return of the social: The case of Vancouver, British Columbia," *Urban Geography*, Vol. 33, no. 7, p. 1055–1084; Jones, C. E., 2015, *Transit-oriented Development and Gentrification in Metro Vancouver's Low-Income SkyTrain Corridor*, Neighbourhood Change Research Partnership, Research Paper 237, <http://neighbourhoodchange.ca/documents/2015/07/vancouver-skytrain-corridor.pdf> (accessed September 3, 2015).

### Factors affecting land use patterns

Land use patterns themselves may also be influenced by a number of factors such as population growth, commuting costs and times, the value of land for housing and land use planning and zoning rules.<sup>32</sup> Natural landscape factors such as the location of mountains or water also influence the availability of land and the shape of urban development.<sup>33</sup>

In 2011, 69% of Canada's population, 23.1 million people, lived in CMAs, an increase of 74% compared to 13.3 million in 1971 (Table A.4).<sup>34</sup> Canada's most populated cities—Toronto, Vancouver and Montréal—experienced the largest increases in population from 1971 to 2011, followed by Calgary and Edmonton (Chart 2.1). However, the fastest growth occurred in smaller CMAs such as Abbotsford–Mission (+309%), Barrie (+298%) and Kelowna (+258%) (Chart 2.2). Population grew in all CMAs except Greater Sudbury.

Access to transit and commute times affect where people choose to live, since getting to work takes time and money and has an effect on quality of life. Time spent commuting and traffic congestion are often irritants, which can decrease people's satisfaction with their commute. In medium and large CMAs, car users with longer commutes were the most dissatisfied with their commuting time.<sup>35</sup>

In 2011, commuters with the longest average travel times in Canada—around 30 minutes—lived in Toronto, Oshawa and Montréal (Table 2.1). Commuters with travel times more than 45 minutes were most likely to live in Oshawa, Toronto and Barrie.<sup>36</sup> One recent study of residents of Greater Toronto found that given options between living in transit friendly, walkable neighbourhoods with shorter commute times or detached homes with large yards, but that required a car to get to most destinations, most would prefer the former, but were limited by the price of housing.<sup>37</sup>

32 Glaeser, E.L. and M.E. Kahn, 2003, "Sprawl and urban growth," *NBER Working Paper Series*, Working Paper 9733, [www.nber.org/papers/w9733](http://www.nber.org/papers/w9733) (accessed June 30, 2015); Brueckner, J. K. and D.A. Fansler, 1983, "The economics of urban sprawl: Theory and evidence on the spatial size of cities," *The Review of Economics and Statistics*, Vol. 65, no. 3, p. 479–482; Kulish, M., A. Richards and C. Gillitzer, 2011, "Urban structure and housing prices: Some evidence from Australian cities," *Research Discussion Paper*, Reserve Bank of Australia, RDP 2011-03, [www.rba.gov.au/publications/rdp/2011/pdf/rdp2011-03.pdf](http://www.rba.gov.au/publications/rdp/2011/pdf/rdp2011-03.pdf) (accessed July 17, 2015).

33 Saiz, A., 2010, "The geographic determinants of housing supply," *Quarterly Journal of Economics*, Vol. 125, no. 3, p. 1253–1296.

34 Canada's total population in 2011 was 33,476,688 according to the Census of Population. Statistics Canada, 2012, *Population and Dwelling Count Highlight Tables, 2011 Census*, Catalogue no. 98-310-XWE2011002.

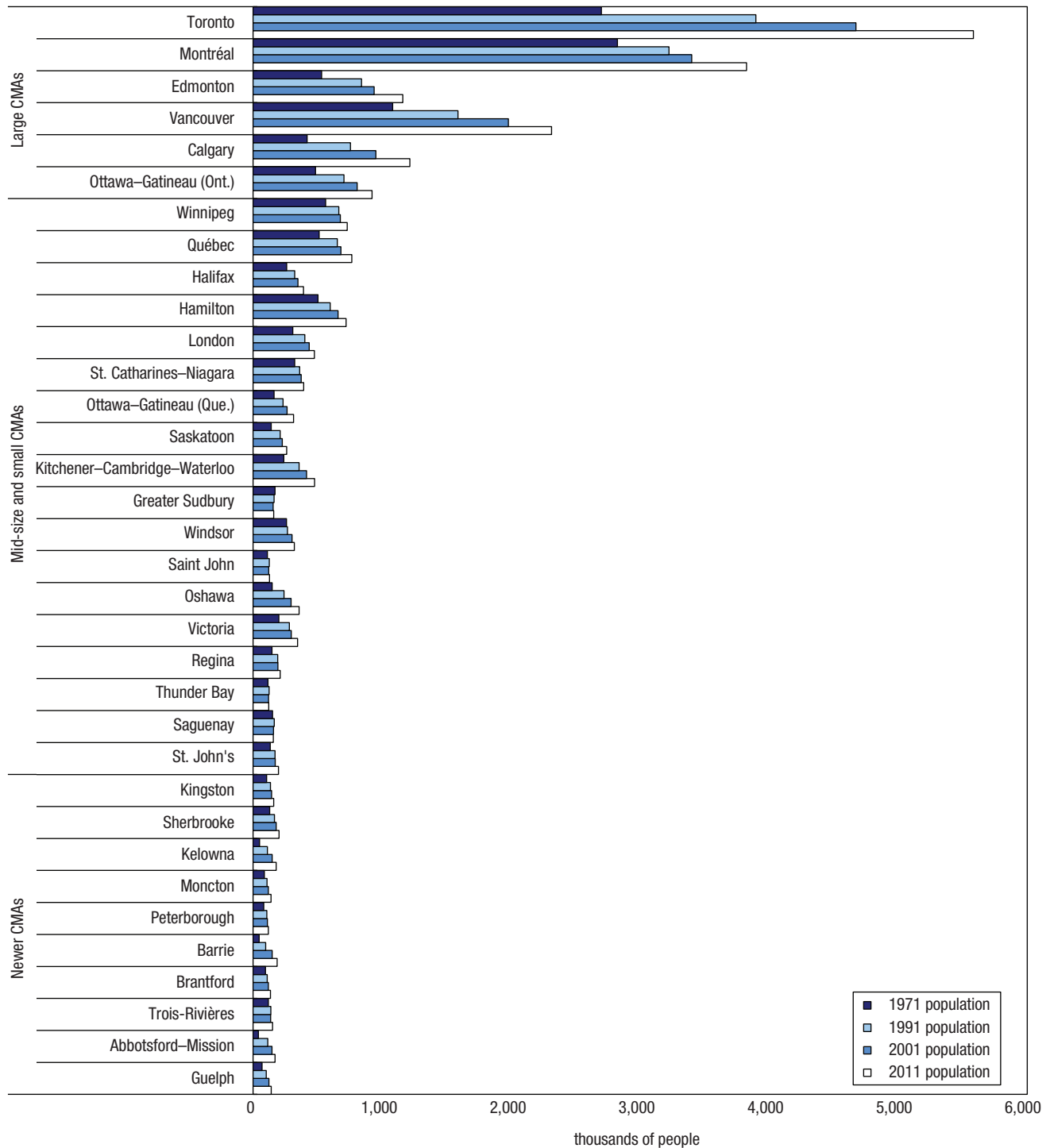
35 Turcotte, M., 2011, "Commuting to work: Results of the 2010 General Social Survey," *Canadian Social Trends*, Statistics Canada Catalogue no. 11-008-X.

36 Statistics Canada, 2013, "Commuting to work: National Household Survey, 2011," *NHS in Brief*, Catalogue no. 99-012-X2011003.

37 Burda, C., 2014, *2014 Home Location Preference Survey: Understanding where GTA residents prefer to live and commute*, Royal Bank of Canada and Pembina Institute, [www.pembina.org/reports/2014-home-location-preference-survey.pdf](http://www.pembina.org/reports/2014-home-location-preference-survey.pdf) (accessed July 22, 2015).

## The changing landscape of Canadian metropolitan areas

**Chart 2.1**  
**Population by census metropolitan area, 1971, 1991, 2001 and 2011**

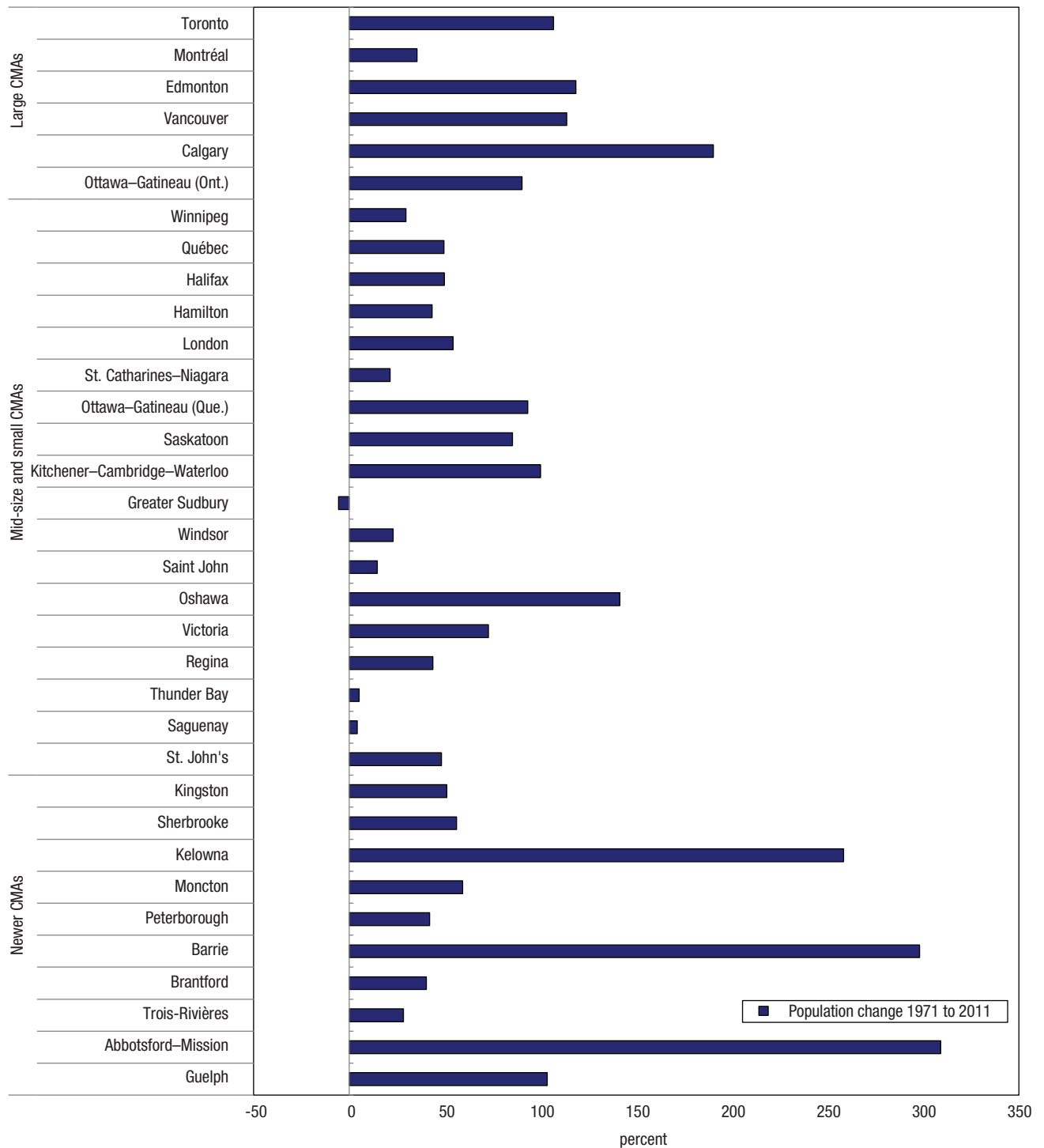


**Notes:** 2011 census metropolitan area (CMA) boundaries were used for all years. For this reason, population data by CMA for 1971, 1991 and 2001 may not match previously published census data. CMAAs were classified as large, mid-size or small based on the 2011 built-up area using geometric intervals. Newer CMAAs—those not populated enough to qualify as CMAAs in 1971—were then grouped separately.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population.

## The changing landscape of Canadian metropolitan areas

**Chart 2.2**  
**Population change by census metropolitan area, 1971 to 2011**



**Notes:** 2011 census metropolitan area (CMA) boundaries were used for all years. For this reason, population data by CMA for 1971, 1991 and 2001 may not match previously published census data. CMAs were classified as large, mid-size or small based on the 2011 built-up area using geometric intervals. Newer CMAs—those not populated enough to qualify as CMAs in 1971—were then grouped separately.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population.



## The changing landscape of Canadian metropolitan areas

**Table 2.1**  
**Usual commuting time from home to work by census metropolitan area, 2011**

	Average time	0 to 14 minutes	15 to 29 minutes	30 to 44 minutes	45 to 59 minutes	60 minutes or more
	minutes	percent of commuters				
<b>Large CMAs</b>						
Toronto	32.8	15.4	29.0	27.2	12.7	15.8
Montréal	29.7	19.0	31.5	25.6	12.0	11.9
Edmonton	25.6	22.7	38.3	25.0	7.9	6.1
Vancouver	28.4	19.6	33.0	26.6	11.0	9.9
Calgary	27.0	18.0	37.8	27.7	9.5	7.0
Ottawa–Gatineau (Ont.)	26.2	20.7	37.0	25.8	10.3	6.1
<b>Mid-size and small CMAs</b>						
Winnipeg	23.3	24.3	42.3	23.4	6.3	3.9
Québec	22.0	28.0	42.3	20.1	5.9	3.7
Halifax	23.7	25.8	40.0	22.2	7.1	5.0
Hamilton	26.9	24.9	37.0	18.9	8.3	11.0
London	21.1	31.8	43.7	15.6	4.5	4.3
St. Catharines–Niagara	20.6	38.8	37.9	13.9	4.2	5.3
Ottawa–Gatineau (Que.)	26.7	21.2	34.8	26.7	10.8	6.6
Saskatoon	19.9	34.8	47.6	11.5	2.8	3.4
Kitchener–Cambridge–Waterloo	21.7	33.2	41.9	14.1	4.6	6.2
Greater Sudbury	20.1	36.2	39.9	16.4	4.3	3.1
Windsor	18.8	34.3	46.5	13.9	3.1	2.2
Saint John	20.9	32.7	42.9	15.2	5.7	3.6
Oshawa	31.8	25.5	29.4	15.3	10.6	19.3
Victoria	21.8	30.1	41.7	18.4	5.5	4.3
Regina	17.3	39.1	47.4	9.3	2.2	2.1
Thunder Bay	17.1	47.0	39.6	9.1	1.7	2.7
Saguenay	16.9	48.5	36.6	9.7	3.3	1.9
St. John's	17.9	38.9	46.8	10.2	1.3	2.8
<b>Newer CMAs</b>						
Kingston	20.4	33.0	43.5	16.4	3.5	3.6
Sherbrooke	18.8	39.3	41.4	13.0	3.2	3.0
Kelowna	19.2	38.8	41.2	12.8	3.8	3.4
Moncton	17.2	44.4	40.2	10.9	2.2	2.3
Peterborough	22.2	40.2	33.5	13.4	5.6	7.3
Barrie	29.6	29.6	27.9	15.8	9.5	17.1
Brantford	22.7	38.8	30.3	15.6	7.9	7.4
Trois-Rivières	18.6	44.3	37.5	12.0	2.7	3.6
Abbotsford–Mission	26.7	32.2	30.4	16.5	7.9	13.0
Guelph	22.8	36.6	34.1	14.8	6.8	7.6

**Note:** CMAs were categorized as large, mid-size or small based on the 2011 built-up area using geometric intervals. Newer CMAs—those not populated enough to qualify as CMAs in 1971—were then grouped separately.

**Sources:** Statistics Canada, Environment, Energy, Transportation Statistics Division, 2016, special tabulation of data from Statistics Canada, 2013, "Commuting to work: National Household Survey, 2011," *NHS in Brief*, Catalogue no. 99-012-X2011003.

The cost of land can also influence the growth of cities.<sup>38</sup> Increasingly, in cities like Toronto and Vancouver, first time home buyers and others wishing to purchase a detached home must move to more distant suburbs or neighbouring cities, such as Barrie or Abbotsford, due to the high cost of housing (Chart 2.3).<sup>39</sup> Others opt for townhouses or condominiums in the city centre, which tend to be cheaper than detached homes, but which are frequently smaller and have less outdoor space.

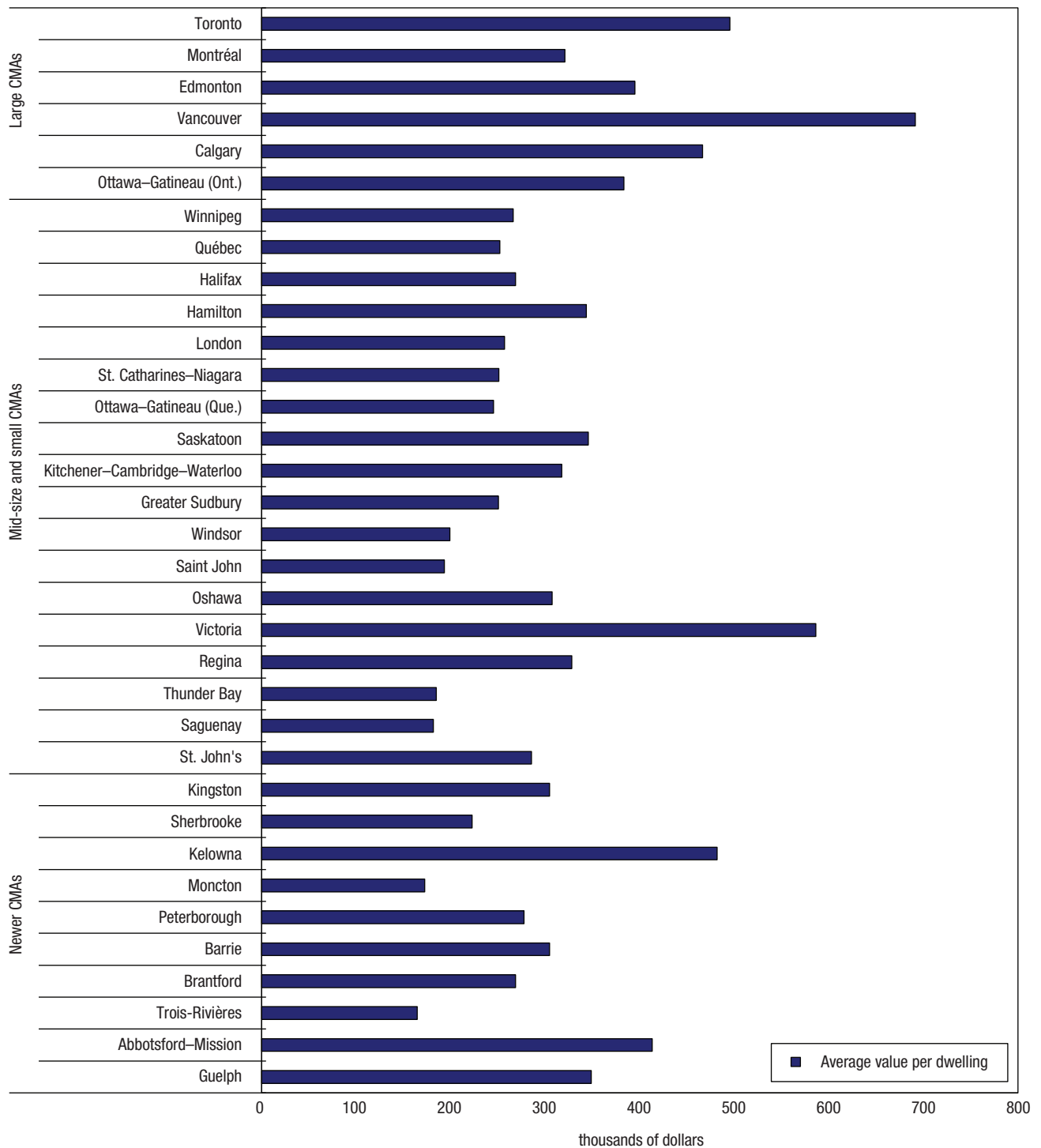
<sup>38</sup> Ottensmann, J.R., 1977, "Urban sprawl, land values and the density of development," *Land Economics*, Vol. 53, no. 4, p. 389–400.

<sup>39</sup> Canada Mortgage and Housing Corporation, 2014, *Housing Market Outlook, Barrie CMA*, [www.cmhc-schl.gc.ca/odpub/esub/65712/65712\\_2014\\_B02.pdf](http://www.cmhc-schl.gc.ca/odpub/esub/65712/65712_2014_B02.pdf) (accessed July 17, 2015); Luke, P., 2014, "Hottest spots for B.C. homebuyers: Surrey, Abbotsford, Evergreen Line communities all in high demand," *The Province*, May 5, [www.theprovince.com/business/Hottest+spots+homebuyers+Surrey+Abbotsford+Evergreen+Line+communities+high+demand/9802218/story.html](http://www.theprovince.com/business/Hottest+spots+homebuyers+Surrey+Abbotsford+Evergreen+Line+communities+high+demand/9802218/story.html) (accessed July 16, 2015).



## The changing landscape of Canadian metropolitan areas

**Chart 2.3**  
Average value of dwellings by census metropolitan area, 2011



**Notes:** Value of dwelling refers to the dollar amount expected by the owner if the dwelling were to be sold. Data apply to owner-occupied dwellings only. CMAs were categorized as large, mid-size or small based on the 2011 built-up area using geometric intervals. Newer CMAs—those not populated enough to qualify as CMAs in 1971—were then grouped separately.  
**Sources:** Statistics Canada, Environment, Energy, and Transportation Statistics Division, 2016, special tabulation of data from Statistics Canada, 2013, 2011 National Household Survey, Catalogue no. 99-014-X2011030.

Many cities and regions have developed land use and growth plans that direct where and what kind of development should occur in order to accommodate projected increases in population.<sup>40</sup> Some of these policies encourage increased density in areas that are already built-up and use urban containment boundaries or other tools to limit urban expansion.<sup>41</sup>

### Land use in and around census metropolitan areas, 1971 to 2011

Cities across Canada differ in size, shape, density and land cover. This section compares the spatial extent of built-up area,<sup>42</sup> arable land<sup>43</sup> and natural and semi-natural land<sup>44</sup> to improve the understanding of land use patterns and agricultural and natural land conversion in and around CMAs from 1971 to 2011 and also presents some measures used to characterize city form.

#### Built-up area change

Built-up area includes buildings, roads, parking lots, parks and gardens. It is where most Canadians live and work, including residential, commercial, institutional and industrial areas. Overall, the total built-up area of CMAs across the country, which includes roads and settled areas, covered 14,546 square kilometres (km<sup>2</sup>) in 2011, up 157% compared to 5,651 km<sup>2</sup> in 1971 (Figure 2.1, Table 2.2 and Table A.1).

40 See for example: Ontario Ministry of Municipal Affairs and Housing, 2013, *Growth Plan for the Greater Golden Horseshoe, 2006*, Office Consolidation, June 2013, [www.placestogrow.ca/index.php?option=com\\_content&task=view&id=359&Itemid=12](http://www.placestogrow.ca/index.php?option=com_content&task=view&id=359&Itemid=12) (accessed July 20, 2015); Metro Vancouver, 2013, *Metro Vancouver 2040: Shaping Our Future*, [www.metrovancouver.org/services/regional-planning/PlanningPublications/RGSAadoptedbyGVRDBoard.pdf](http://www.metrovancouver.org/services/regional-planning/PlanningPublications/RGSAadoptedbyGVRDBoard.pdf) (accessed July 20, 2015).

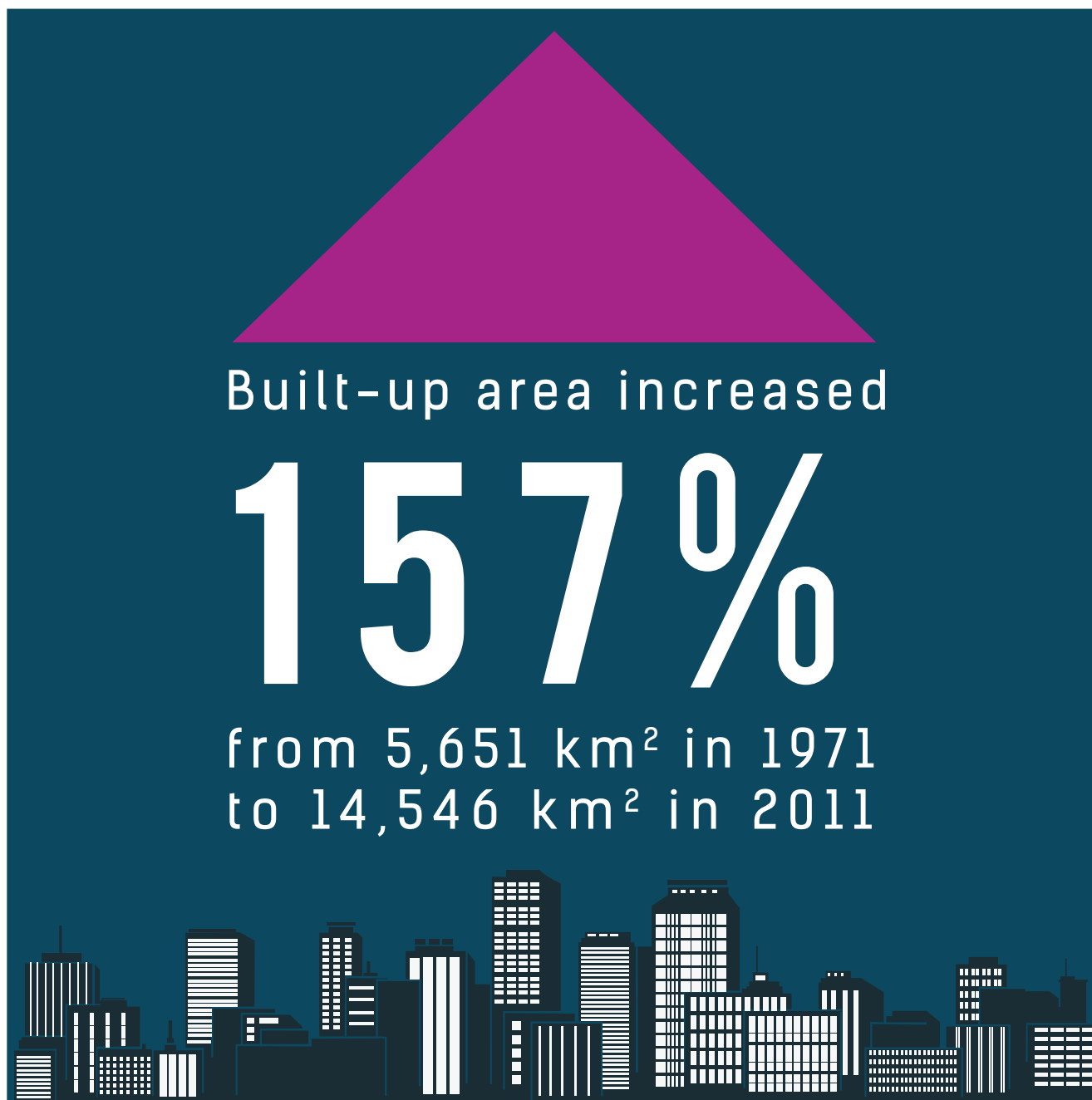
41 Organisation for Economic Co-operation and Development (OECD), 2012, *Compact City Policies: A Comparative Assessment*, *OECD Green Growth Studies*, OECD Publishing, <http://dx.doi.org/10.1787/9789264167865-en> (accessed August 10, 2015).

42 Built-up area for 1971 is estimated using the *Canada Land Inventory: Land Use* and the *Canada Land Use Monitoring Program*. The latter is only available for the 23 CMAs that existed in 1971 and Guelph. As a result 1971 built-up area may be underestimated for the newer CMAs. Roads are modeled for 1971. Built-up area for 1991, 2001 and 2011 is estimated using data from Agriculture and Agri-Food Canada's (AAFC) 30 m *Land Use, 1990, 2000 and 2010*, using code 21 – Settlement (built-up and urban) and 25 – Roads (primary, secondary and tertiary). See Appendix B for more information on data sources and methods.

43 Arable land is composed of cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

44 The natural and semi-natural land cover class is the residual area remaining after subtracting built-up and arable land from the total area. The class also includes some houses and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also and overlying tree canopy.

Figure 2.1  
Built-up area growth, census metropolitan areas of Canada, 1971 to 2011



**Sources:**

Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 2.2**  
**Built-up area by census metropolitan area, 1971, 1991, 2001 and 2011**

	Total built-up area				Built-up area growth	
	1971	1991	2001	2011	1971 to 2011	
	square kilometres				square kilometres	percent
<b>Total CMA</b>	5,651	11,580	13,532	14,546	8,895	157
<b>Large</b>						
Toronto	995	1,714	2,082	2,184	1,189	120
Montréal	755	1,297	1,410	1,571	816	108
Edmonton	342	891	1,037	1,094	752	220
Vancouver	492	801	960	995	503	102
Calgary	273	571	634	700	427	156
Ottawa–Gatineau (Ont.)	219	572	591	635	417	191
<b>Mid-size and small</b>						
Winnipeg	326	517	535	559	233	71
Québec	183	363	408	475	292	160
Halifax	148	313	428	467	319	217
Hamilton	187	323	397	420	233	124
London	167	331	397	415	247	148
St. Catharines–Niagara	187	314	395	412	225	121
Ottawa–Gatineau (Que.)	67	235	252	328	261	391
Saskatoon	103	291	304	319	217	211
Kitchener–Cambridge–Waterloo	119	217	265	281	163	137
Greater Sudbury	85	206	249	269	184	215
Windsor	113	214	250	258	145	128
Saint John	74	178	239	250	175	235
Oshawa	77	173	220	236	159	207
Victoria	120	184	217	233	113	95
Regina	102	210	219	230	128	125
Thunder Bay	71	144	186	193	122	170
Saguenay	63	154	168	188	126	201
St. John's	60	120	169	181	121	201
<b>Newer CMAs</b>						
Kingston	43	176	194	208	165	382
Sherbrooke	44	152	170	203	160	364
Kelowna	12	140	165	185	172	1,402
Moncton	30	129	168	182	152	504
Peterborough	38	127	158	166	128	336
Barrie	24	109	146	155	132	556
Brantford	44	110	150	155	111	250
Trois-Rivières	36	118	131	147	111	310
Abbotsford–Mission	18	102	131	139	121	669
Guelph	35	84	107	112	77	220

**Notes:** Built-up area data were taken from multiple sources. The 1971 built-up areas were based on *Canada Land Inventory Land Use and Canada Land Use Monitoring Program* (CLUMP) with modeling of roads. CLUMP data excluded the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up areas may be underestimated for these CMAs. Built-up area estimates for other years are based on *Land Use, 1990, 2000 and 2010*. 2011 CMA boundaries were used for all years. CMAs were categorized as large, mid-size or small based on the 2011 built-up area, using geometric intervals. Newer CMAs—those not populated enough to qualify as CMAs in 1971 and for which, with the exception of Guelph, CLUMP data were unavailable—were then grouped separately.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

In 2011, the CMA of Toronto had the largest built-up area in the country, with 2,184 km<sup>2</sup> of roads and settled areas (Chart 2.4). Other large CMAs included Montréal, ranked second with 1,571 km<sup>2</sup>, Edmonton with 1,094 km<sup>2</sup>, Vancouver with 995 km<sup>2</sup>, Calgary with 700 km<sup>2</sup> and Ottawa–Gatineau (Ont.)<sup>45</sup> with 635 km<sup>2</sup> of built-up area.

These metropolitan areas experienced substantial increases in built-up area from 1971 to 2011. The largest increases in built-up area were in Toronto (+1,189 km<sup>2</sup>), Montréal (+816 km<sup>2</sup>), Edmonton (+752 km<sup>2</sup>), Vancouver (+503 km<sup>2</sup>), Calgary (+427 km<sup>2</sup>) and Ottawa–Gatineau (Ont.) (+417 km<sup>2</sup>). Of these CMAs, the highest growth rates occurred in Edmonton (+220%) and Ottawa–Gatineau (Ont.) (+191%).

Over this same period, mid-sized and smaller CMAs also experienced considerable expansion of built-up area—for example, Halifax (+319 km<sup>2</sup>), Québec (+292 km<sup>2</sup>), Ottawa–Gatineau (Que.) (+261 km<sup>2</sup>) and London (+247 km<sup>2</sup>). Ottawa–Gatineau (Que.) had the highest growth rate, with built-up area increasing 391% from 1971 to 2011.

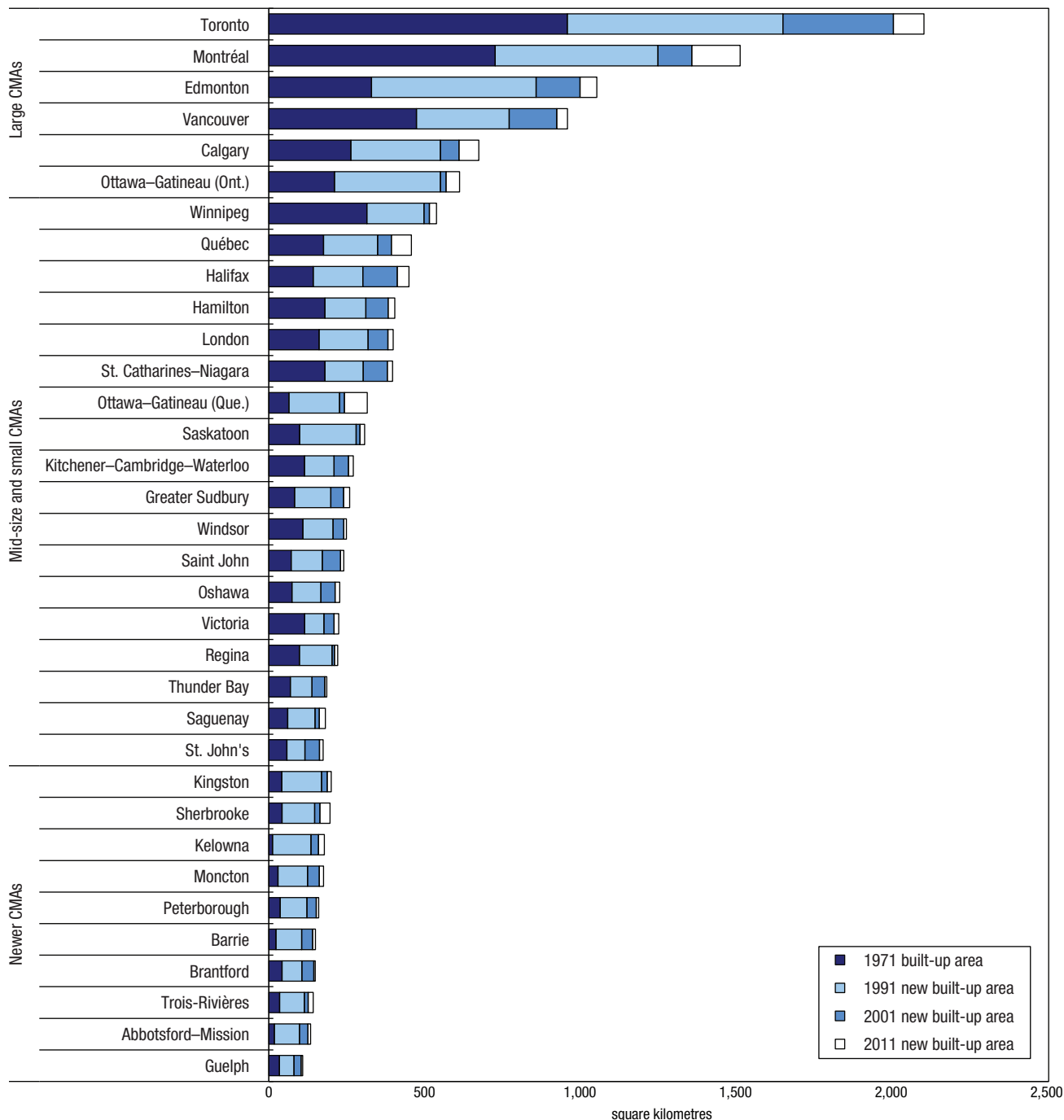
Since 1971, ten new CMAs—cities that did not meet the criteria to be considered CMAs in 1971—also experienced large expansions in built-up area, although this growth is likely overestimated since a key data source for 1971 only covered CMAs that existed at that time.<sup>46</sup> Built-up area grew by 172 km<sup>2</sup> in Kelowna, by 165 km<sup>2</sup> in Kingston and by 160 km<sup>2</sup> in Sherbrooke. The fastest growth occurred in Kelowna (+1,402%) and Abbotsford–Mission (+669%).

<sup>45</sup> The census metropolitan area (CMA) of Ottawa–Gatineau straddles a provincial boundary. This report presents data for the Ontario portion and Quebec portion of the CMA separately.

<sup>46</sup> *Canada Land Use Monitoring Program (CLUMP)* data exclude the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up areas may be underestimated for these CMAs. Despite not being a CMA in 1971, CLUMP data exists for Guelph as it was mapped along with Kitchener–Cambridge–Waterloo. See Appendix B for more information.

## The changing landscape of Canadian metropolitan areas

**Chart 2.4**  
**Built-up area by census metropolitan area, 1971, 1991, 2001 and 2011**



**Notes:** Built-up area data were taken from multiple sources. The 1971 built-up areas were based on *Canada Land Inventory: Land Use and Canada Land Use Monitoring Program (CLUMP)* with modeling of roads. CLUMP data excluded the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up areas may be underestimated for these CMAs. Built-up area estimates for other years were taken from *Land Use, 1990, 2000 and 2010*. 2011 CMA boundaries were used for all years. CMAs were categorized as large, mid-size or small based on the 2011 built-up area using geometric intervals. Newer CMAs—those not populated enough to qualify as CMAs in 1971, and for which, with the exception of Guelph, CLUMP data were unavailable—were then grouped separately.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

### Land use intensity

Characterizing the form of city growth—whether it is compact or dispersed—is often determined based on density measures, such as population, dwelling or employment density.<sup>47</sup> These measures can be used as indicators of land use intensity.

In 2011, **population density** was highest in Toronto (3,368 persons per square kilometre), Montréal (3,356 persons/km<sup>2</sup>), Vancouver (3,100 persons/km<sup>2</sup>) and Calgary (2,685 persons/km<sup>2</sup>)—an indicator that these CMAs had more compact forms of development compared to other large CMAs such as Ottawa–Gatineau (Ont.) (1,952 persons/km<sup>2</sup>) and Edmonton (1,665 persons/km<sup>2</sup>) (Chart 2.5).

Among mid-size and smaller CMAs, Winnipeg (2,346 persons/km<sup>2</sup>), Hamilton (2,320 persons/km<sup>2</sup>) and Kitchener–Cambridge–Waterloo (2,273 persons/km<sup>2</sup>) had the highest population densities in 2011. Guelph (1,683 persons/km<sup>2</sup>), Abbotsford–Mission (1,652 persons/km<sup>2</sup>) and Barrie (1,645 persons/km<sup>2</sup>) were the most densely populated newer CMAs.

A similar comparison of the **dwelling density** shows that Montréal (1,490 dwellings/km<sup>2</sup>) had the highest dwelling density, followed by Vancouver (1,273 dwellings/km<sup>2</sup>) and Toronto (1,255 dwellings/km<sup>2</sup>) (Chart 2.6). Québec (1,038 dwellings/km<sup>2</sup>) had the highest dwelling density among mid-size CMAs, followed by Winnipeg (983 dwellings/km<sup>2</sup>) and Victoria (951 dwellings/km<sup>2</sup>), while Guelph (711 dwellings/km<sup>2</sup>) and Sherbrooke (708 dwellings/km<sup>2</sup>) had the highest dwelling densities among newer CMAs.

From 1971 to 2011, average CMA population density dropped from approximately 3,460 persons/km<sup>2</sup> to close to 2,250 persons/km<sup>2</sup>, although it increased from 2001 to 2011.<sup>48</sup> Average dwelling density also decreased in CMAs, but to a lesser extent, falling from approximately 1,020 dwellings/km<sup>2</sup> in 1971 to 930 dwellings/km<sup>2</sup> in 2011. The decrease in the average size of households is one factor that may have contributed to these trends. From 1971 to 2011, average household size in Canada dropped from 3.6 to 2.3.<sup>49</sup> The number of one person households rose from 13% to 28%, while the number of households with four or more people dropped from 44% to 23%.<sup>50</sup>

From 2001 to 2011, population density increased most in Toronto (+411 persons/km<sup>2</sup> or +14%), Vancouver (+327 persons/km<sup>2</sup> or +12%), Calgary (+290 persons/km<sup>2</sup> or +12%), Barrie (+258 persons/km<sup>2</sup> or +19%), Oshawa (+237 persons/km<sup>2</sup> or +13%) and Edmonton (+226 persons/km<sup>2</sup> or +16%). These CMAs needed less new settled area to accommodate each additional person residing in these CMAs, an indicator of the relative efficiency of land use (Chart 2.7).

Dwelling density increased most in Toronto (+200 dwellings/km<sup>2</sup> or +19%), Vancouver (+176 dwellings/km<sup>2</sup> or +16%), Calgary (+151 dwellings/km<sup>2</sup> or +16%), Barrie (+121 dwellings/km<sup>2</sup> or +23%), Edmonton (+121 dwellings/km<sup>2</sup> or +21%), Oshawa (+120 dwellings/km<sup>2</sup> or +18%) and Victoria (120 dwellings/km<sup>2</sup> or +14%) over the same period.

Though overall more people lived in CMAs in 2011 compared to 2001, population density decreased or remained flat in 12 CMAs, with the largest declines in Ottawa–Gatineau (Que.) (-9%), Saguenay (-9%), Sherbrooke (-8%) and Québec (-5%). Dwelling density decreased or was flat in six CMAs.

47 Density can be measured in different ways. This study presents population and dwelling density by CMA as the ratio of settled area population or dwellings to the settled area (km<sup>2</sup>), which is defined as built-up area excluding roads. For more information on density measures see: Schneider, A. and C.E. Woodcock, 2008, "Compact, dispersed, fragmented, extensive? A comparison of urban growth in twenty-five global cities using remotely sensed data, pattern metrics and census information," *Urban Studies*, Vol. 45, no. 3, p. 659–692; Taylor, Z. and J. Van Nostrand, 2008, *Shaping the Toronto Region, Past, Present, and Future: An exploration of the potential effectiveness of changes to the planning policies governing Greenfield development in the Greater Golden Horseshoe*, Neptis Foundation, [www.neptis.org/sites/default/files/toronto\\_metropolitan\\_region\\_shaping\\_the\\_toronto\\_region/shaping\\_report\\_web\\_20080902\\_0.pdf](http://www.neptis.org/sites/default/files/toronto_metropolitan_region_shaping_the_toronto_region/shaping_report_web_20080902_0.pdf) (accessed July 20, 2015); OECD, 2012, *Compact City Policies: A Comparative Assessment*, OECD Green Growth Studies, OECD Publishing, <http://dx.doi.org/10.1787/9789264167865-en> (accessed August 10, 2015).

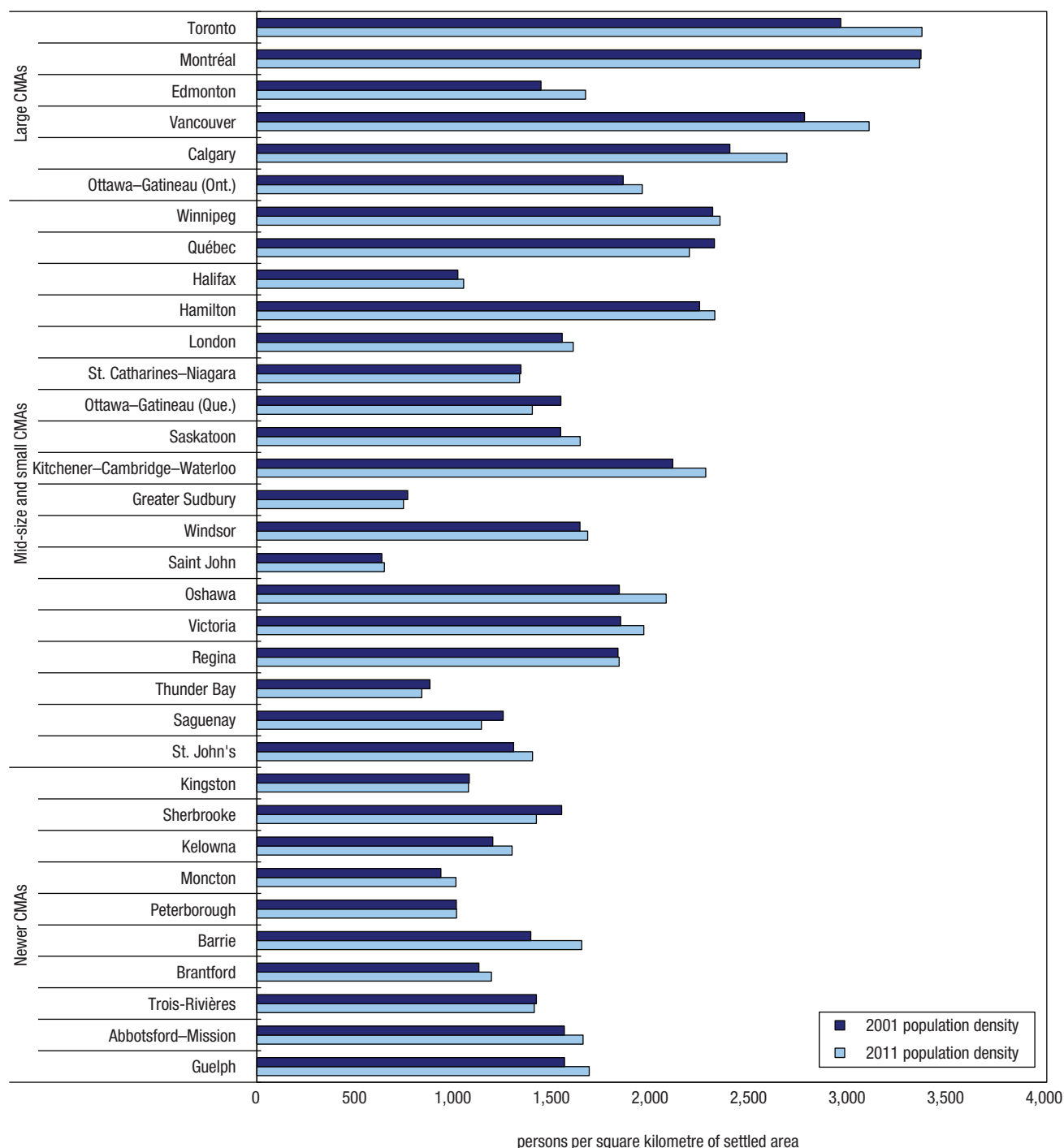
48 Population and dwelling data for 1971 and 1991 are determined using Census of Population enumeration area points, while data for 2001 and 2011 use dissemination block points. Data for the latter two periods is finer in scale and therefore can be better attributed to the settled areas, which may limit comparability of the data over time.

49 Statistics Canada, CANSIM Table 153-0037 (accessed July 15, 2015); Statistics Canada, 2012, Population and dwelling counts, for Canada, provinces and territories, 2011 and 2006 censuses (table), *Population and Dwelling Count Highlight Tables, 2011 Census*, Catalogue no. 98-310-XWE2011002.

50 Statistics Canada, 2012, "Fifty years of families in Canada: 1961 to 2011," *Census in Brief*, Catalogue no. 98-312-X2011003.

## The changing landscape of Canadian metropolitan areas

**Chart 2.5**  
Population density by census metropolitan area, 2001 and 2011



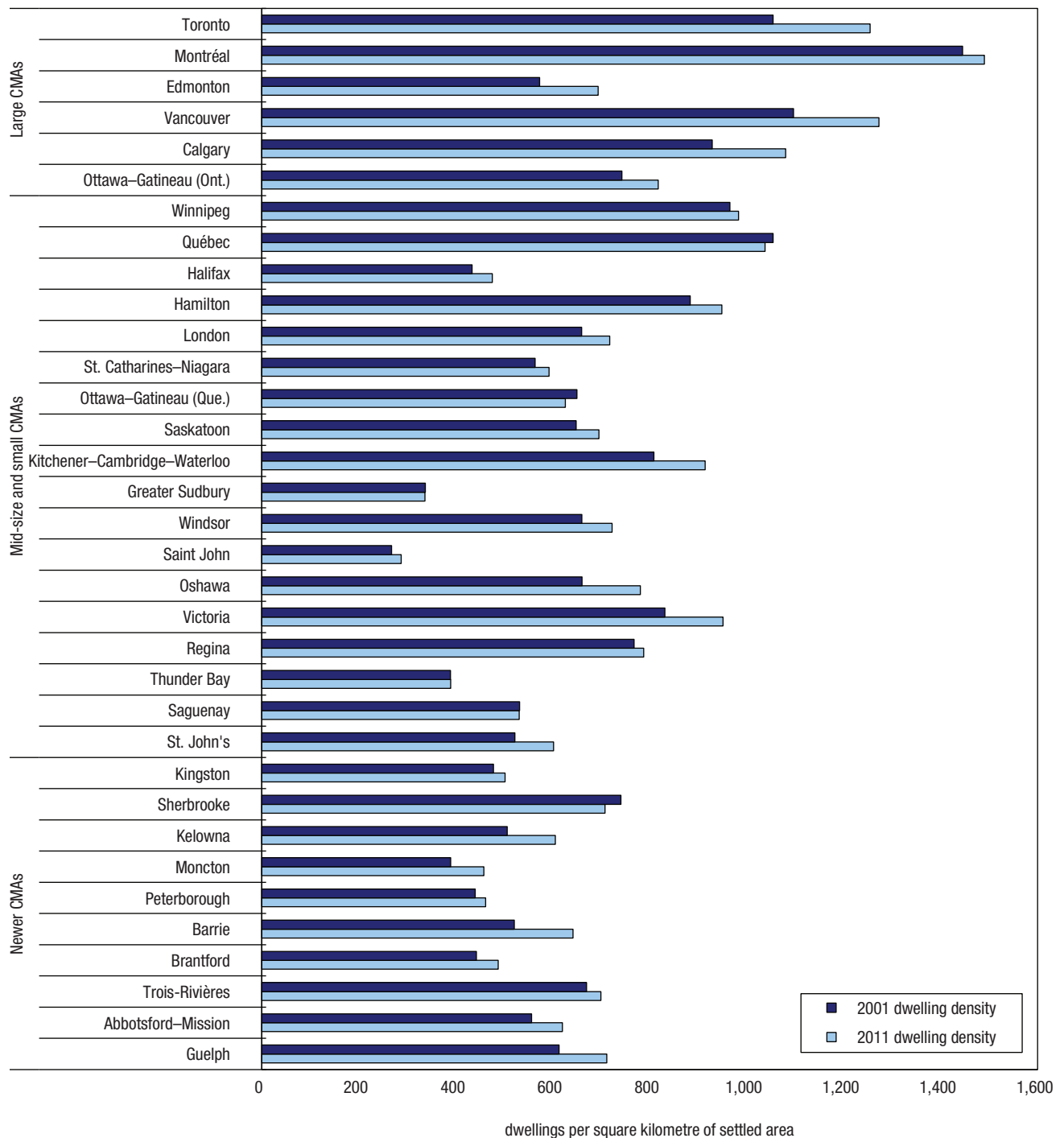
**Notes:** This chart compares the population density for 2001 and 2011 by dividing the settled area population by the settled area of the CMA (built-up area excluding roads). Settled area population includes 2001 and 2011 dissemination block points located within 400 m of settled areas. Low-density dwellings may not be captured as built-up in the remotely sensed data. CMAs were categorized as large, mid-size or small based on the 2011 built-up area using geometric intervals. Newer CMAs—those not populated enough to qualify as CMAs in 1971—were grouped separately.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 2001 and 2011 Censuses of Population; Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).



## The changing landscape of Canadian metropolitan areas

**Chart 2.6**  
**Dwelling density by census metropolitan area, 2001 and 2011**

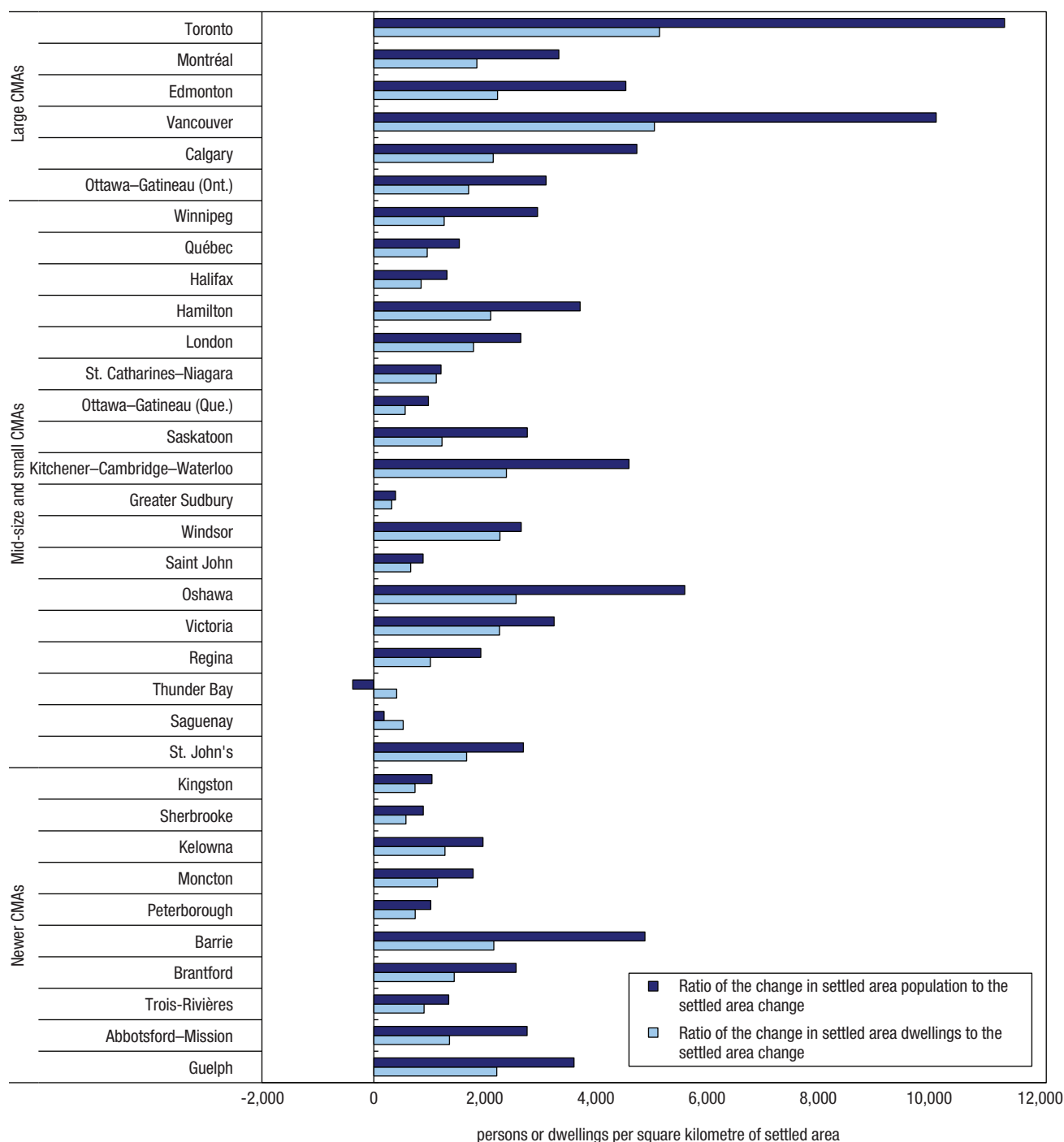


**Notes:** This chart compares the dwelling density for 2001 and 2011 by dividing the number of dwellings in the settled area by the settled area of the CMA (built-up area excluding roads). Dwellings in the settled area include 2001 and 2011 dissemination block points located within 400 m of settled areas. Low-density dwellings may not be captured as built-up in the remotely sensed data. CMAAs were categorized as large, mid-size or small based on the 2011 built-up area using geometric intervals. Newer CMAAs—those not populated enough to qualify as CMAAs in 1971—were then grouped separately.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 2001 and 2011 Censuses of Population; Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Chart 2.7**  
**Efficiency of new land use by census metropolitan area, 2001 to 2011**



**Notes:** This chart shows the ratio of the change in the settled area population and the change in settled area dwellings to the area of land converted to settled area between 2001 and 2011. It is an indicator of the efficiency of land use—high population or dwellings to settled area ratios indicate that less land is needed to house each additional person living in the city, while low ratios indicate more land is needed per person or dwelling. Settled area population and dwellings include 2001 and 2011 dissemination block points located within 400 m of the settled area. Low-density dwellings may not be captured as built-up in the remotely sensed data. CMAs were classified as large, mid-size or small based on the the 2011 built-up area using geometric intervals. Newer CMAs—those not populated enough to qualify as CMAs in 1971—were then grouped separately.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 2001 and 2011 Censuses of Population; Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

Another factor influencing changes in population and dwelling density is the change in the average size of dwellings. More than half of homes built since 2001 were over 1,500 square feet compared to a quarter of homes built before 1978. As well, 13% of homes built since 2001 were over 2,500 square feet compared to 5% of homes built before 1978.<sup>51</sup> This trend suggests that fewer people are living in more space—though how much land is used depends also on the lot size.

Comparing the type of dwellings is another way to look at the issue of density.<sup>52</sup> Areas with a high proportion of single detached housing stock can be considered lower density, whereas areas with a high proportion of apartment and multiple unit buildings, such as row houses, can be considered higher density.

In 2011, single detached dwellings made up the largest proportion of dwellings in Barrie (71%), Peterborough (70%) and Windsor (70%) (Chart 2.8). They were least common in Montréal (33%), Vancouver (34%) and Toronto (41%). Dwellings in apartment buildings with five or more storeys were most common in Toronto (28%), Ottawa–Gatineau (Ont.) (18%), London (16%) and Hamilton (16%). Other dwellings including semi-detached dwellings, row houses and dwellings in low-rise apartment buildings with fewer than five storeys, were most common in Montréal (59%), Québec (52%), Vancouver (51%) and Victoria (51%).

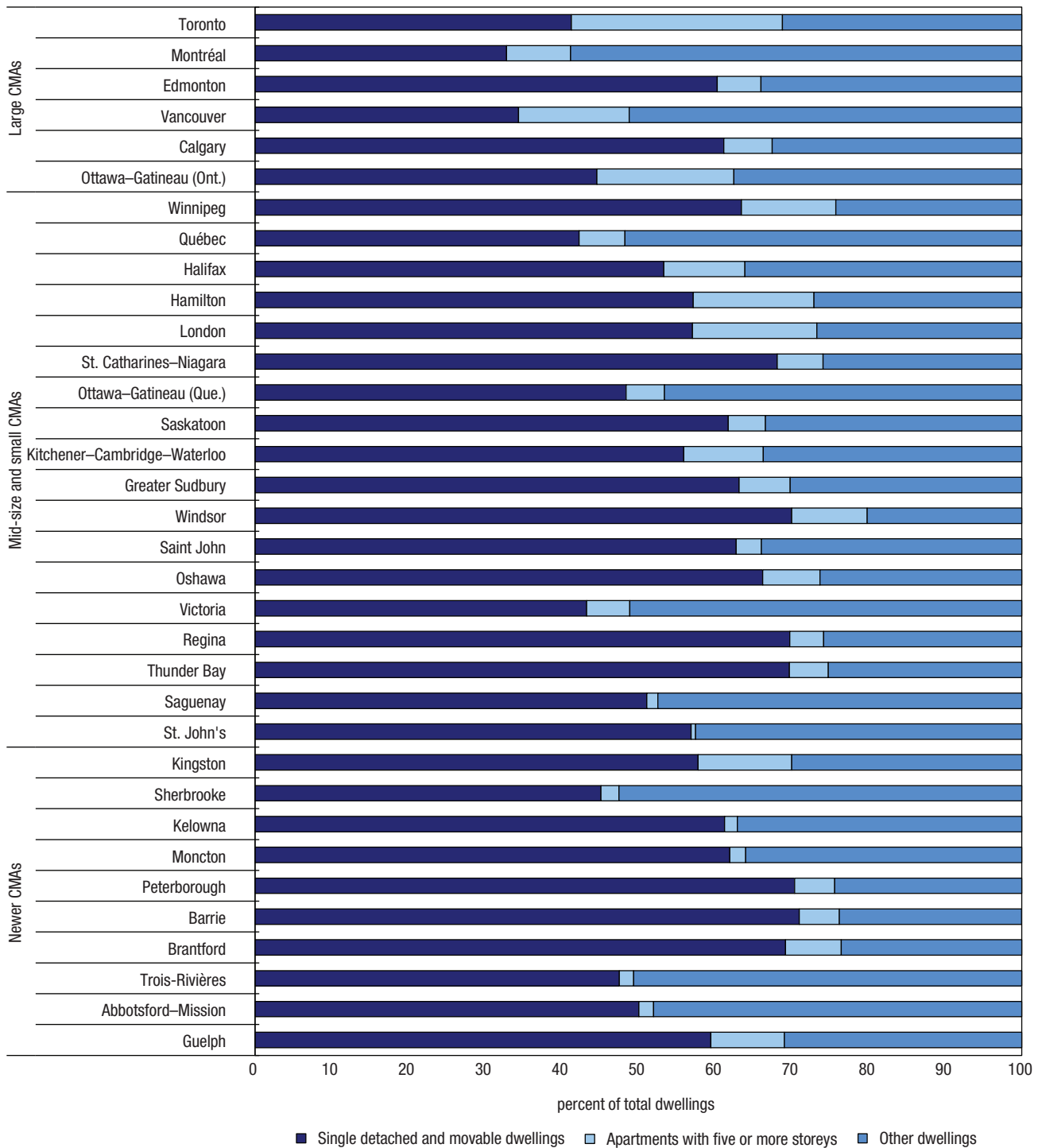
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51 Statistics Canada, Environment, Energy and Transportation Statistics Division, special tabulation of data from the *Households and the Environment Survey, 2011: Energy Use*, which includes information on the reported age of construction and heated area of a dwelling, excluding the basement and garage.

52 Turcotte, M., 2008, "The city/suburb contrast: How can we measure it?," *Canadian Social Trends*, Statistics Canada Catalogue no. 11-008-X.

## The changing landscape of Canadian metropolitan areas

**Chart 2.8**  
**Dwelling type by census metropolitan area, 2011**



**Notes:** Movable dwellings includes mobile homes and other movable dwellings such as house boats and railroad cars. Other dwellings includes the following categories: semi-detached house, row house, apartment or flat in a duplex, apartment in a building that has fewer than five storeys and other single-attached house. CMAs were classified as large, mid-size or small based on the 2011 built-up area using geometric intervals. Newer CMAs—those not populated to qualify as CMAs in 1971—were then grouped separately.

**Sources:** Statistics Canada, Environment, Energy, Transportation Statistics Division, 2016, special tabulation of data from Statistics Canada, 2013, 2011 *National Household Survey: Data Tables*, Catalogue no. 99-014-X2011026.

## The changing landscape of Canadian metropolitan areas

The residential building stock has changed over time. In 1971, 61% of building permits issued across the country were for multiple-unit dwellings, but the proportion of permits for single dwellings outpaced those issued for multiple-units from the early 1980s until 2006.<sup>53</sup> This trend also varies widely by CMA.

In Toronto, 64% of dwellings were built between 1971 and 2011 (Table 2.3). Of these dwellings, 30% were in high-rise apartments with five or more storeys, compared to 22% of dwellings built before 1971. In Montréal, 54% of dwellings were built since 1971 and of these 40% were single detached dwellings, compared to only 24% built in previous decades. In comparison, 73% of dwellings in Vancouver were built from 1971 to 2011 and newly constructed dwellings were increasingly in high-rise buildings—26% of dwellings built from 2001 and 2011 compared to 13% built from 1971 and 2001 and 9% of dwellings built before 1971.<sup>54</sup>

Looking at mid-size and small CMAs, just under half of Winnipeg's dwellings were built between 1971 and 2011, 59% of which were single detached dwellings, down from 67% of dwellings built before 1971. In Hamilton, meanwhile, 52% of dwellings were built since 1971, with other dwellings, particularly row houses, making up a larger share of the new housing stock.

In Abbotsford–Mission, which was classified as a CMA for the first time following the 2001 Census, 86% of dwellings have been built since 1971 and the proportion of single-detached dwellings built has dropped from close to three-quarters for homes built prior to 1971 to less than half for newer construction. In Barrie, which became a CMA following the 2006 Census, 80% of dwellings have been built since 1971 and single detached dwellings remain the most popular dwelling type, accounting for 71% of these homes.

53 Statistics Canada, CANSIM Table 026-0001 (accessed November 15, 2015); Read-Hobman, T., 2015, "Evolution of housing in Canada from 1957 to 2014," *Canadian Megatrends*, Statistics Canada Catalogue no. 11-630-X.

54 Statistics Canada, 2013, *2011 National Household Survey: Data Tables*, Catalogue no. 99-014-X2011026.

## The changing landscape of Canadian metropolitan areas

**Table 2.3**  
**Dwelling type and construction period by census metropolitan area, 2011**

	Single detached and movable dwellings <sup>1</sup>		Apartments with five or more storeys		Other dwellings <sup>2</sup>	
	Construction period - before 1971	Construction period - 1971 to 2011	Construction period - before 1971	Construction period - 1971 to 2011	Construction period - before 1971	Construction period - 1971 to 2011
	number					
<b>Large CMAs</b>						
Toronto	295,130	525,895	160,195	387,185	256,895	364,370
Montréal	178,960	350,170	46,735	88,085	518,585	430,730
Edmonton	77,345	194,350	6,715	19,090	37,295	115,990
Vancouver	104,515	201,760	22,665	106,145	114,750	341,475
Calgary	59,790	223,920	6,130	23,070	34,130	116,940
Ottawa–Gatineau (Ont.)	59,015	104,695	20,525	45,085	43,005	94,830
<b>Mid-size and small CMAs</b>						
Winnipeg	99,300	85,505	14,070	21,800	33,945	36,700
Québec	44,635	101,565	5,125	15,560	75,475	103,525
Halifax	31,240	56,805	4,030	13,400	22,410	37,255
Hamilton	85,100	76,165	21,280	23,115	28,670	47,800
London	51,865	59,400	9,390	22,305	21,610	30,475
St. Catharines–Niagara	63,820	45,430	4,210	5,390	18,115	23,455
Ottawa–Gatineau (Que.)	19,205	44,420	1,610	4,985	15,635	45,680
Saskatoon	24,660	39,700	1,555	3,485	10,805	24,070
Kitchener–Cambridge–Waterloo	37,865	63,600	4,470	14,355	21,170	39,990
Greater Sudbury	22,705	20,000	1,900	2,570	10,955	9,505
Windsor	47,085	41,705	4,555	7,915	12,155	13,435
Saint John	12,255	20,435	775	925	10,315	7,390
Oshawa	25,285	60,550	3,330	6,365	10,875	23,280
Victoria	29,545	36,795	1,815	6,815	27,570	50,850
Regina	26,835	33,085	1,410	2,380	8,430	13,770
Thunder Bay	21,910	14,340	830	1,795	6,325	6,810
Saguenay	12,900	22,580	210	780	16,275	16,690
St. John's	11,760	33,180	65	355	10,995	22,605
<b>Newer CMAs</b>						
Kingston	16,285	21,815	1,965	6,095	8,375	11,420
Sherbrooke	12,250	28,835	305	1,820	19,230	28,635
Kelowna	7,345	38,555	60	1,165	3,750	24,075
Moncton	11,905	24,190	355	830	6,225	14,765
Peterborough	17,710	16,675	965	1,560	5,710	6,225
Barrie	10,115	38,485	530	3,035	3,350	12,935
Brantford	18,865	17,615	1,675	2,165	6,235	6,175
Trois-Rivières	12,110	21,170	345	945	16,085	19,430
Abbotsford–Mission	6,090	23,605	110	1,020	2,025	26,445
Guelph	12,035	20,555	1,650	3,610	5,655	11,320

1. Movable dwellings includes mobile homes and other movable dwellings such as house boats and railroad cars.

2. Other dwellings includes the following categories: semi-detached house, row house, apartment or flat in a duplex, apartment in a building that has fewer than five storeys and other single-attached house.

**Notes:** Due to random rounding, total dwellings may not equal the sum of the sub-categories. CMAs were classified as large, mid-size or small based on the 2011 built-up area using geometric intervals. Newer CMAs—those not populated to qualify as CMAs in 1971—were then grouped separately.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Statistics Canada, 2013, 2011 *National Household Survey: Data Tables*, Catalogue no. 99-014-X2011026.

## The changing landscape of Canadian metropolitan areas

**Table 2.3 (concluded)**  
**Dwelling type and construction period by census metropolitan area, 2011**

	Type of dwelling - Total dwellings			Growth rate - 1971 to 2011
	Construction period - before 1971	Construction period - 1971 to 2011	Construction period - Total dwellings	
	number			percent
<b>Large CMAs</b>				
Toronto	712,235	1,277,460	1,989,695	179
Montréal	744,295	868,990	1,613,290	117
Edmonton	121,390	329,410	450,795	271
Vancouver	241,945	649,375	891,305	268
Calgary	100,070	363,935	464,000	364
Ottawa–Gatineau (Ont.)	122,565	244,605	367,170	200
<b>Mid-size and small CMAs</b>				
Winnipeg	147,320	144,020	291,340	98
Québec	125,255	220,635	345,885	176
Halifax	57,690	107,450	165,150	186
Hamilton	135,065	147,125	282,185	109
London	82,880	112,180	195,055	135
St. Catharines–Niagara	86,175	74,270	160,445	86
Ottawa–Gatineau (Que.)	36,500	95,115	131,615	261
Saskatoon	37,040	67,255	104,290	182
Kitchener–Cambridge–Waterloo	63,530	117,960	181,495	186
Greater Sudbury	35,620	32,145	67,770	90
Windsor	63,795	63,080	126,870	99
Saint John	23,360	28,775	52,130	123
Oshawa	39,510	90,195	129,700	228
Victoria	58,930	94,455	153,395	160
Regina	36,695	49,240	85,935	134
Thunder Bay	29,100	22,970	52,060	79
Saguenay	29,420	40,070	69,485	136
St. John's	22,835	56,195	79,020	246
<b>Newer CMAs</b>				
Kingston	26,630	39,335	65,965	148
Sherbrooke	31,790	59,295	91,085	187
Kelowna	11,170	63,780	74,950	571
Moncton	18,535	39,780	58,315	215
Peterborough	24,370	24,470	48,850	100
Barrie	14,015	54,480	68,495	389
Brantford	26,765	25,945	52,725	97
Trois-Rivières	28,570	41,565	70,135	145
Abbotsford–Mission	8,240	51,075	59,320	620
Guelph	19,340	35,515	54,870	184

1. Movable dwellings includes mobile homes and other movable dwellings such as house boats and railroad cars.

2. Other dwellings includes the following categories: semi-detached house, row house, apartment or flat in a duplex, apartment in a building that has fewer than five storeys and other single-attached house.

**Notes:** Due to random rounding, total dwellings may not equal the sum of the sub-categories. CMAs were classified as large, mid-size or small based on the 2011 built-up area using geometric intervals. Newer CMAs—those not populated to qualify as CMAs in 1971—were then grouped separately.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Statistics Canada, 2013, 2011 *National Household Survey: Data Tables*, Catalogue no. 99-014-X2011026.

### Arable land use change

**Arable land** is critical ecological infrastructure, part of the natural capital that allows for the production of food and other agricultural products while providing other ecosystem goods and services including carbon sequestration, recreational and aesthetics benefits. See Textbox 2.1: Why use the census metropolitan area-ecosystem (CMA-E) geography? for information on the geographical unit used in the following sections.

#### **Textbox 2.1 Why use the census metropolitan area-ecosystem (CMA-E) geography?**

Every five years, the Census of Agriculture collects information on farming in Canada, including the area of each crop and land use; the number of each type of livestock; land management practices; farm expenses and other topics.

Census of Agriculture data, however, are not compiled by census metropolitan area (CMA). This report uses cropland, summerfallow and tame or seeded pasture data from the Interpolated Census of Agriculture product, which reallocates farm areas to the Soil Landscapes of Canada (SLC) polygons. These arable land areas were aggregated to the CMA-E geography. For this reason, data for arable and natural and semi-natural land, the latter of which is calculated as a residual, are available only by CMA-E.

CMA-Es, which include the SLC polygons within and surrounding the CMA, are a useful geography for presenting aggregate information on metropolitan areas' arable and natural land assets. SLC polygons are the finest environmental geography for which census data are disseminated and also represent a fundamental building block of ecosystems, since they delineate the major permanent natural attributes of soil and land.

However, these arable and natural land data do not have the spatial accuracy to be usefully mapped at this scale. Data presented on the growth of settled area on arable or natural and semi-natural land are instead calculated by overlaying the growth in settled area from 1971 to 2011 on the *Canada Land Inventory: Land Use (CLI: LU)* base layer.

CMAs and CMA-Es vary in size, shape and topography. CMA-Es are not spatially mutually exclusive—they overlap where a SLC polygon crosses more than one CMA boundary, as is the case in Vancouver and Abbotsford–Mission or Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. For this reason, land use or population data for CMA-Es should not be summed to generate a total and caution should be used when comparing data. See maps of CMA-Es in Section 3 and Appendix B for more information.

Note that Census of Agriculture data are spatially referenced to the location of the farm headquarters, which may not be where the farm land is actually located.

CMA-Es that had a large amount of arable land were mainly located in the Prairies and in southern Ontario and Quebec (Table A.1). CMA-Es in these areas were also likely to have arable land make up a high proportion of their total land area (Chart 2.9). For example, 11,633 km<sup>2</sup> of arable land was farmed in Regina in 2011, accounting for 73% of its total land area.

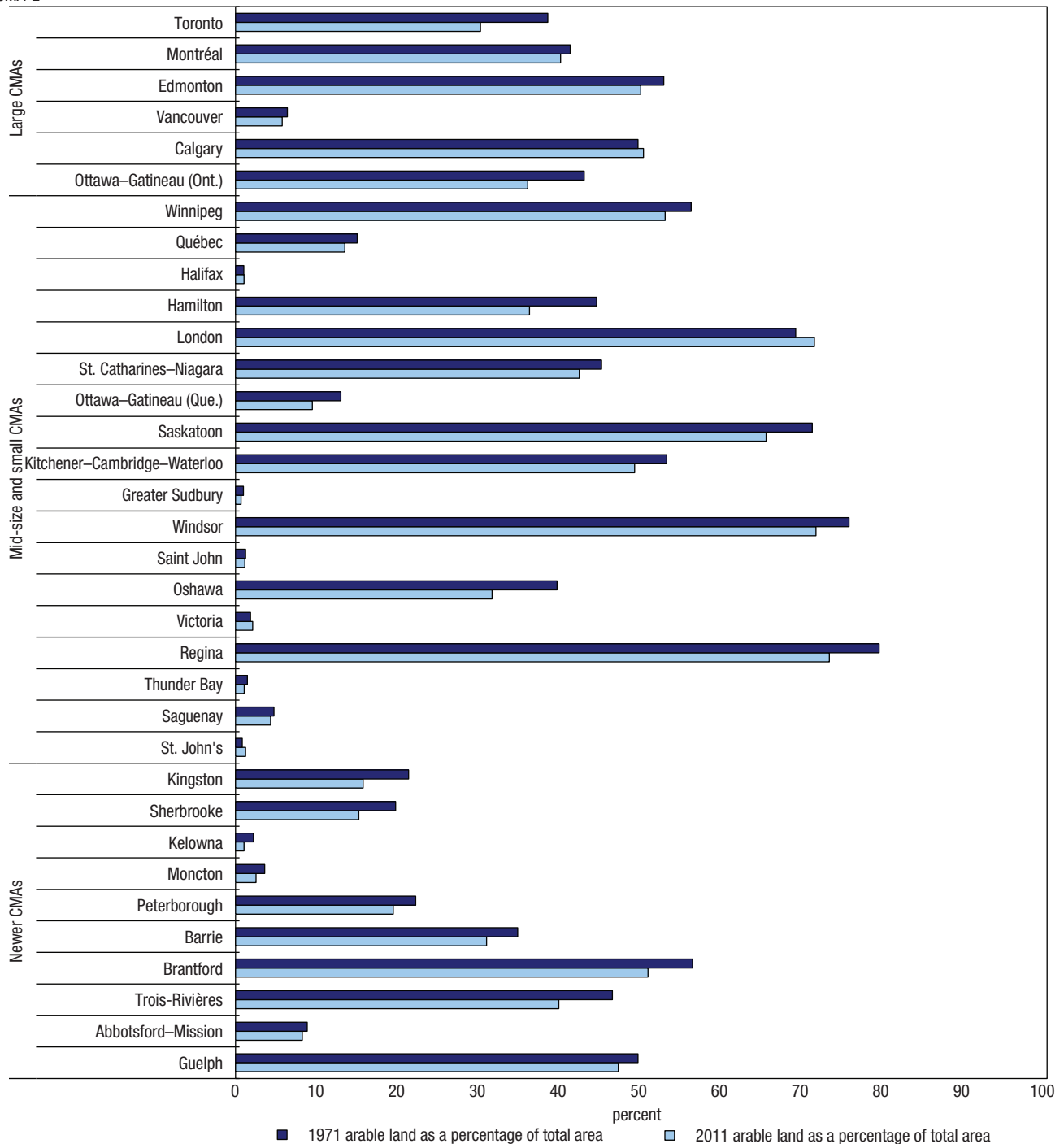


## The changing landscape of Canadian metropolitan areas

**Chart 2.9**

**Arable land as a percentage of the census metropolitan area-ecosystem (CMA-E), 1971 and 2011**

CMA-E



**Notes:** Arable land is composed of cropland, tame or seeded pasture and summerfallow from the 1971 and 2011 Interpolated Census of Agriculture. CMA-E are not spatially mutually exclusive—they overlap where a SLC polygon crosses more than one CMA boundary, as is the case in Vancouver and Abbotsford–Mission or Toronto and surrounding CMA-Es including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph and Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries. CMA-Es are ordered here according to their respective CMA built-up area. CMA-Es were classified as large, mid-size or small based on the 2011 built-up area using geometric intervals. Newer CMA-Es—those not populated enough to qualify as CMA-Es in 1971—were then grouped separately.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Agriculture and Agri-Food Canada Statistics Canada, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971.

## The changing landscape of Canadian metropolitan areas

Between 1971 and 2011, the amount of arable land decreased most in the CMA-Es of Toronto (-1,063 km<sup>2</sup>), Regina (-975 km<sup>2</sup>), Saskatoon (-909 km<sup>2</sup>), Winnipeg (-615 km<sup>2</sup>), Ottawa–Gatineau (Ont.) (-584 km<sup>2</sup>) and Edmonton (-564 km<sup>2</sup>). However, the largest rates of change occurred in Kelowna (-52%), Greater Sudbury (-30%), Moncton (-29%) and Ottawa–Gatineau (Que.) (-27%).

Arable land increased in five CMA-Es—the largest increases occurred in London (+192 km<sup>2</sup> or +3%) and Calgary (+85 km<sup>2</sup> or +1%). An increase in arable land implies a decrease in natural or semi-natural land. It could result from bringing natural land for pasture or idle farmland into production or conversion from other natural land covers.

The growth of settled area between 1971 and 2011 occurred in similar proportions on arable land and on natural and semi-natural land (Table A.2).<sup>55</sup> CMA-Es with the largest increases in settled area on arable land include those in the Golden Horseshoe—for example, Toronto CMA-E with 961 km<sup>2</sup>—as well as Montréal (+448 km<sup>2</sup>), Edmonton (+402 km<sup>2</sup>), Ottawa–Gatineau (Ont.) (+295 km<sup>2</sup>), London (+256 km<sup>2</sup>) and Calgary (+214 km<sup>2</sup>).

CMA-Es with the highest proportion of settled area expansion occurring on arable land were located mainly in southern Ontario and the Prairies. The majority of growth in settled area in Windsor (85% or +134 km<sup>2</sup>), London (73% or +256 km<sup>2</sup>), Hamilton (72% or +487 km<sup>2</sup>), Edmonton (70% or +402 km<sup>2</sup>) and Saskatoon (69% or +108 km<sup>2</sup>) occurred on land that had, in 1971, been classed as arable land.

### Loss of agricultural land by soil capability classification

Other land suitable for agriculture can also be lost to urban expansion—for example natural land for pasture, woodlands and other land on farms, as well as land that is not actively farmed—for example abandoned fields. Land in Canada has been classed according to the soil capability for supporting arable culture and forage crops. Land with few soil or climate limitations for sustained crop production—termed **dependable agricultural land** (class 1 to 3)—is mostly located in the Prairies and southern Ontario and Quebec.<sup>56</sup>

Land that was developed between 1971 and 2011 in many of the CMA-E in southern Ontario, in particular those surrounding Toronto, was overwhelmingly on this best quality agricultural land (Table A.3).<sup>57</sup> In Toronto, London, St. Catharines–Niagara and Windsor, 85% of the land converted to settled area from 1971 to 2011 was dependable agricultural land. This loss represented 9% of the stock of dependable agricultural land located in these CMA-Es. In comparison, less dependable agricultural land was lost around Vancouver and Victoria, but this represented 26% of the stock of class 1 to 3 agricultural land in these CMA-Es.

### Natural and semi-natural land cover change

**Natural and semi-natural land** includes ecologically and economically important ecosystem assets such as forests, grasslands, shrublands, barrenlands, wetlands and water.<sup>58</sup> These areas generate many essential ecosystem goods and services that benefit society. Ecosystem goods derived from natural areas include timber, fish, mushrooms, berries and plants, while ecosystem services include carbon sequestration, flood protection, clean air and water, recreation and other cultural services. From an ecological perspective, natural land may also provide a diverse range of habitats supporting biodiversity. See Textbox 2.2: Access to nature for information on how Canadians experience nature.

55 Arable land or natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the *Canada Land Inventory: Land Use (CLI: LU)*, base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using *AAFC Land Use, 1990*. For arable land, this included the following CLI: LU classes: cropland, improved pasture and forage crops, orchards and vineyards and horticulture. Arable and natural and semi-natural land lost to roads is not included in this analysis.

56 Agriculture and Agri-Food Canada, n.d., *Interactive Maps: Canada Land Inventory – 1: 250 000 Land Capability for Agriculture*, [www.agr.gc.ca/atlas/agpv?webmap=en-5b54c00685b74cab960a54bc444fc927&webmap-fr=79aa06a083fa4b6e8f65e4828ee5a746](http://www.agr.gc.ca/atlas/agpv?webmap=en-5b54c00685b74cab960a54bc444fc927&webmap-fr=79aa06a083fa4b6e8f65e4828ee5a746) (accessed July 15, 2015).

57 Growth of settled area on agricultural land by soil capability class is calculated by overlaying the growth in settled area from 1971 to 2011 on the *Canada Land Inventory: Soil Capability for Agriculture*, base layer. Agricultural land lost to roads is not included in this analysis.

58 The natural and semi-natural land cover class is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy.

### Textbox 2.2 Access to nature

Access to nature plays a role in overall well-being.<sup>59</sup> Studies have shown that green space, which includes public parks, trees, shrubs and vegetation, promotes opportunities for social interaction among neighbours, as well as an overall sense of community.<sup>60</sup> Urban design that includes green space can facilitate physical activity.<sup>61</sup> Green space has also been linked to health benefits<sup>62</sup> including mental health benefits<sup>63</sup> and restorative effects,<sup>64</sup> as well as positive effects on children's cognitive functioning<sup>65</sup> and resilience.<sup>66</sup>

According to the *2013 Households and the Environment Survey*, 85% of households reported having a park or public green space near their home and 72% reported that they participated in outdoor activities close to their home (Table 2.4). Overall, 85% had trees, bushes or hedges on their property, 57% grew vegetables, herbs, fruits or flowers for personal use and 28% made purchases to feed or shelter birds, to watch birds or travel for bird watching trips.

These percentages vary by CMA and by various socio-economic and dwelling characteristics. For example, households composed of families with children were more likely to participate in outdoor activities than households composed of seniors only. Residents of homes built in 2010 or later were less likely to report that they lived near a park or public green space or that they participated in outdoor activities.

Trees in cities, including street trees, trees in parks and on public or private property, provide environmental benefits and help beautify communities. Many cities in Canada currently have plans to manage their urban forests.<sup>67</sup> Tree cover in cities is affected by the natural environment—cities in areas that are forested are more likely to have a higher percent of urban tree cover than cities surrounded by grasslands or deserts, but differences due to local land use also exist.<sup>68</sup>

For medium and large [population centres](#) across Canada, the urban tree canopy cover is estimated at 4,412 km<sup>2</sup>, approximately 27% of the total area of these cities.<sup>69</sup> This percentage varies for different regions of the country (Map 2.1).

- 59 Wolf, K.L., 2010, *Green Cities: Good Health*, University of Washington, College of the Environment, [http://depts.washington.edu/hhwb/Top\\_Introduction.html](http://depts.washington.edu/hhwb/Top_Introduction.html) (accessed July 15, 2015).
- 60 Levine Coley, R., W.C. Sullivan and F.E. Kuo, 1997, "Where does community grow?: The social context created by nature in urban public housing," *Environment and Behaviour*, Vol. 29, p. 468–494. <http://willsull.net/resources/Sullivan-papers/ColeySullivanKuo1997.pdf> (accessed July 14, 2015).
- 61 Lee, A.C. and R. Maheswaran, 2010, "The health benefits of urban green spaces: a review of the evidence," *Journal of Public Health*, Vol. 33, no. 22, p. 212–222.
- 62 Secretariat of the Convention on Biological Diversity and the World Health Organization, 2015, *Connecting Global Priorities: Biodiversity and Human Health, Summary of the State of Knowledge Review*, [www.cbd.int/health/stateofknowledge/default.shtml](http://www.cbd.int/health/stateofknowledge/default.shtml) (accessed September 15, 2015).
- 63 Bratman, G.N., J.P. Hamilton, K.S. Hahn, G.C. Daily and J.J. Gross, 2015, "Nature experience reduces rumination and subgenual prefrontal cortex activation," *Proceedings of the National Academy of Sciences of the United States*, Vol. 112, no. 28, p. 8567–8572.
- 64 van den Berg, A.E., T. Hartig and H. Staats, 2007, "Preference for nature in urbanized societies: Stress, restoration and the pursuit of sustainability," *Journal of Social Issues*, Vol. 63, no. 1, p. 79–96; Ulrich, R.S., 1984, "View through a window may influence recovery from surgery," *Science*, Vol. 224, Issue 4647 (April 27, 1984), p. 420–421.
- 65 Wells, N.M., 2000, "At home with nature: Effects of "greenness" on children's cognitive functioning," *Environment and Behavior*, Vol. 32, p. 775–795, [http://sfrc.ufl.edu/urbanforestry/Resources/PDF%20downloads/Wells\\_2000.pdf](http://sfrc.ufl.edu/urbanforestry/Resources/PDF%20downloads/Wells_2000.pdf) (accessed July 14, 2015).
- 66 Wells, N.M. and G.W. Evans, 2003, "Nearby nature: A buffer of life stress among rural children," *Environment and Behavior*, Vol. 35, no. 3, p. 311–330.
- 67 City of Vancouver, 2015, *Developing Vancouver's Urban Forest Strategy*, <http://vancouver.ca/home-property-development/urban-forest-strategy.aspx> (accessed September 28, 2015); City of Calgary, 2007, *Parks Urban Forest Strategic Plan*, [www.calgary.ca/CA/city-clerks/Documents/Council-policy-library/csp028-Parks-Urban-Forest-Strategic-Plan.pdf](http://www.calgary.ca/CA/city-clerks/Documents/Council-policy-library/csp028-Parks-Urban-Forest-Strategic-Plan.pdf) (accessed September 28, 2015); City of Ottawa, 2015, *Urban Forest Management Plan*, <http://ottawa.ca/en/city-hall/public-consultations/environment/urban-forest-management-plan> (accessed September 28, 2015); Ville de Montréal (City of Montreal), 2005, *Tree Policy of Montreal*, [http://ville.montreal.qc.ca/pls/portal/docs/PAGE/ARR\\_VER\\_EN/MEDIA/DOCUMENTS/POLITIQUEDELARBREMONTREAL2005ANG.PDF](http://ville.montreal.qc.ca/pls/portal/docs/PAGE/ARR_VER_EN/MEDIA/DOCUMENTS/POLITIQUEDELARBREMONTREAL2005ANG.PDF) (accessed September 28, 2015); City of Halifax, n.d., *Urban Forest Master Plan (UFMP)*, [www.halifax.ca/Property/UFMP/index.php](http://www.halifax.ca/Property/UFMP/index.php).
- 68 Nowak, D.J., R.A. Rowntree, G.E. McPherson, S.M. Sisinni, E.R. Kerkmann and J.C. Stevens, 1996, "Measuring and analyzing urban tree cover," *Landscape and Urban Planning*, Vol. 36, p. 49–57.
- 69 Pasher, J., M. McGovern, M. Khoury and J. Duffe, 2014, "Assessing carbon storage and sequestration by Canada's urban forests using high resolution earth observation data," *Urban Forestry & Urban Greening*, Vol. 13, no. 3, p. 484–494.

## The changing landscape of Canadian metropolitan areas

**Table 2.4**

**Access to nature, by census metropolitan area (CMA), dwelling type, dwelling construction period, type of household and household income, 2013**

	Had park or public green space close to their home <sup>1</sup>	Participated in outdoor activities close to their home <sup>1</sup>	Had trees, bushes or hedges on their property	Grew vegetables, herbs, fruits or flowers for personal use	Made purchases to feed or shelter birds on their property, to watch birds or to travel for bird watching trips
	percent of households				
<b>Canada</b>	85	72	85	57	28
<b>Large CMAs</b>					
Toronto	85	69	78	52	19
Montréal	91	66	83	48	17
Edmonton	89	80	84	63	28
Vancouver	87	75	74	53	19
Calgary	88	69	81	54	23
Ottawa–Gatineau (Ont.-Que.)	91	79	88	57	25
<b>Mid-size and small CMAs</b>					
Winnipeg	88	73	82	68	25
Québec	83	66	85	50	21
Halifax	92	87	95	54	34
Hamilton	86	73	83	60	29
London	85	73	85	58	32
St. Catharines–Niagara	82	71	89	66	34
Saskatoon	89	77	84	63	25 <sup>E</sup>
Kitchener–Cambridge–Waterloo	89	75	87	61	33
Greater Sudbury	79	75	88	54	31 <sup>E</sup>
Windsor	89	75	90	53	31 <sup>E</sup>
Saint John	78	82	92	60	40
Oshawa	91	70	86	61	33
Victoria	92	84	90	68	46
Regina	92	78	87	54	26
Thunder Bay	87	75	92	62	41
Saguenay	81	59	87	49	30
St. John's	80	88	90	54	25
<b>Newer CMAs</b>					
Kingston	86	74	96	71	39
Sherbrooke	92	80	90	67	36
Kelowna	85	82	91	56	44 <sup>E</sup>
Moncton	93	83	74	39	21 <sup>E</sup>
Peterborough	81	79	97	77	40
Barrie	93	80	96	63	39
Brantford	81	77	91	59	35 <sup>E</sup>
Trois-Rivières	87	74	86	60	35 <sup>E</sup>
Abbotsford–Mission	81	73	86	61	32 <sup>E</sup>
Guelph	92	74	97	63	40
<b>Dwelling type</b>					
Single-detached	85	77	92	68	37
Double (side-by-side)	89	72	87	59	24
Row or terrace	88	72	77	50	21
Duplex	88	64	80	50	17
Low-rise apartment (fewer than 5 stories)	86	63	74	35	12
High-rise apartment (5 stories or more)	82	64	61	30	6 <sup>F</sup>
Mobile home	64	61	85	51	38

## The changing landscape of Canadian metropolitan areas

**Table 2.4 (concluded)**

**Access to nature, by census metropolitan area (CMA), dwelling type, dwelling construction period, type of household and household income, 2013**

	Had park or public green space close to their home <sup>1</sup>	Participated in outdoor activities close to their home <sup>1</sup>	Had trees, bushes or hedges on their property	Grew vegetables, herbs, fruits or flowers for personal use	Made purchases to feed or shelter birds on their property, to watch birds or to travel for bird watching trips
	percent of households				
<b>Dwelling construction period</b>					
1977 or earlier	86	72	87	59	32
1978 to 2000	86	74	88	59	29
2001 to 2009	87	77	82	56	25
2010 or newer	67	54	60	32	11
<b>Type of household</b>					
Only adults 18 and 19 years old	F	F	F	F	F
Only adults 20 to 24 years old	89	68	57	41 <sup>E</sup>	F
Only adults 25 to 44 years old	90	78	75	43	14
Only adults 45 to 64 years old	83	71	88	57	33
Only adults 65 years old and older	75	56	84	52	28
Adults and children from 0 to 12 years only	89	84	87	59	27
Adults and teens from 13 to 19 years only	86	79	85	61	32
Adults and members from 0 to 19 only	90	82	85	68	32
Other compositions	86	69	86	63	30
<b>Household income</b>					
Under \$20,000 (includes income loss)	79	56	81	39	19
\$20,000 to \$39,999	85	64	83	48	24
\$40,000 to \$59,999	89	72	86	57	29
\$60,000 to \$79,999	90	79	88	60	32
\$80,000 to \$99,999	93	82	91	67	32
\$100,000 to \$149,999	94	89	93	69	34
\$150,000 and more	94	88	95	71	35
Income not stated	63	53	67	43	20

1. Close to home is defined as being within a ten minute journey from home.

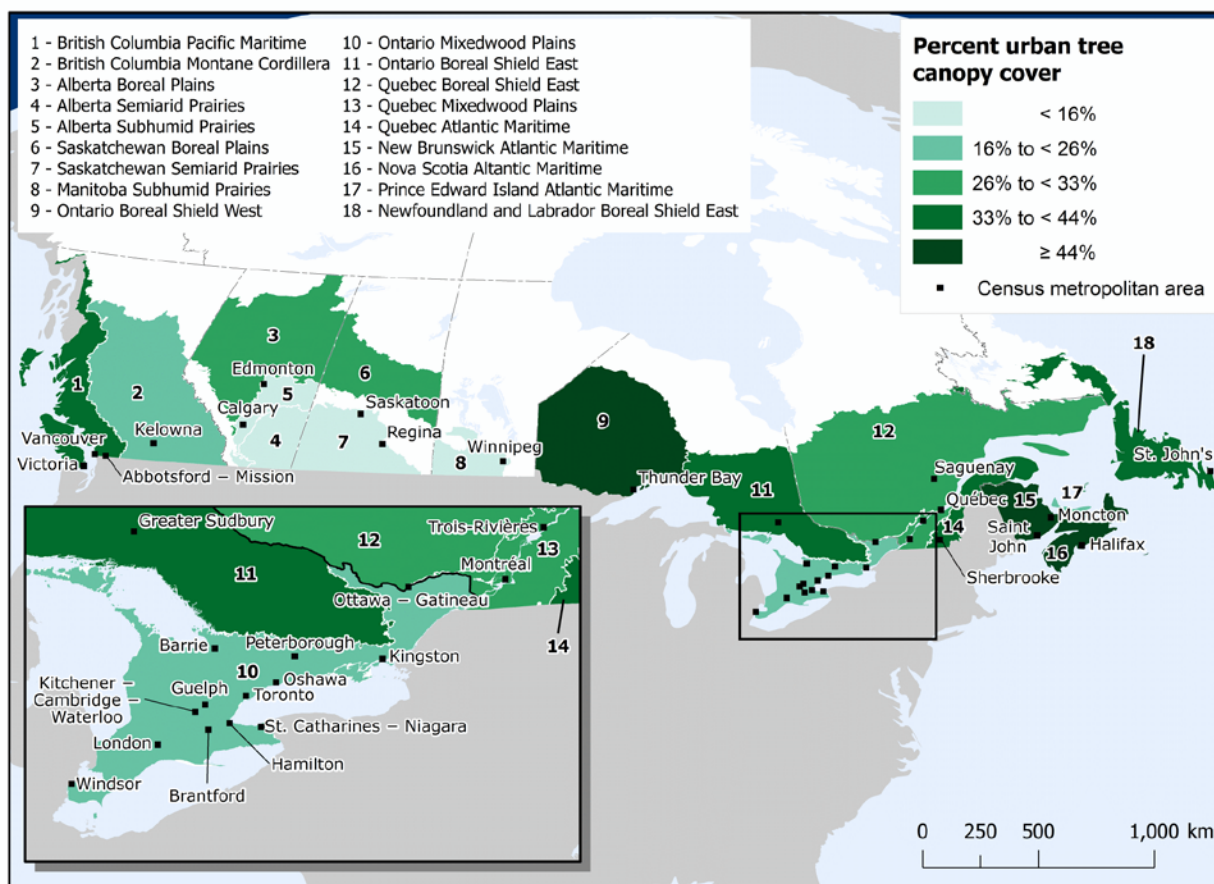
**Note:** CMAs were classified as large, mid-size or small based on the 2011 built-up area using geometric intervals. Newer CMAs—those not populated enough to qualify as CMAs in 1971—were then grouped separately. Data for the CMA of Ottawa–Gatineau, (Ont.-Que.) are presented jointly.

**Sources:** Statistics Canada, Environment Energy and Transportation Statistics Division, 2016, special tabulation of data from the 2013 *Households and the Environment Survey*; Statistics Canada, CANSIM Tables 153-0130, 153-0131, 153-0132, 153-0133, 153-0148, 153-0149, 153-0150, 153-0153, 153-0154, 153-0155, 153-0156, 153-0157, 153-0158, 153-0159, 153-0160.

## The changing landscape of Canadian metropolitan areas

**Map 2.1**

**Estimated tree canopy for medium and large urban population centres, by reconciliation unit**



**Note:** CMA names are shown for illustrative purposes. Data for the reconciliation units is for the 85 medium and large urban population centres (those with a population greater than 30,000). Reconciliation units are a spatial framework used by Environment and Climate Change Canada that combines the Ecological Framework of Canada with provincial and territorial administrative boundaries. There are some regional differences in the population centre boundaries. More non-built areas are included in population centres in the Atlantic region, which could have resulted in an overestimation of the urban tree cover in these areas.

**Source:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Pasher, J., M. McGovern, M. Khoury and J. Duffe, 2014, "Assessing carbon storage and sequestration by Canada's urban forests using high resolution earth observation data," *Urban Forestry & Urban Greening*, Vol. 13, no. 3, p. 484-494; Environment and Climate Change Canada, Pollutant Inventories and Reporting Division, Greenhouse Gas Section.

## The changing landscape of Canadian metropolitan areas

The amount and proportion of natural and semi-natural land cover differs for each CMA-E (Table A.1 and Chart 2.10).<sup>70</sup> CMA-Es with higher proportions of arable land, generally located in the Prairies and southern Ontario, had lower proportions of natural and semi-natural land, while the opposite pattern occurred in other areas.

In 2011, Greater Sudbury had the most natural and semi-natural land of all CMA-Es, covering 35,052 km<sup>2</sup> and accounting for 98% of its total area. Other CMA-Es with large natural areas included Halifax with 15,322 km<sup>2</sup> (95% of total area), Thunder Bay with 11,710 km<sup>2</sup> (96% of total area), Saguenay with 11,482 km<sup>2</sup> (93% of total area), Edmonton with 8,541 km<sup>2</sup> (43% of total area) and Winnipeg with 7,882 km<sup>2</sup> (41% of total area).

Natural and semi-natural land also made up a significant share of the total CMA-E land area in Kelowna (96%), Saint John (94%) and Moncton (93%). The CMA-E with the lowest proportion of natural area is Windsor, accounting for 13% of its land area, followed by London (19%) and Regina (23%).

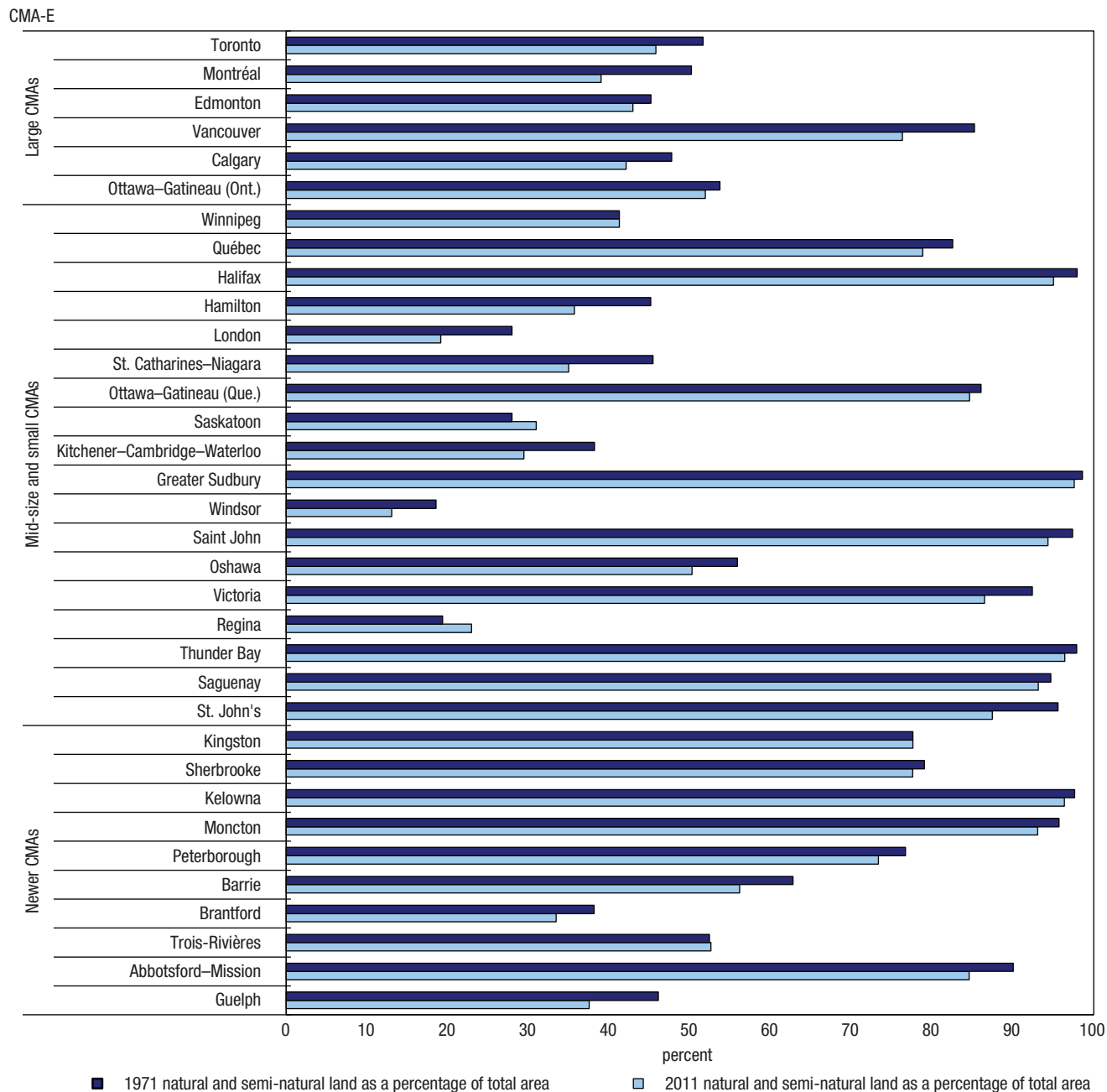
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<sup>70</sup> Natural and semi-natural land areas are not spatially mutually exclusive—they overlap where a SLC polygon crosses more than one CMA boundary, as is the case in Vancouver and Abbotsford–Mission or Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in [Section 3: Ecosystem accounts and statistics by census metropolitan area](#) for a visual representation of the CMA-E boundaries.



## The changing landscape of Canadian metropolitan areas

**Chart 2.10**  
**Natural and semi-natural land as a percentage of the census metropolitan area-ecosystem (CMA-E), 1971 and 2011**



**Notes:** Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as in the case of Vancouver and Abbotsford-Mission or Toronto and surrounding CMA-Es including Hamilton, Oshawa, Kitchener-Cambridge-Waterloo, Guelph, Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in Section 3: Census metropolitan area statistics for a visual representation of the CMA-E boundaries. CMA-Es are ordered here according to their respective CMA built-up area. CMA-Es were classified as large, mid-size or small based on the 2011 built-up area using geometric intervals. Newer CMA-Es—those not populated enough to qualify as CMA-Es in 1971—were then grouped separately.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)* [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCAN, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCAN, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

Most natural and semi-natural land in CMA-Es in 2011 was categorized as forest.<sup>71</sup> CMA-Es where forest accounted for the largest share of natural area include Victoria (94%), Ottawa–Gatineau (Que.) (85%), Québec (82%) and Vancouver (81%).

Overall, the largest decreases in natural and semi-natural land between 1971 and 2011 occurred in Montréal (-1,140 km<sup>2</sup>), Toronto (-748 km<sup>2</sup>), London (-737 km<sup>2</sup>), Calgary (-704 km<sup>2</sup>), Vancouver (-540 km<sup>2</sup>) and Halifax (-471 km<sup>2</sup>). Natural land increased in Regina (+566 km<sup>2</sup>), Saskatoon (+480 km<sup>2</sup>) and Trois-Rivières (+10 km<sup>2</sup>)—the result of a decrease in arable land.

CMA-Es with the largest increases in settled area on natural and semi-natural land include Montréal (+462 km<sup>2</sup>), Toronto (+448 km<sup>2</sup>), Halifax (+297 km<sup>2</sup>) and Vancouver (+296 km<sup>2</sup>) (Table A.2).<sup>72</sup> CMA-Es with the largest proportion of urban expansion occurring on natural and semi-natural land include Greater Sudbury (87%, +259 km<sup>2</sup>), Thunder Bay (87%, +130 km<sup>2</sup>), Halifax (86%, +297 km<sup>2</sup>) and St. John's (83%, +91 km<sup>2</sup>).

Most growth of settled area on natural or semi-natural land from 1971 to 2011 occurred on land that was, in 1971, categorized as forest or natural land for pasture, with other land accounting for a small share.

CMA-Es with a high proportion of settled area converted from forest include Halifax (95%), St. John's (92%), Saint John (86%) and Trois-Rivières (73%). CMA-Es with a high proportion of built-up area converted from natural land for pasture include Calgary (83%), Saskatoon (73%), Regina (67%), St. Catharines–Niagara (63%) and London (58%).

### Conclusion

The conversion of arable and natural land to built-up land covers due to urban expansion in the periphery of cities comes at the loss of ecological infrastructure. This natural capital provides vital ecosystem goods and services—for example, flood and groundwater protection, habitat provision, food production, green space and recreation—which may be difficult to quantify, but which exist nonetheless and provide important benefits.

This issue of *Human Activity and the Environment* summarizes the state of land cover and land use change in and around Canada's largest cities and includes CMA-specific profiles with tables, charts, maps and relevant links (Section 3) allowing researchers, land use planners, students and others to visualize the extent of urban expansion in Canada's largest metropolitan areas between 1971 and 2011.

71 Agriculture and Agri-Food Canada, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015).

72 Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using *AAFC Land Use, 1990*. Included the following CLI: LU classes: woodlands, rough grazing and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas. Natural and semi-natural land lost to roads is not included in this analysis.

### Section 3: Ecosystem accounts and statistics by census metropolitan area

This section presents tables, charts and maps on land cover and land use change and population and dwellings for each of Canada's 33 census metropolitan areas (CMAs) and census metropolitan area-ecosystems (CMA-Es). It also includes an ecosystem asset account table compatible with the United Nations' *System of Environmental-Economic Accounting (SEEA) Experimental Ecosystem Accounting* (see Textbox 3.1). Links are included to a wealth of other relevant Statistics Canada information that is available for CMAs. For information on the data sources, limitations and methods, see Appendix B.

Spatial data files (ArcGIS®, file extension: .shp) for each CMA can be downloaded from the [HTML version](#) of the publication.

#### Textbox 3.1 Ecosystem accounting and the ecosystem asset account

Ecosystem accounting is an emerging field within the discipline of environmental accounting. The concepts and methods of environmental accounting are described in the United Nations' *SEEA Central Framework*, which became an international statistical standard in 2012, after 20 years of development. The concepts and methods of ecosystem accounting, described in the United Nations' *SEEA Experimental Ecosystem Accounting*, are not as mature.

Some national statistical offices, Statistics Canada among them, are working to validate and further develop the concepts and methods described in *SEEA Experimental Ecosystem Accounting*. Initial results are presented in the ecosystem asset accounts presented below for each CMA.

The accounting processes developed to generate this land cover and land use change information represent the progress in ecosystem accounting at Statistics Canada (see Appendix B Data sources and methods for a summary description of the methodology). While these tables currently only include broad categories—built-up area, arable land, natural and semi-natural land—work is planned to generate time series on other land cover and land use categories, which will eventually form part of the table.

#### For more information see:

Statistics Canada, 2013, "Measuring ecosystem goods and services in Canada," *Human Activity and the Environment*, Catalogue no. 16-201-X.

Statistics Canada, 2014, "What is the value of an ecosystem? Teacher's Kit for *Human Activity and the Environment 2013: Measuring ecosystem goods and services in Canada*," *Human Activity and the Environment - Teacher's kit*, Catalogue no. 16-507-X.

Statistics Canada, 2014, "Agriculture in Canada," *Human Activity and the Environment*, Catalogue no. 16-201-X.

United Nations Statistics Division, European Commission, Food and Agriculture Organization of the United Nations, International Monetary Fund, Organisation for Economic Co-operation and Development and The World Bank, 2014, *System of Environmental-Economic Accounting 2012: Central Framework*, [http://unstats.un.org/unsd/envaccounting/seeaRev/SEEA\\_CF\\_Final\\_en.pdf](http://unstats.un.org/unsd/envaccounting/seeaRev/SEEA_CF_Final_en.pdf) (accessed July 28, 2015).

United Nations, European Commission, Food and Agricultural Organization of the United Nations, Organisation for Economic Co-operation and Development and World Bank, 2014, *System of Environmental-Economic Accounting 2012: Experimental Ecosystem Accounting*, [http://unstats.un.org/unsd/envaccounting/seeaRev/eea\\_final\\_en.pdf](http://unstats.un.org/unsd/envaccounting/seeaRev/eea_final_en.pdf) (accessed November 24, 2015).

### Abbotsford–Mission, British Columbia

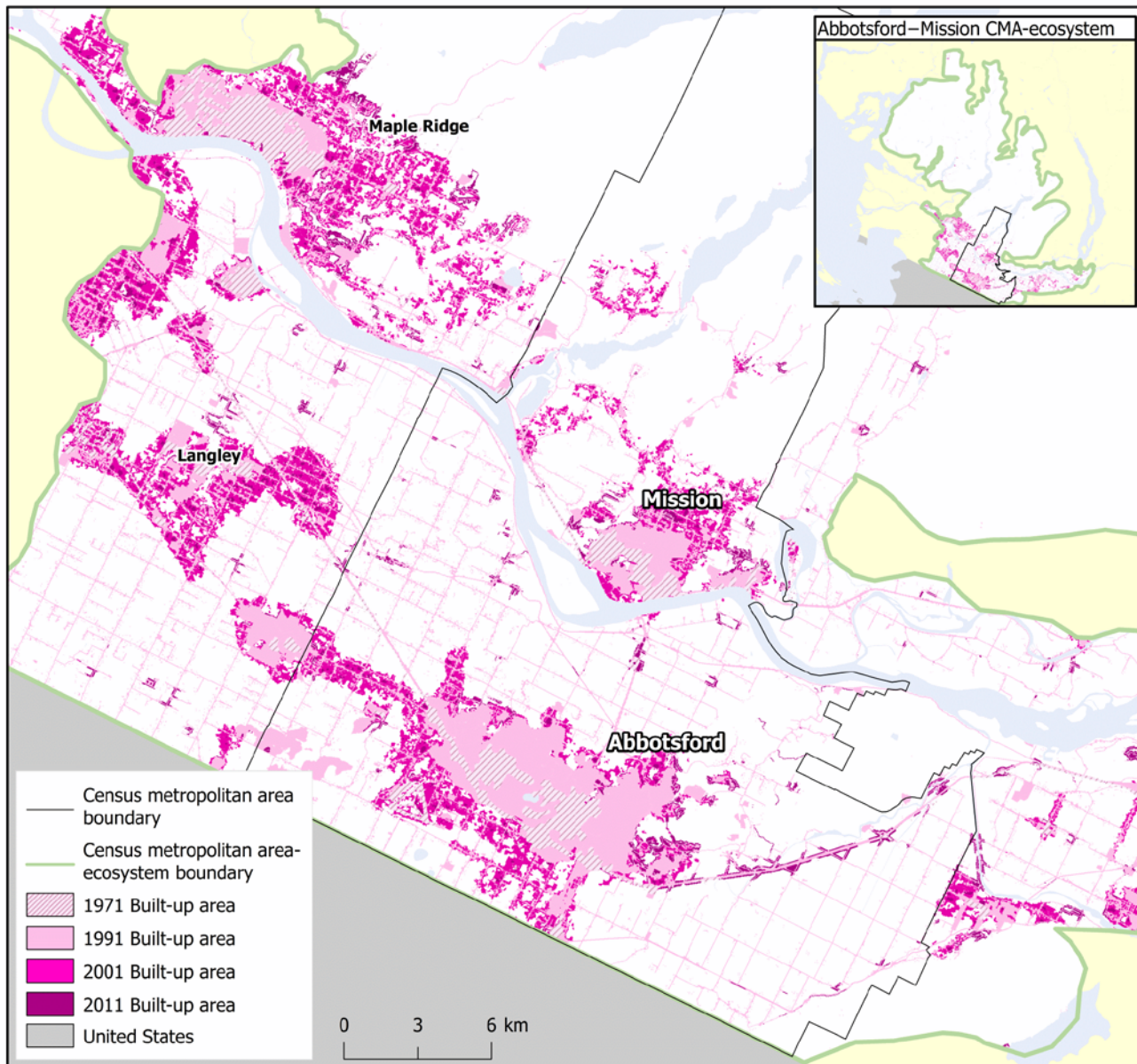
#### Highlights

- At the CMA level, built-up area increased from 18 km<sup>2</sup> in 1971 to 139 km<sup>2</sup> in 2011, an increase of 669%.
- At the CMA-E level, built-up area increased from 60 km<sup>2</sup> in 1971 to 382 km<sup>2</sup> in 2011, an increase of 537%.
- In 2011, the natural and semi-natural land class was divided into forest (81%), water (7%) and other (12%).
- From 1971 to 2011, 109 km<sup>2</sup> of arable land and 130 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 66.8% was forest, 29.5% was natural land for pasture and 3.7% was classed as other.
- Population in the CMA increased by 309% from 41,602 to 170,191 between 1971 and 2011.
- The number of dwellings in the CMA increased by 441% from 11,799 to 63,821 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.1

Built-up area, Abbotsford–Mission census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Note:** Canada Land Use Monitoring Program (CLUMP) data were not available for this CMA—the 1971 built-up area may be underestimated. Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

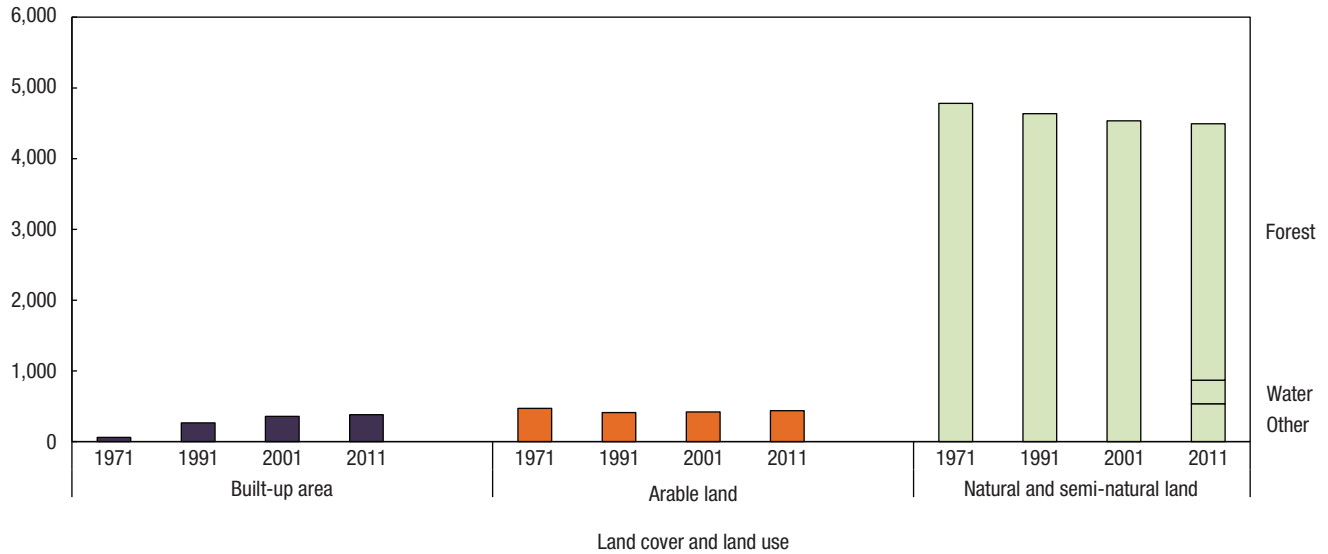
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): Land Use (1971)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.rncan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015); United States Census Bureau, 2014, *Digital cartographic file in shapefile format – States*, file: cb\_2014\_us\_state\_500k.zip, [http://www.census.gov/geo/maps-data/data/cbf/cbf\\_state.html](http://www.census.gov/geo/maps-data/data/cbf/cbf_state.html) (accessed October 29, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.1

### Land cover and land use, Abbotsford–Mission census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres



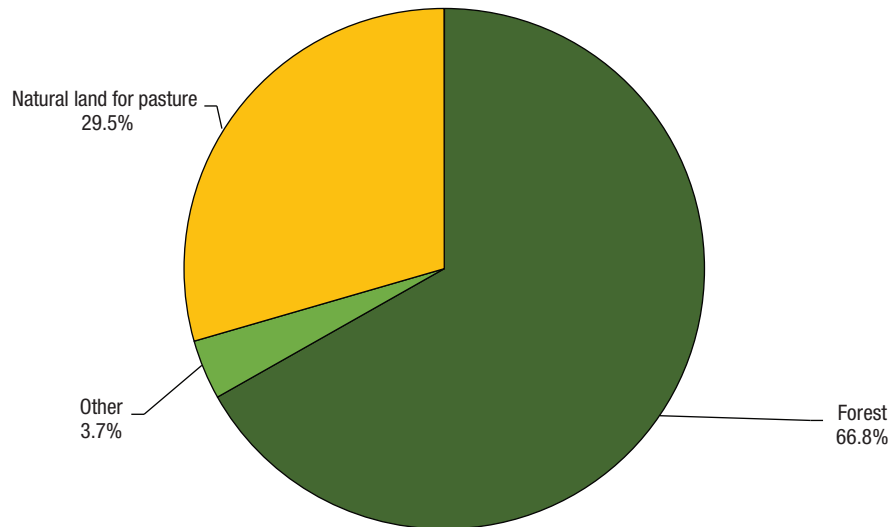
**Notes:** CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Vancouver and Abbotsford–Mission. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries. Built-up area for 1971 is based on *Canada Land Inventory: Land Use (CL: LU)*, with modeling of roads. *Canada Land Use Monitoring Program (CLUMP)* data exclude the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up areas may be underestimated for these CMAs. CL: LU built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CL: Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.2

Natural and semi-natural land lost to settled area, by selected land class, Abbotsford–Mission census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geotit/cli\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geotit/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geotit/clump/clump\\_1971/](ftp://ftp2.cits.rncan.gc.ca/pub/geotit/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.1**  
**Population and dwellings, total and settled area, Abbotsford–Mission census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2,3</sup>	
	Total area	Settled area <sup>4</sup>	Total area	Settled area <sup>4</sup>
	number			
<b>1971</b>				
Population	41,602	23,642	124,228	76,482
Dwellings	11,799	7,082	35,563	22,832
<b>1991</b>				
Population	113,562	112,708	280,133	270,222
Dwellings	38,410	38,153	96,169	92,936
<b>2001</b>				
Population	147,147	144,157	357,609	345,307
Dwellings	52,486	51,504	131,372	126,862
<b>2011</b>				
Population	170,191	166,285	417,561	407,341
Dwellings	63,821	62,422	161,672	157,780
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	309	603	236	433
Dwellings	441	781	355	591

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Vancouver and Abbotsford–Mission. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.

4. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population; Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCAN, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.2**  
**Land cover and land use, Abbotsford–Mission census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2,3</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	605	5,313	11
<b>1971</b>			
Total built-up <sup>4</sup>	18	60	30
Settled	11	37	31
Roads	7	23	29
Arable <sup>5</sup>	..	470	..
Natural and semi-natural <sup>6</sup>	..	4,783	..
<b>1991</b>			
Total built-up <sup>7</sup>	102	265	38
Settled	64	161	40
Roads	38	104	36
Arable <sup>5</sup>	..	412	..
Natural and semi-natural <sup>6</sup>	..	4,636	..
<b>2001</b>			
Total built-up <sup>7</sup>	131	357	37
Settled	93	253	37
Roads	38	104	36
Arable <sup>5</sup>	..	420	..
Natural and semi-natural <sup>6</sup>	..	4,536	..
<b>2011</b>			
Total built-up <sup>7</sup>	139	382	36
Settled	101	276	36
Roads	38	106	36
Arable <sup>5</sup>	..	438	..
Natural and semi-natural <sup>6</sup>	..	4,493	..
Forest	..	3,624	..
Water	..	333	..
Other	..	536	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>4,7</sup>	669	537	...
Arable <sup>5</sup>	...	-7	...
Natural and semi-natural <sup>6</sup>	...	-6	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.  
2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.  
3. CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Vancouver and Abbotsford–Mission. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.  
4. Built-up area for 1971 is based on *Canada Land Inventory: Land Use (CLI: LU)*, code B – Urban Built-up. *Canada Land Use Monitoring Program (CLUMP)* data exclude the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up areas may be underestimated for these CMAs. CLI: LU built-up areas that were not built-up in the AAFIC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.  
5. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.  
6. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.  
7. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).  
8. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.  
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCAN, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCAN, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.3**  
**Ecosystem asset account, Abbotsford–Mission census metropolitan area-ecosystem (CMA-E), 1971 to 2011**

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	37	23	470	4,783
Land lost to settled area	...	...	-109	-130
Balance of change <sup>4</sup>	240	82	77	-160
Closing stock 2011	276	106	438	4,493

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use* (CLI: LU). *Canada Land Use Monitoring Program* (CLUMP) data exclude the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up may be underestimated for these CMAs. CLI: LU built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads—primary, secondary and tertiary).

2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.

3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.

4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.

**Note:** CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Vancouver and Abbotsford–Mission. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

### Links to more information

Tables by metropolitan area, Abbotsford–Mission

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met101-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met101-eng.htm)

Abbotsford–Mission CMA, population change, 2006 to 2011, by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-932-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-932-013-01-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Abbotsford–Mission CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=932&Geo2=PR&Code2=59&Data=Count&SearchText=Abbotsford&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=932&Geo2=PR&Code2=59&Data=Count&SearchText=Abbotsford&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Abbotsford–Mission (CMA), National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=932&Data=Count&SearchText=Abbotsford&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=932&Data=Count&SearchText=Abbotsford&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

### Barrie, Ontario

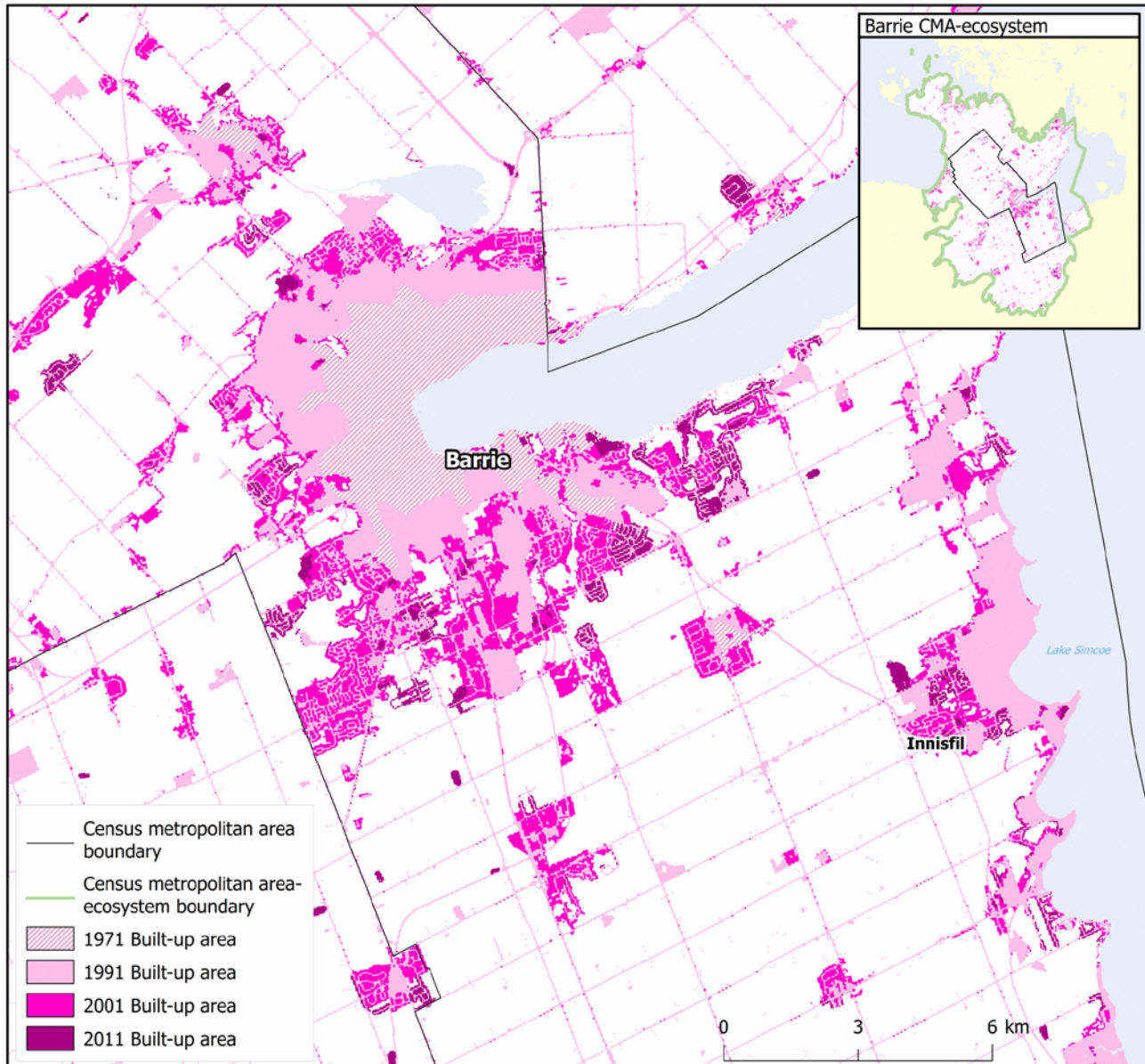
#### Highlights

- At the CMA level, built-up area increased from 24 km<sup>2</sup> in 1971 to 155 km<sup>2</sup> in 2011, an increase of 556%.
- At the CMA-E level, built-up area increased from 93 km<sup>2</sup> in 1971 to 487 km<sup>2</sup> in 2011, an increase of 422%.
- In 2011, the natural and semi-natural land class was divided into forest (41%), water (17%) and other (41%).
- From 1971 to 2011, 124 km<sup>2</sup> of arable land and 154 km<sup>2</sup> of natural and semi-natural were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 64.2% was forest, 15.0% was natural land for pasture and 20.8% was classed as other.
- Population in the CMA increased by 298% from 46,983 to 187,013 between 1971 and 2011.
- The number of dwellings in the CMA increased by 430% from 13,748 to 72,817 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.2

Built-up area, Barrie census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Notes:** Canada Land Use Monitoring Program (CLUMP) data were not available—the 1971 built-up area may be underestimated. Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

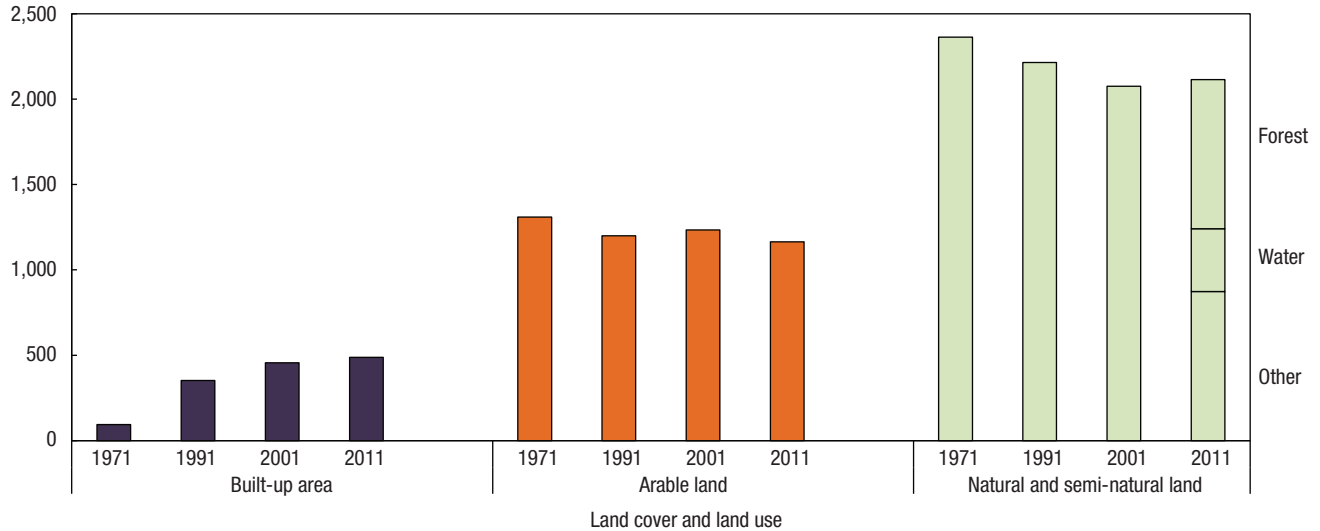
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCAN, Canada Centre for Mapping and Earth Observation 2014, *CanVec+*, <ftp://ftp2.cits.nrcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.3

### Land cover and land use, Barrie census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres



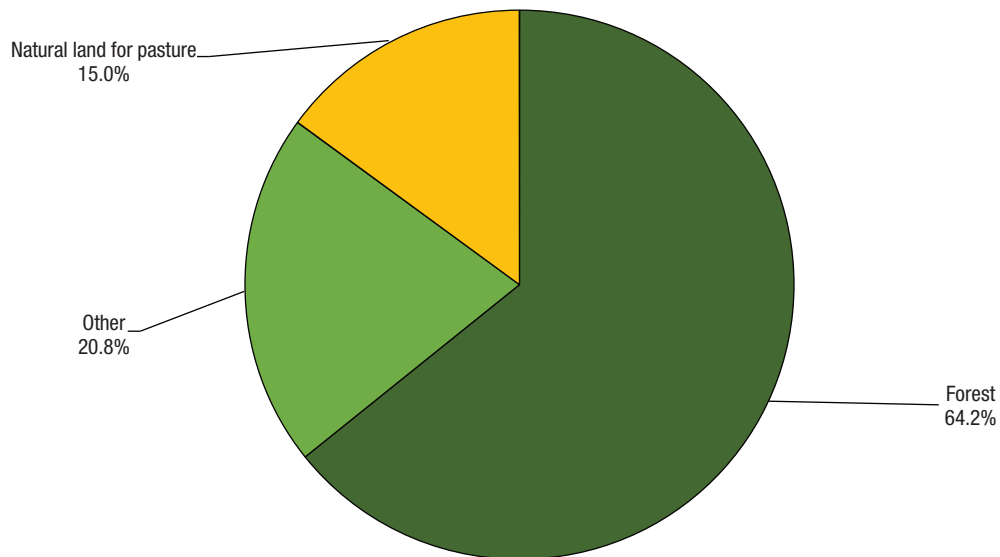
**Notes:** CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries. Built-up area for 1971 is based on *Canada Land Inventory: Land Use (CLI: LU)*, with modeling of roads. *Canada Land Use Monitoring Program (CLUMP)* data exclude the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up areas may be underestimated for these CMAs. CLI: LU built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geotit/cli\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geotit/cli_250k/landuse/) (accessed September 15, 2015); NRCAN, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geotit/clump/clump\\_1971/](ftp://ftp2.cits.rncan.gc.ca/pub/geotit/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCAN, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.rncan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.4

Natural and semi-natural land lost to settled area, by selected land class, Barrie census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using *AAFC's Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada, Canada Centre for Remote Sensing, 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geotit/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geotit/cli_250k/landuse/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.4**  
**Population and dwellings, total and settled area, Barrie census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2,3</sup>	
	Total area	Settled area <sup>4</sup>	Total area	Settled area <sup>4</sup>
	number			
<b>1971</b>				
Population	46,983	32,008	154,937	102,588
Dwellings	13,748	9,616	43,852	29,986
<b>1991</b>				
Population	97,397	96,163	260,449	250,609
Dwellings	34,563	34,187	91,610	88,307
<b>2001</b>				
Population	148,480	140,373	344,733	311,011
Dwellings	56,390	52,702	141,136	126,487
<b>2011</b>				
Population	187,013	179,854	413,061	381,276
Dwellings	72,817	70,183	175,245	162,442
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	298	462	167	272
Dwellings	430	630	300	442

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.

4. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population and Natural Resources Canada, Canada Centre for Remote Sensing, 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.5**  
**Land cover and land use, Barrie census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2,3</sup>	CMA as a proportion of CMA-ecosystem
		square kilometres	percent
<b>Total land area</b>	898	3,766	24
<b>1971</b>			
Total built-up <sup>4</sup>	24	93	25
Settled	14	54	26
Roads	10	40	24
Arable <sup>5</sup>	..	1,310	..
Natural and semi-natural <sup>6</sup>	..	2,363	..
<b>1991</b>			
Total built-up <sup>7</sup>	109	352	31
Settled	65	203	32
Roads	44	149	30
Arable <sup>5</sup>	..	1,199	..
Natural and semi-natural <sup>6</sup>	..	2,215	..
<b>2001</b>			
Total built-up <sup>7</sup>	146	456	32
Settled	101	305	33
Roads	45	151	30
Arable <sup>5</sup>	..	1,234	..
Natural and semi-natural <sup>6</sup>	..	2,076	..
<b>2011</b>			
Total built-up <sup>7</sup>	155	487	32
Settled	109	331	33
Roads	46	156	30
Arable <sup>5</sup>	..	1,165	..
Natural and semi-natural <sup>8</sup>	..	2,114	..
Forest	..	873	..
Water	..	368	..
Other	..	873	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>4,7</sup>	556	422	...
Arable <sup>5</sup>	...	-11	...
Natural and semi-natural <sup>6</sup>	...	-11	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.
  2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.
  3. CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.
  4. Built-up area for 1971 is based on *Canada Land Inventory: Land Use* (CLI: LU), code B – Urban Built-up. *Canada Land Use Monitoring Program* (CLUMP) data exclude the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up areas may be underestimated for these CMAs. CLI: LU built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.
  5. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.
  6. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.
  7. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).
  8. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.
- Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing, 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCAN, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.6**  
**Ecosystem asset account, Barrie census metropolitan area-ecosystem (CMA-E), 1971 to 2011**

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	54	40	1,310	2,363
Land lost to settled area	...	...	-124	-154
Balance of change <sup>4</sup>	278	116	-21	-95
Closing stock 2011	331	156	1,165	2,114

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use* (CLI: LU). *Canada Land Use Monitoring Program* (CLUMP) data exclude the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up may be underestimated for these CMAs. CLI: LU built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads—primary, secondary and tertiary).

2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.

3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.

4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.

**Note:** CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing, 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.rncan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

### Links to more information

Tables by metropolitan area, Barrie

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met102-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met102-eng.htm)

Barrie CMA, population change, 2006 to 2011, by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-568-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-568-013-01-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Barrie CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=568&Geo2=PR&Code2=35&Data=Count&SearchText=barrie&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=568&Geo2=PR&Code2=35&Data=Count&SearchText=barrie&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Barrie CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=568&Data=Count&SearchText=barrie&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=568&Data=Count&SearchText=barrie&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

### Brantford, Ontario

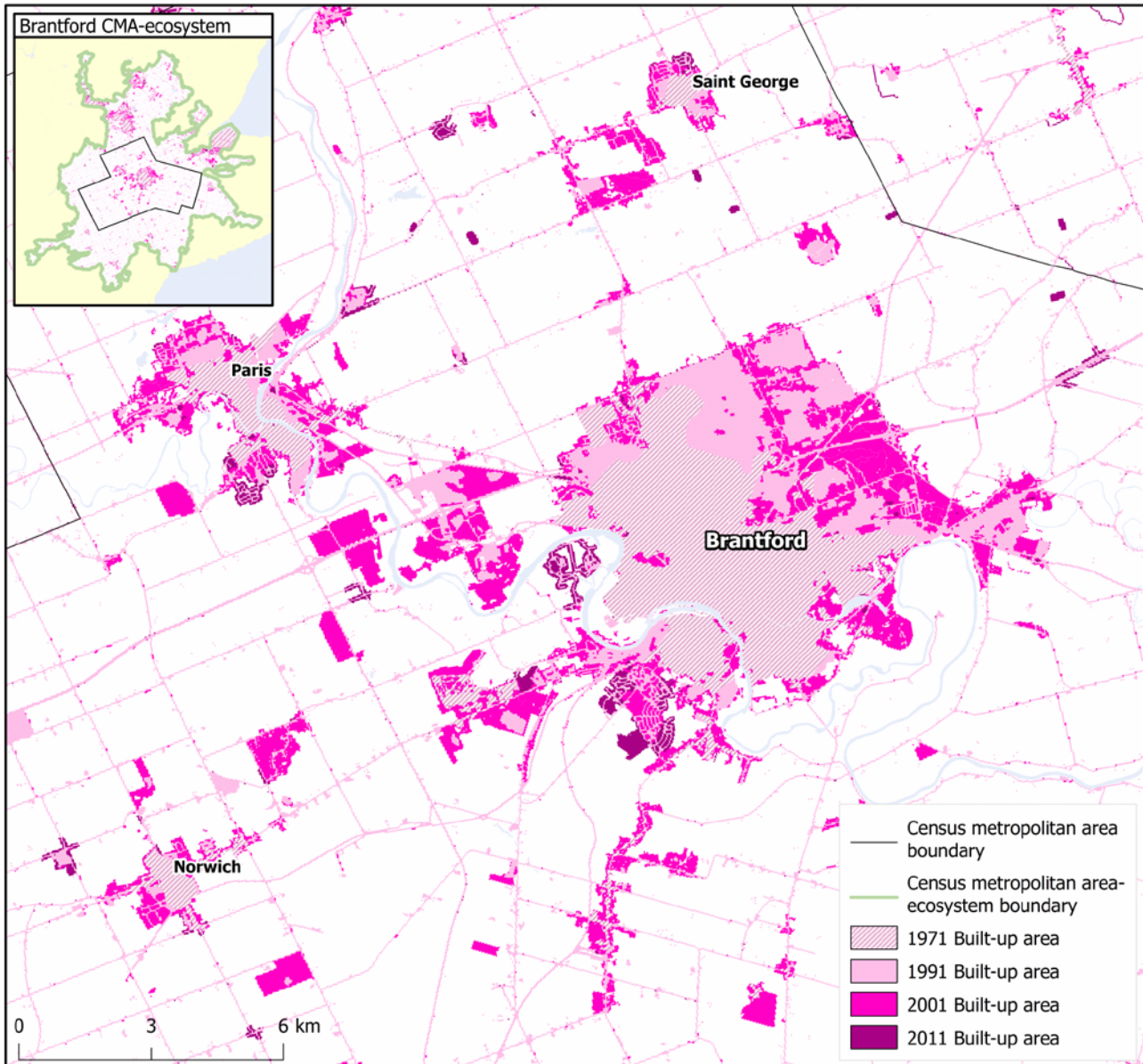
#### Highlights

- At the CMA level, built-up area increased from 44 km<sup>2</sup> in 1971 to 155 km<sup>2</sup> in 2011, an increase of 250%.
- At the CMA-E level, built-up area increased from 233 km<sup>2</sup> in 1971 to 661 km<sup>2</sup> in 2011, an increase of 183%.
- In 2011, the natural and semi-natural land class was divided into forest (56%), water (5%) and other (39%).
- From 1971 to 2011, 216 km<sup>2</sup> of arable land and 96 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 37.9% was forest, 52.5% was natural land for pasture, and 9.6% was classed as other.
- Population in the CMA increased by 40% from 96,534 to 135,501 between 1971 and 2011.
- The number of dwellings in the CMA increased by 96% from 28,181 to 55,115 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.3

Built-up area, Brantford census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Notes:** Canada Land Use Monitoring Program (CLUMP) data were not available for this CMA—the 1971 built-up area may be underestimated. Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

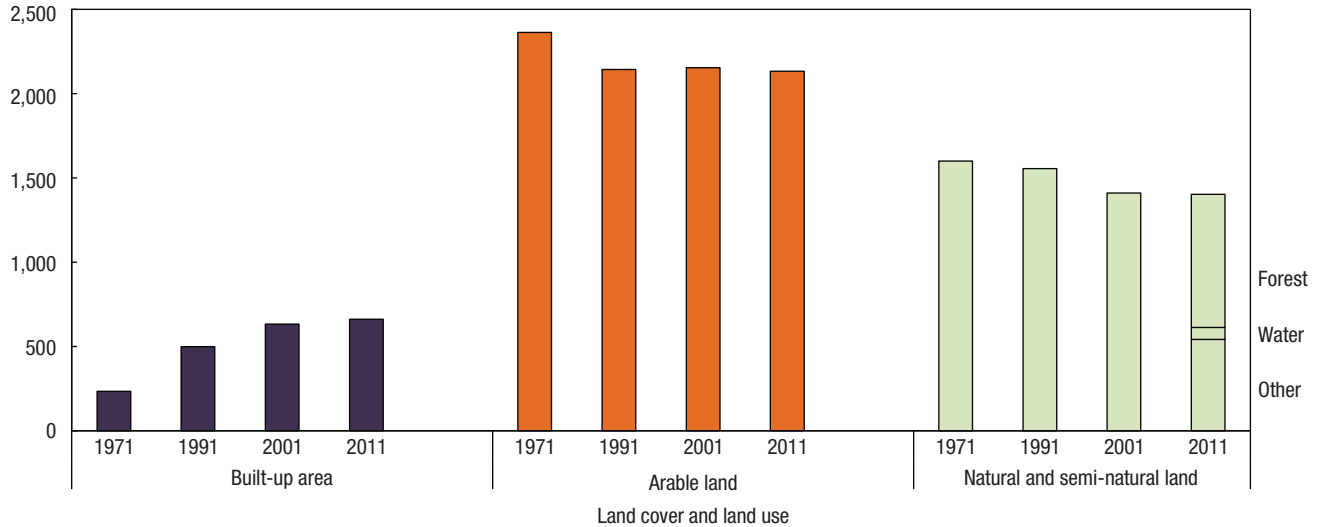
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.nrcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.5

### Land cover and land use, Brantford census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres



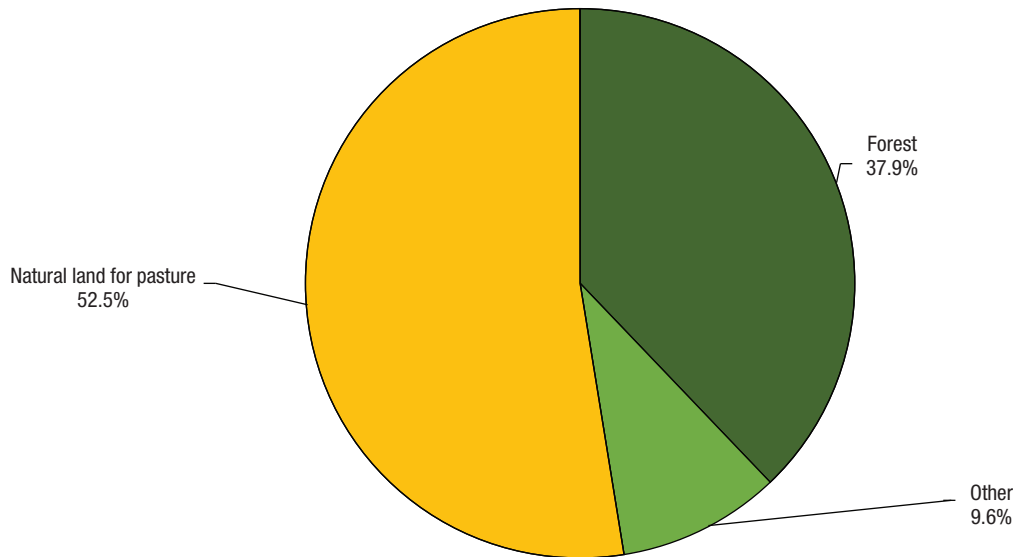
**Notes:** CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries. Built-up area for 1971 is based on *Canada Land Inventory: Land Use (CLI: LU)*, with modeling of roads. *Canada Land Use Monitoring Program (CLUMP)* data exclude the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up areas may be underestimated for these CMAs. CLI: LU built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geotit/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geotit/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geotit/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geotit/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.6

Natural and semi-natural land lost to settled area, by selected land class, Brantford census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.7**

**Population and dwellings, total and settled area, Brantford census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2,3</sup>	
	Total area	Settled area <sup>4</sup>	Total area	Settled area <sup>4</sup>
	number			
<b>1971</b>				
Population	96,534	77,205	589,200	518,481
Dwellings	28,181	23,248	173,647	155,188
<b>1991</b>				
Population	110,380	109,293	642,636	634,063
Dwellings	39,965	39,588	238,588	235,759
<b>2001</b>				
Population	118,086	112,322	709,215	677,896
Dwellings	46,208	44,217	280,292	269,553
<b>2011</b>				
Population	135,501	124,364	778,104	737,629
Dwellings	55,115	51,023	321,212	306,685
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	40	61	32	42
Dwellings	96	119	85	98

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.

4. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population; Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geotti/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geotti/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geotti/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geotti/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.8**  
**Land cover and land use, Brantford census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2,3</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	1,073	4,196	26
<b>1971</b>			
Total built-up <sup>4</sup>	44	233	19
Settled	24	137	18
Roads	20	96	21
Arable <sup>5</sup>	..	2,363	..
Natural and semi-natural <sup>6</sup>	..	1,600	..
<b>1991</b>			
Total built-up <sup>7</sup>	110	498	22
Settled	60	294	21
Roads	49	204	24
Arable <sup>5</sup>	..	2,143	..
Natural and semi-natural <sup>6</sup>	..	1,555	..
<b>2001</b>			
Total built-up <sup>7</sup>	150	632	24
Settled	100	426	23
Roads	50	206	24
Arable <sup>5</sup>	..	2,153	..
Natural and semi-natural <sup>6</sup>	..	1,410	..
<b>2011</b>			
Total built-up <sup>7</sup>	155	661	23
Settled	105	450	23
Roads	50	211	24
Arable <sup>5</sup>	..	2,133	..
Natural and semi-natural <sup>8</sup>	..	1,402	..
Forest	..	789	..
Water	..	71	..
Other	..	542	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>4,7</sup>	250	183	...
Arable <sup>5</sup>	...	-10	...
Natural and semi-natural <sup>6</sup>	...	-12	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.
  2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.
  3. CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.
  4. Built-up area for 1971 is based on *Canada Land Inventory: Land Use (CLI: LU)*, code B – Urban Built-up. *Canada Land Use Monitoring Program (CLUMP)* data exclude the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up areas may be underestimated for these CMAs. CLI: LU built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.
  5. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.
  6. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.
  7. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).
  8. For 2011, forest and water are broken out separately based on data from AAFC *Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.
- Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCAN, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCAN, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.9**  
**Ecosystem asset account, Brantford census metropolitan area-ecosystem (CMA-E), 1971 to 2011**

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	137	96	2,363	1,600
Land lost to settled area	...	...	-216	-96
Balance of change <sup>4</sup>	312	115	-14	-102
Closing stock 2011	450	211	2,133	1,402

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use* (CLI: LU). *Canada Land Use Monitoring Program* (CLUMP) data exclude the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up may be underestimated for these CMAs. CLI: LU built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads—primary, secondary and tertiary).

2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.

3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.

4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.

**Note:** CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

### Links to more information

Tables by metropolitan area, Brantford

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met103-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met103-eng.htm)

Brantford CMA, population change, 2006 to 2011, by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-543-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-543-013-01-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Brantford CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=543&Geo2=PR&Code2=35&Data=Count&SearchText=brantford&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=543&Geo2=PR&Code2=35&Data=Count&SearchText=brantford&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Brantford CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=543&Data=Count&SearchText=brantford&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=543&Data=Count&SearchText=brantford&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1)

### Calgary, Alberta

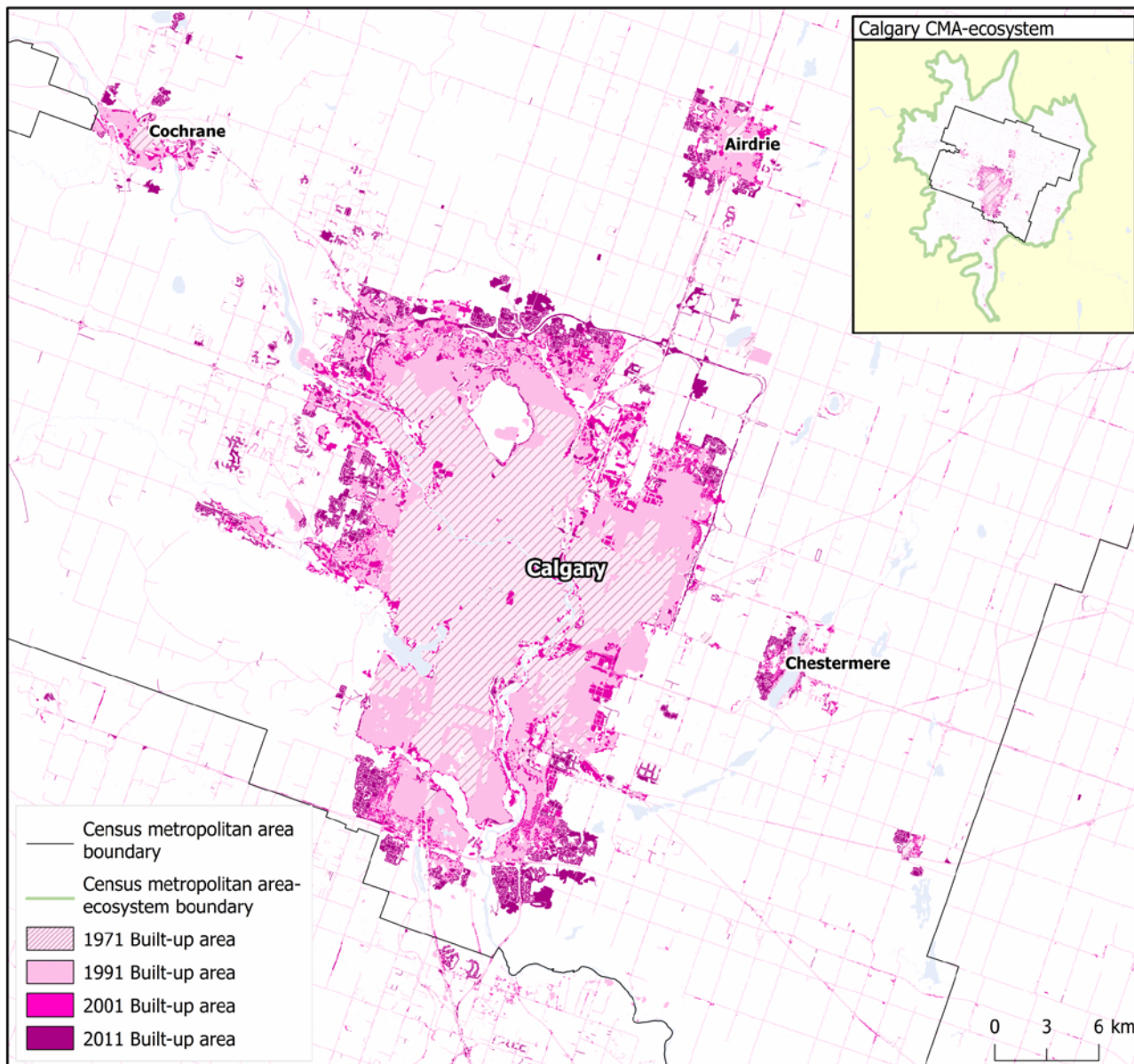
#### Highlights

- At the CMA level, built-up area increased from 273 km<sup>2</sup> in 1971 to 700 km<sup>2</sup> in 2011, an increase of 156%.
- At the CMA-E level, built-up area increased from 332 km<sup>2</sup> in 1971 to 951 km<sup>2</sup> in 2011, an increase of 186%.
- In 2011, the natural and semi-natural land class was divided into forest (38%), water (5%) and other (56%).
- From 1971 to 2011, 214 km<sup>2</sup> of arable land and 154 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 12.6% was forest, 82.8% was natural land for pasture and 4.6% was classed as other.
- Population in the CMA increased by 190% from 418,510 to 1,214,839 between 1971 and 2011.
- The number of dwellings in the CMA increased by 291% from 125,071 to 488,451 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.4

Built-up area, Calgary census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Note:** Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

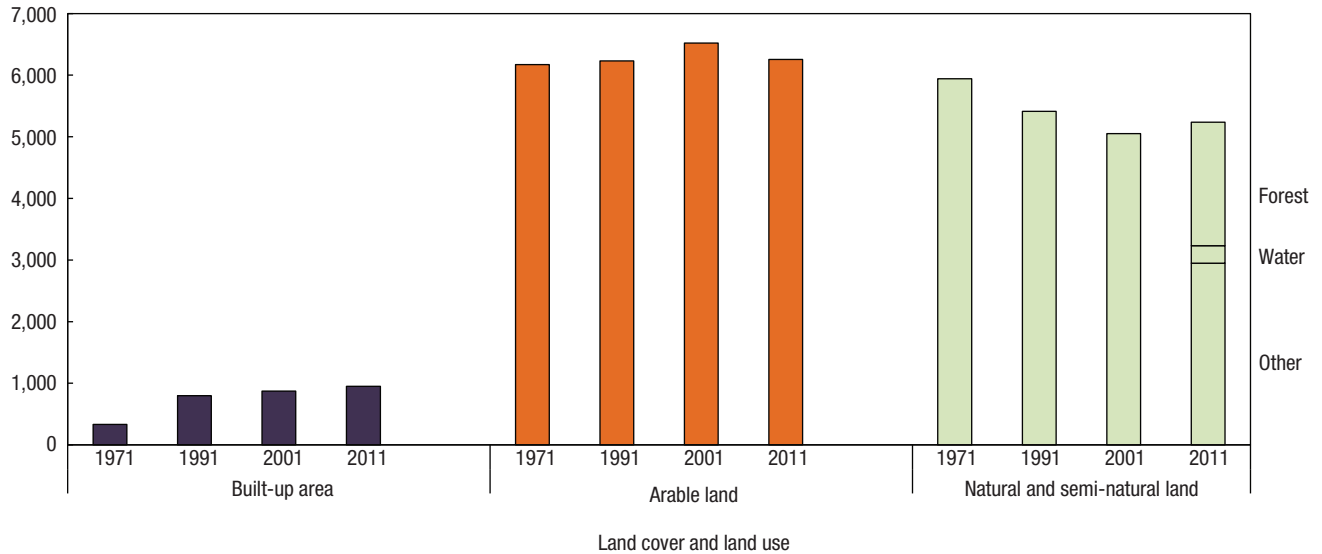
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.nrcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.7

### Land cover and land use, Calgary census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres



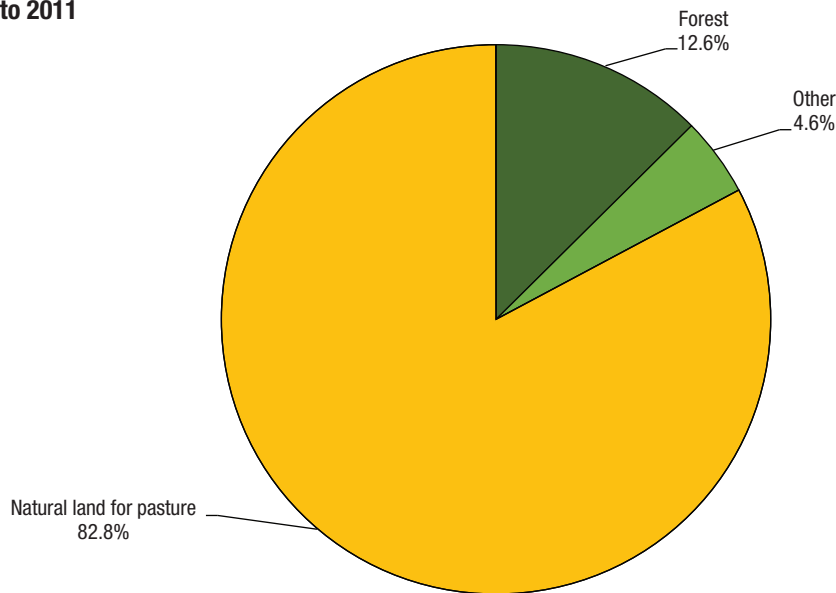
**Notes:** Built-up area for 1971 is based on *Canada Land Inventory: Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), with modeling of roads. CLI: LU and CLUMP built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.8

Natural and semi-natural land lost to settled area, by selected land class, Calgary census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geotit/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geotit/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geotit/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geotit/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.10**

**Population and dwellings, total and settled area, Calgary census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2</sup>	
	Total area	Settled area <sup>3</sup>	Total area	Settled area <sup>3</sup>
	number			
<b>1971</b>				
Population	418,510	407,409	439,891	415,649
Dwellings	125,071	122,250	131,290	124,949
<b>1991</b>				
Population	754,543	752,919	797,148	794,301
Dwellings	276,153	275,641	290,275	289,352
<b>2001</b>				
Population	951,560	937,773	1,013,182	985,165
Dwellings	368,593	363,793	391,432	381,455
<b>2011</b>				
Population	1,214,839	1,202,912	1,305,343	1,275,860
Dwellings	488,451	484,133	523,751	512,800
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	190	195	197	207
Dwellings	291	296	299	310

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population; Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.11**  
**Land cover and land use, Calgary census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	5,108	12,444	41
<b>1971</b>			
Total built-up <sup>3</sup>	273	332	82
Settled	158	162	97
Roads	116	170	68
Arable <sup>4</sup>	..	6,172	..
Natural and semi-natural <sup>5</sup>	..	5,940	..
<b>1991</b>			
Total built-up <sup>6</sup>	571	797	72
Settled	330	390	85
Roads	242	407	59
Arable <sup>4</sup>	..	6,233	..
Natural and semi-natural <sup>5</sup>	..	5,414	..
<b>2001</b>			
Total built-up <sup>6</sup>	634	872	73
Settled	392	464	84
Roads	242	408	59
Arable <sup>4</sup>	..	6,520	..
Natural and semi-natural <sup>5</sup>	..	5,053	..
<b>2011</b>			
Total built-up <sup>6</sup>	700	951	74
Settled	448	531	84
Roads	252	420	60
Arable <sup>4</sup>	..	6,257	..
Natural and semi-natural <sup>7</sup>	..	5,237	..
Forest	..	2,004	..
Water	..	284	..
Other	..	2,949	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>3,6</sup>	156	186	...
Arable <sup>4</sup>	...	1	...
Natural and semi-natural <sup>5</sup>	...	-12	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. Built-up area for 1971 is based on Canada Land Inventory Land Use (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), code B – Urban Built-up. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

4. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

5. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

6. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

7. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.12**

**Ecosystem asset account, Calgary census metropolitan area-ecosystem (CMA-E), 1971 to 2011**

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	162	170	6,172	5,940
Land lost to settled area	...	...	-214	-154
Balance of change <sup>4</sup>	368	250	299	-550
Closing stock 2011	531	420	6,257	5,237

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP). CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).
  2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.
  3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.
  4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.
- Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

### Links to more information

Tables by metropolitan area, Calgary

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met104-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met104-eng.htm)

Calgary CMA, percentage of private dwellings owned by a member of the household, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-825-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-825-013-01-00-eng.pdf)

Calgary CMA, percentage of owner households spending 30% or more in shelter costs, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-825-013-02-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-825-013-02-00-eng.pdf)

Calgary CMA, percentage of renter households spending 30% or more in shelter costs, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-825-013-03-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-825-013-03-00-eng.pdf)

Calgary CMA average value of owned private dwellings, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-825-013-04-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-825-013-04-00-eng.pdf)

Calgary CMA, population change, 2006 to 2011, by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-825-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-825-013-01-00-eng.pdf)

Calgary CMA, percentage of the employed labour force using a car, truck or van to get to work in 2011, by 2011 census tract

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99012-005-825-013-07-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99012-005-825-013-07-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Calgary CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=825&Geo2=PR&Code2=48&Data=Count&SearchText=calgary&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=825&Geo2=PR&Code2=48&Data=Count&SearchText=calgary&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Calgary CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=825&Data=Count&SearchText=calgary&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=825&Data=Count&SearchText=calgary&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1)

### Edmonton, Alberta

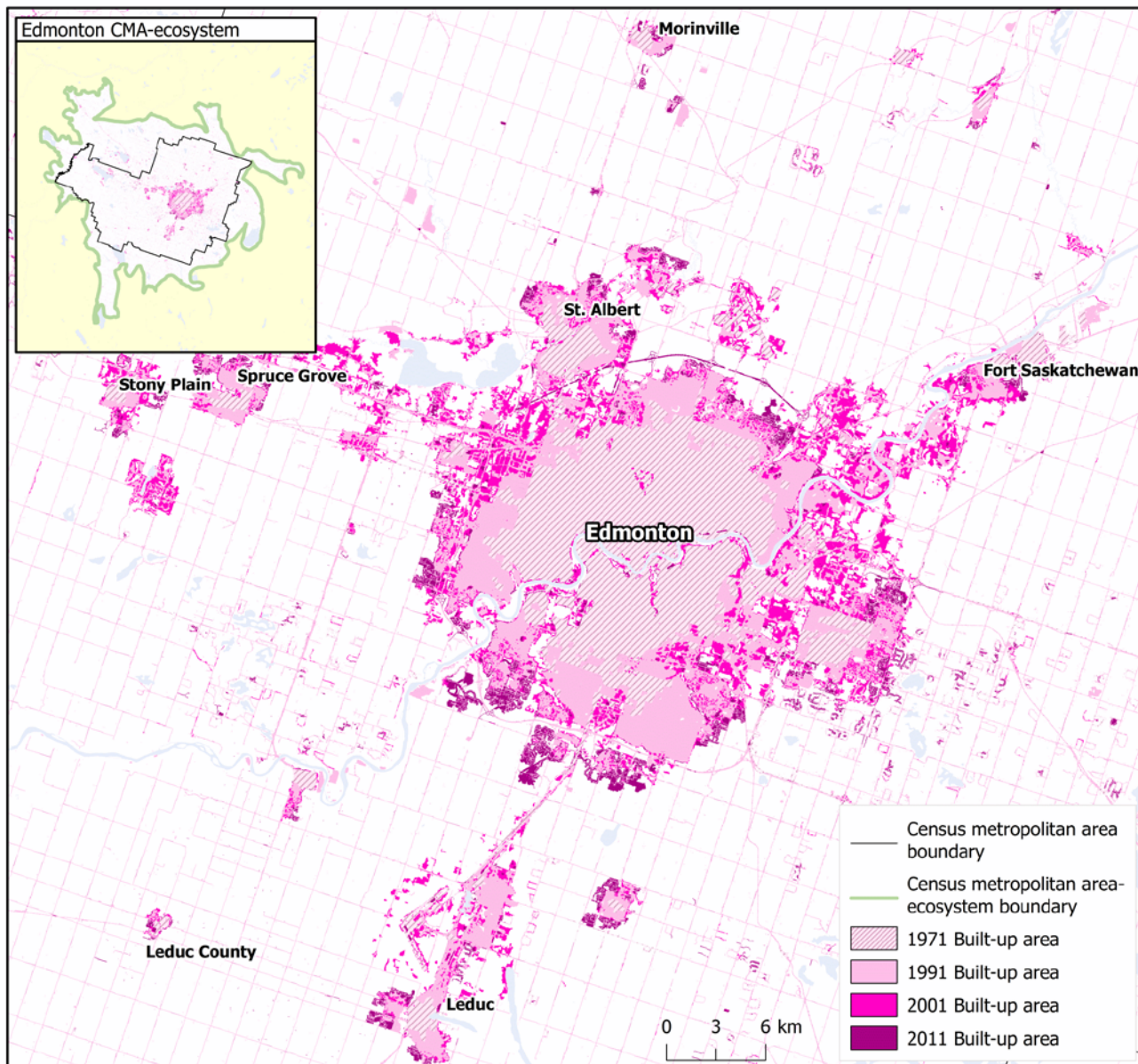
#### Highlights

- At the CMA level, built-up area increased from 342 km<sup>2</sup> in 1971 to 1,094 km<sup>2</sup> in 2011, an increase of 220%.
- At the CMA-E level, built-up area increased from 414 km<sup>2</sup> in 1971 to 1,422 km<sup>2</sup> in 2011, an increase of 243%.
- In 2011, the natural and semi-natural land class was divided into forest (39%), water (14%) and other (48%).
- From 1971 to 2011, 402 km<sup>2</sup> of arable land and 169 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 39.3% was forest, 47.5% was natural land for pasture and 13.2% was classed as other.
- Population in the CMA increased by 118% from 530,888 to 1,159,869 between 1971 and 2011.
- The number of dwellings in the CMA increased by 212% from 154,343 to 482,249 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.5

Built-up area, Edmonton census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Note:** Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

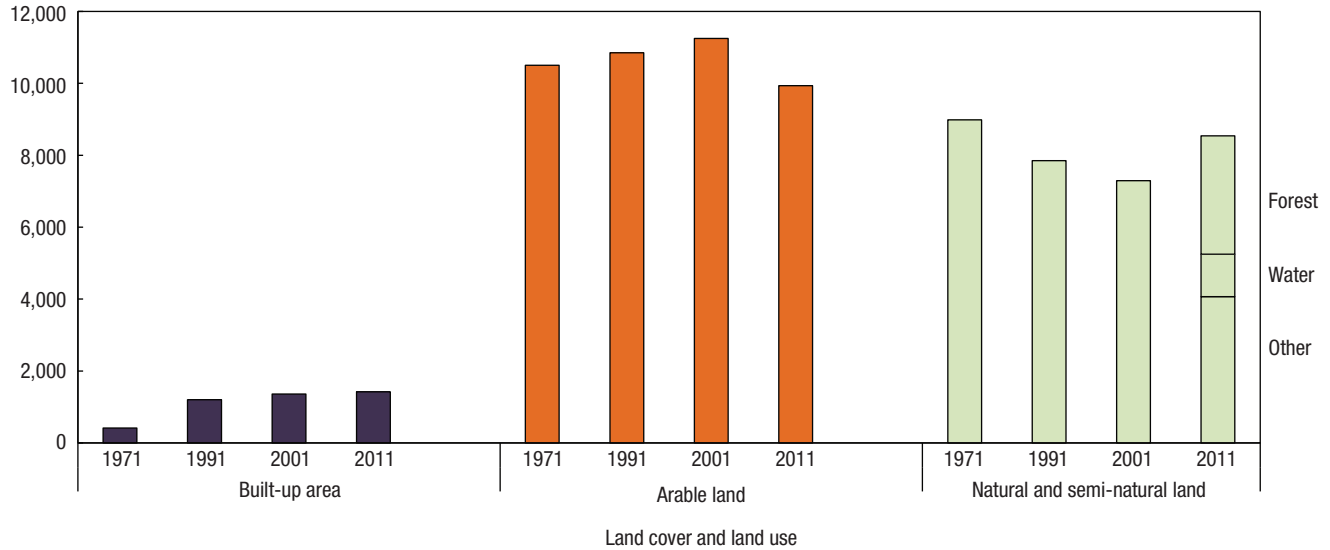
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.nrcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.9

### Land cover and land use, Edmonton census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

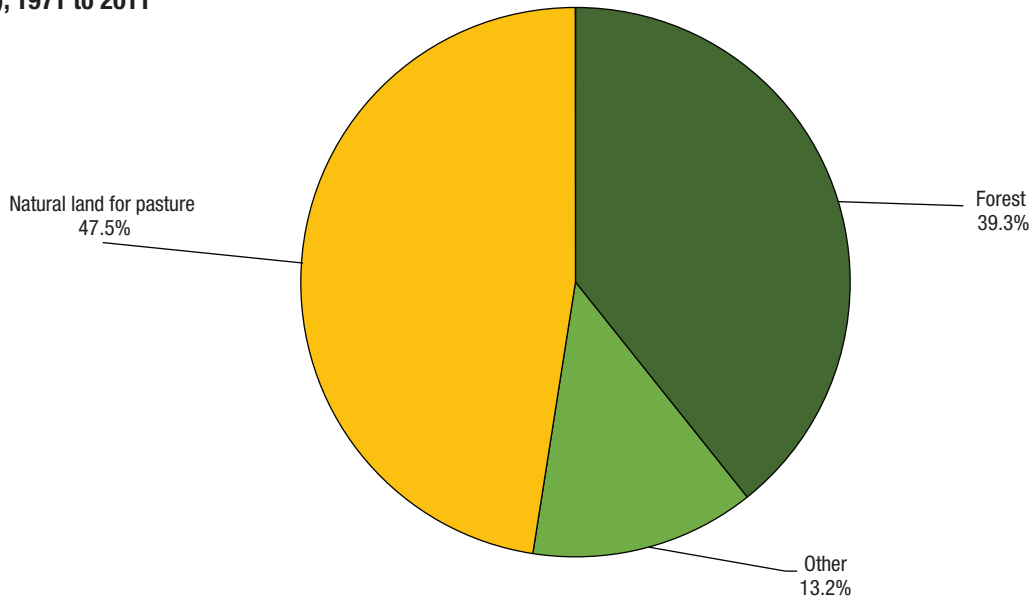
square kilometres



**Notes:** Built-up area for 1971 is based on *Canada Land Inventory: Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), with modeling of roads. CLI: LU and CLUMP built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

**Chart 3.10**  
**Natural and semi-natural land lost to settled area, by selected land class, Edmonton census metropolitan area-ecosystem (CMA-E), 1971 to 2011**



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.13**

**Population and dwellings, total and settled area, Edmonton census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2</sup>	
	Total area	Settled area <sup>3</sup>	Total area	Settled area <sup>3</sup>
	number			
<b>1971</b>				
Population	530,888	496,313	556,734	501,037
Dwellings	154,343	145,504	161,464	146,980
<b>1991</b>				
Population	841,132	834,384	878,922	868,747
Dwellings	306,572	304,400	319,570	316,269
<b>2001</b>				
Population	937,845	902,136	979,242	923,063
Dwellings	371,908	359,045	391,804	370,593
<b>2011</b>				
Population	1,159,869	1,126,596	1,205,484	1,151,795
Dwellings	482,249	469,294	504,340	482,858
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	118	127	117	130
Dwellings	212	223	212	229

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population; Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.14**

**Land cover and land use, Edmonton census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	9,427	19,900	47
<b>1971</b>			
Total built-up <sup>3</sup>	342	414	83
Settled	185	189	98
Roads	157	225	70
Arable <sup>4</sup>	..	10,501	..
Natural and semi-natural <sup>5</sup>	..	8,984	..
<b>1991</b>			
Total built-up <sup>6</sup>	891	1,199	74
Settled	482	547	88
Roads	409	652	63
Arable <sup>4</sup>	..	10,852	..
Natural and semi-natural <sup>5</sup>	..	7,848	..
<b>2001</b>			
Total built-up <sup>6</sup>	1,037	1,357	76
Settled	627	704	89
Roads	411	654	63
Arable <sup>4</sup>	..	11,248	..
Natural and semi-natural <sup>5</sup>	..	7,295	..
<b>2011</b>			
Total built-up <sup>6</sup>	1,094	1,422	77
Settled	677	760	89
Roads	417	662	63
Arable <sup>4</sup>	..	9,937	..
Natural and semi-natural <sup>7</sup>	..	8,541	..
Forest	..	3,290	..
Water	..	1,185	..
Other	..	4,066	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>3,6</sup>	220	243	...
Arable <sup>4</sup>	...	-5	...
Natural and semi-natural <sup>5</sup>	...	-5	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. Built-up area for 1971 is based on Canada Land Inventory Land Use (CLI: LU) and Canada Land Use Monitoring Program (CLUMP), code B – Urban Built-up. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC Land Use, 1990 dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

4. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

5. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

6. Built-up area estimates for 1991, 2001 and 2011 are based on Land Use, 1990, 2000 and 2010, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

7. For 2011, forest and water are broken out separately based on data from AAFC Crop Inventory, 2011 and CanVec+ respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, Canada Land Inventory: CLI Land Use (circa 1966), [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCAN, CCRS, 1999, Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971), [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, Land Use 1990, 2000 and 2010, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, Census of Agriculture, Census Geographic Component Base 2011 and 2001 and Census of Agriculture, Regular Base 1991 and 1971; AAFC, 2013, AAFC Crop Inventory, 2011, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCAN, Canada Centre for Mapping and Earth Observation, 2014, CanVec+, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

Table 3.15

### Ecosystem asset account, Edmonton census metropolitan area-ecosystem (CMA-E), 1971 to 2011

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	189	225	10,501	8,984
Land lost to settled area	...	...	-402	-169
Balance of change <sup>4</sup>	571	437	-162	-275
Closing stock 2011	760	662	9,937	8,541

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP). CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.

3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.

4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

### Links to more information

Tables by metropolitan area, Edmonton

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met105-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met105-eng.htm)

Edmonton CMA, percentage of private dwellings owned by a member of the household, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-835-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-835-013-01-00-eng.pdf)

Edmonton CMA, percentage of owner households spending 30% or more in shelter costs, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-835-013-02-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-835-013-02-00-eng.pdf)

Edmonton CMA, percentage of renter households spending 30% or more in shelter costs, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-835-013-03-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-835-013-03-00-eng.pdf)

Edmonton CMA average value of owned private dwellings, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-835-013-04-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-835-013-04-00-eng.pdf)

Edmonton CMA, population change, 2006 to 2011, by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-835-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-835-013-01-00-eng.pdf)

Edmonton CMA, percentage of the employed labour force using a car, truck or van to get to work in 2011, by 2011 census tract

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99012-005-835-013-07-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99012-005-835-013-07-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Edmonton CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=835&Geo2=PR&Code2=48&Data=Count&SearchText=edmonton&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=835&Geo2=PR&Code2=48&Data=Count&SearchText=edmonton&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Edmonton CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=835&Data=Count&SearchText=edmonton&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=835&Data=Count&SearchText=edmonton&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1)

### Greater Sudbury, Ontario

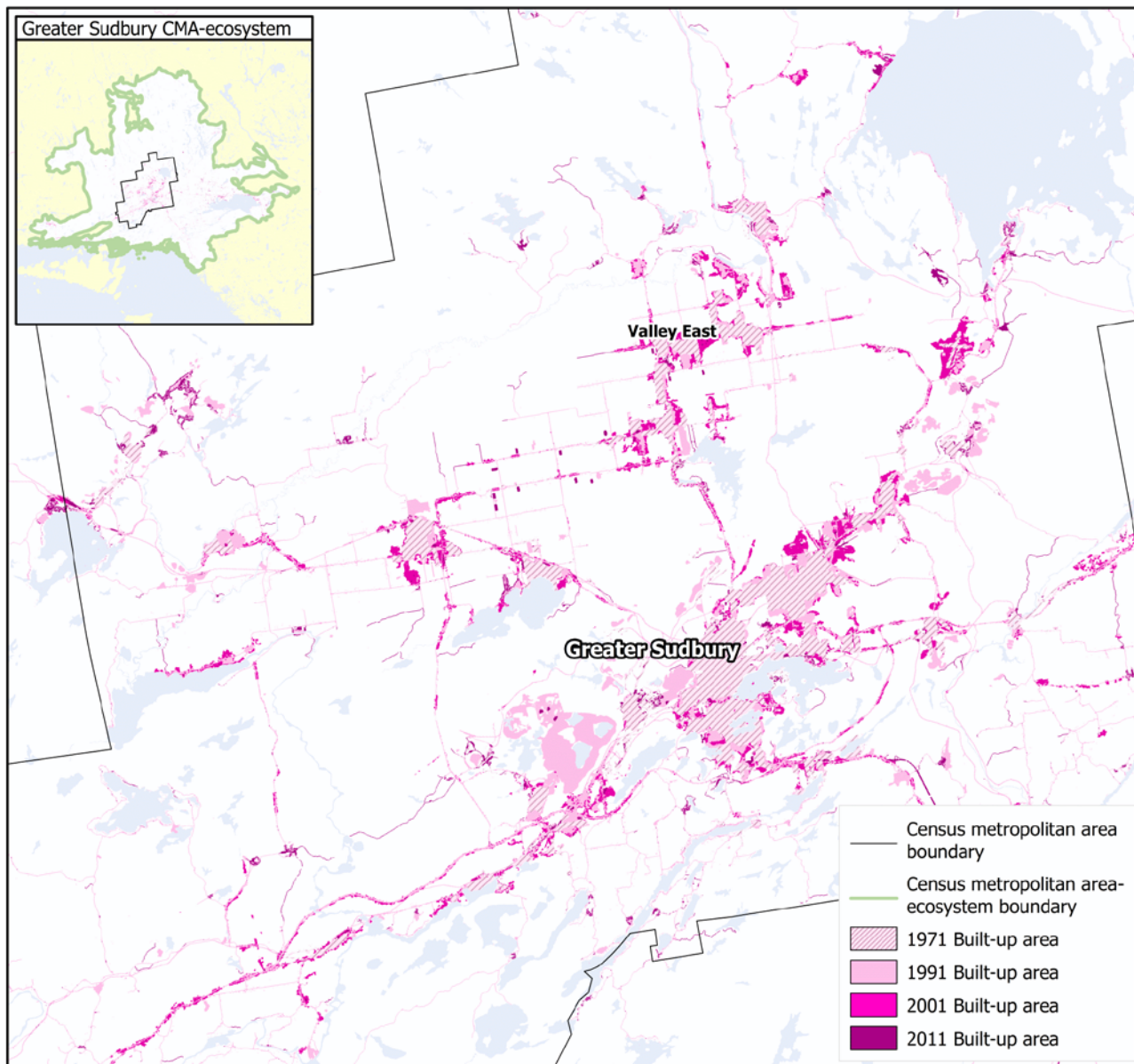
#### Highlights

- At the CMA level, built-up area increased from 85 km<sup>2</sup> in 1971 to 269 km<sup>2</sup> in 2011, an increase of 215%.
- At the CMA-E level, built-up area increased from 152 km<sup>2</sup> in 1971 to 624 km<sup>2</sup> in 2011, an increase of 311%.
- In 2011, the natural and semi-natural land class was divided into forest (69%), water (13%) and other (17%).
- From 1971 to 2011, 40 km<sup>2</sup> of arable land and 259 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 70.4% was forest, 6.2% was natural land for pasture and 23.4% was classed as other.
- Population in the CMA decreased by 6% from 170,271 to 160,770 between 1971 and 2011.
- The number of dwellings in the CMA increased by 70% from 42,864 to 72,736 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.6

Built-up area, Greater Sudbury census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Note:** Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

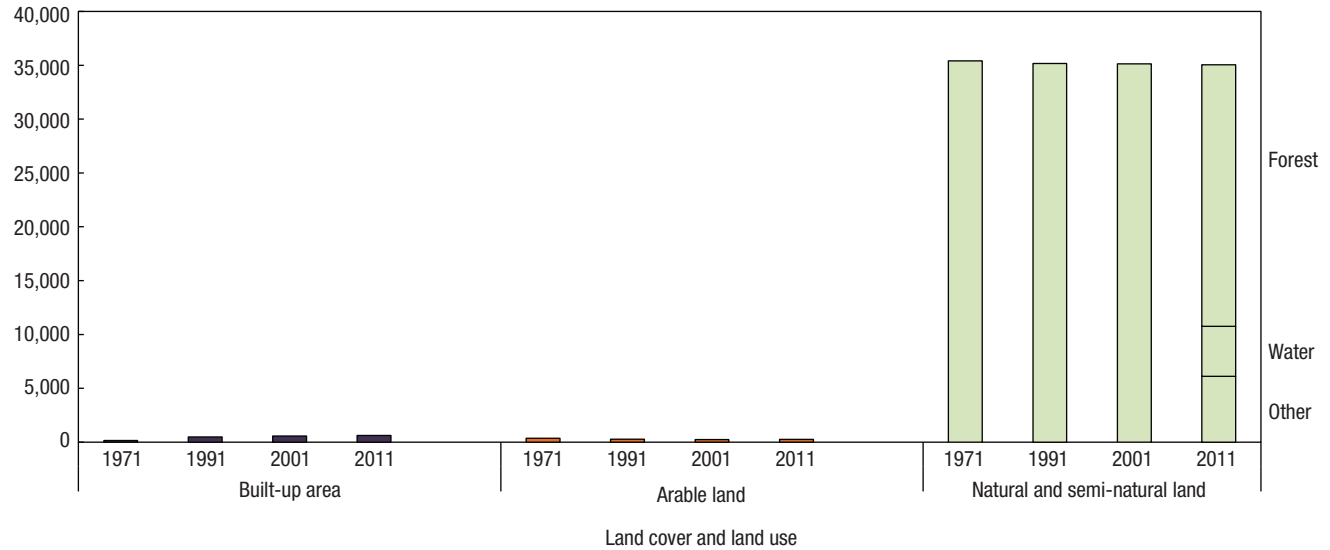
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.nrcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.11

### Land cover and land use, Greater Sudbury census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres

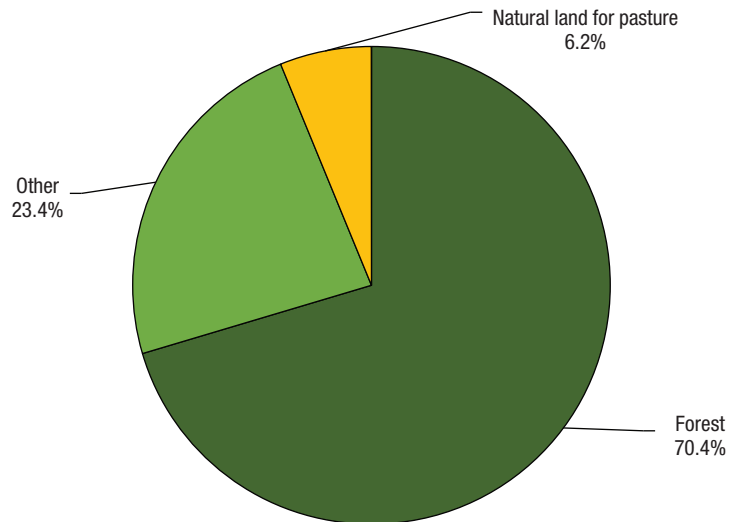


**Notes:** Built-up area for 1971 is based on *Canada Land Inventory: Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), with modeling of roads. CLI: LU and CLUMP built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

Chart 3.12

Natural and semi-natural land lost to settled area, by selected land class, Greater Sudbury census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.16**

**Population and dwellings, total and settled area, Greater Sudbury census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2</sup>	
	Total area	Settled area <sup>3</sup>	Total area	Settled area <sup>3</sup>
	number			
<b>1971</b>				
Population	170,271	148,167	271,483	219,479
Dwellings	42,864	37,778	68,700	56,390
<b>1991</b>				
Population	162,539	156,494	270,609	248,982
Dwellings	59,318	57,276	99,136	90,938
<b>2001</b>				
Population	155,601	142,381	260,934	224,262
Dwellings	68,823	62,903	123,382	101,793
<b>2011</b>				
Population	160,770	146,593	267,661	234,018
Dwellings	72,736	66,412	127,675	109,522
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	-6	-1	-1	7
Dwellings	70	76	86	94

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population; Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.17**  
**Land cover and land use, Greater Sudbury census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	3,411	35,921	9
<b>1971</b>			
Total built-up <sup>3</sup>	85	152	56
Settled	60	86	69
Roads	26	65	39
Arable <sup>4</sup>	..	353	..
Natural and semi-natural <sup>5</sup>	..	35,416	..
<b>1991</b>			
Total built-up <sup>6</sup>	206	482	43
Settled	144	275	53
Roads	62	208	30
Arable <sup>4</sup>	..	271	..
Natural and semi-natural <sup>5</sup>	..	35,168	..
<b>2001</b>			
Total built-up <sup>6</sup>	249	559	45
Settled	186	350	53
Roads	63	209	30
Arable <sup>4</sup>	..	234	..
Natural and semi-natural <sup>5</sup>	..	35,129	..
<b>2011</b>			
Total built-up <sup>6</sup>	269	624	43
Settled	197	386	51
Roads	72	238	30
Arable <sup>4</sup>	..	246	..
Natural and semi-natural <sup>7</sup>	..	35,052	..
Forest	..	24,301	..
Water	..	4,640	..
Other	..	6,110	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>3,6</sup>	215	311	...
Arable <sup>4</sup>	...	-30	...
Natural and semi-natural <sup>5</sup>	...	-1	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. Built-up area for 1971 is based on *Canada Land Inventory Land Use (CLI: LU)* and *Canada Land Use Monitoring Program (CLUMP)*, code B – Urban Built-up. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

4. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

5. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

6. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

7. For 2011, forest and water are broken out separately based on data from AAFC *Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](http://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](http://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <http://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.18**

**Ecosystem asset account, Greater Sudbury census metropolitan area-ecosystem (CMA-E), 1971 to 2011**

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	86	65	353	35,416
Land lost to settled area	...	...	-40	-259
Balance of change <sup>4</sup>	299	173	-67	-105
Closing stock 2011	386	238	246	35,052

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP). CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads—primary, secondary and tertiary).
  2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.
  3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.
  4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.
- Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

### Links to more information

Tables by metropolitan area, Greater Sudbury

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met106-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met106-eng.htm)

Great Sudbury CMA, population change, 2006 to 2011, by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-580-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-580-013-01-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Great Sudbury CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=580&Geo2=PR&Code2=35&Data=Count&SearchText=greater&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=580&Geo2=PR&Code2=35&Data=Count&SearchText=greater&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Great Sudbury CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=580&Data=Count&SearchText=greater&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=580&Data=Count&SearchText=greater&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1)

### Guelph, Ontario

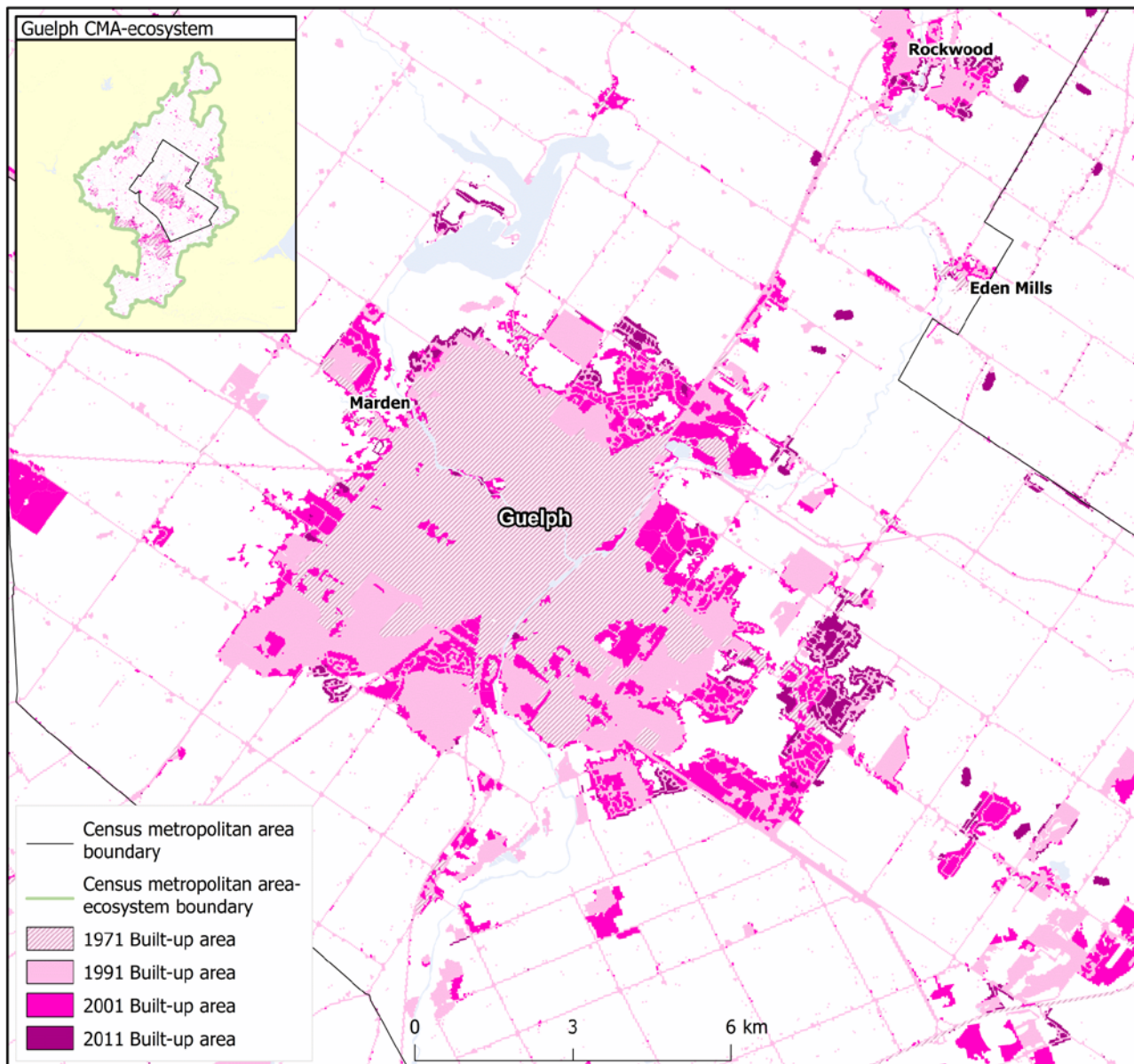
#### Highlights

- At the CMA level, built-up area increased from 35 km<sup>2</sup> in 1971 to 112 km<sup>2</sup> in 2011, an increase of 220%.
- At the CMA-E level, built-up area increased from 112 km<sup>2</sup> in 1971 to 398 km<sup>2</sup> in 2011, an increase of 255%.
- In 2011, the natural and semi-natural land class was divided into forest (66%), water (4%) and other (30%)
- From 1971 to 2011, 132 km<sup>2</sup> of arable land and 80 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 51.4% was forest, 39.5% was natural land for pasture and 9.2% was classed as other.
- Population in the CMA increased by 104% from 69,329 to 141,097 between 1971 and 2011.
- The number of dwellings in the CMA increased by 196% from 20,055 to 59,362 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.7

Built-up area, Guelph census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Note:** Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

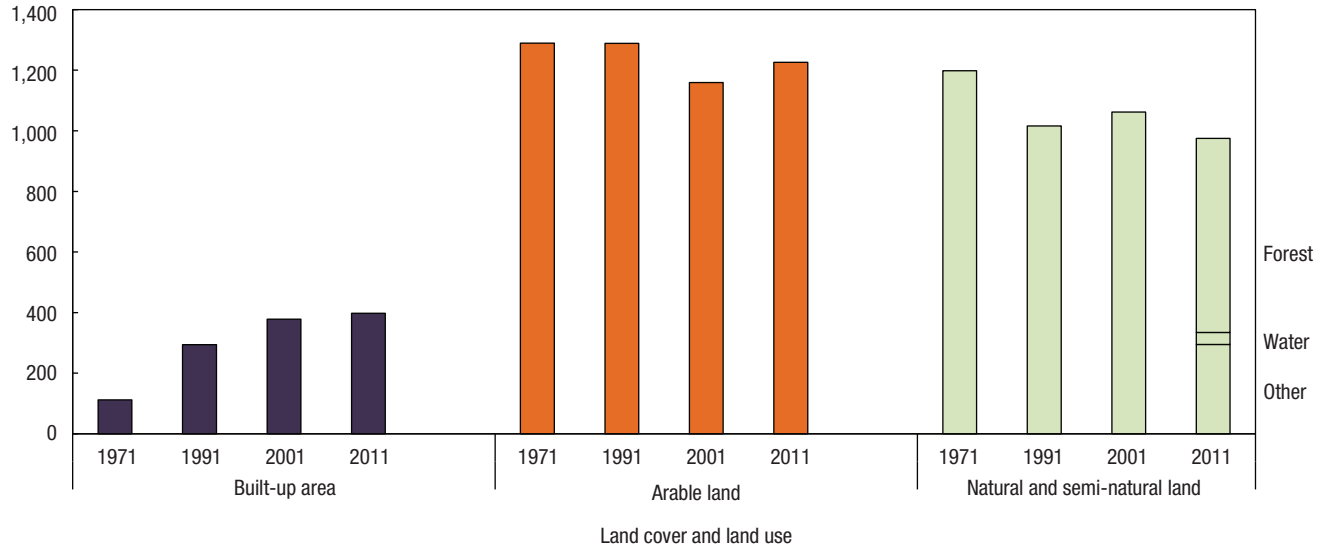
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.nrcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.13

### Land cover and land use, Guelph census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres



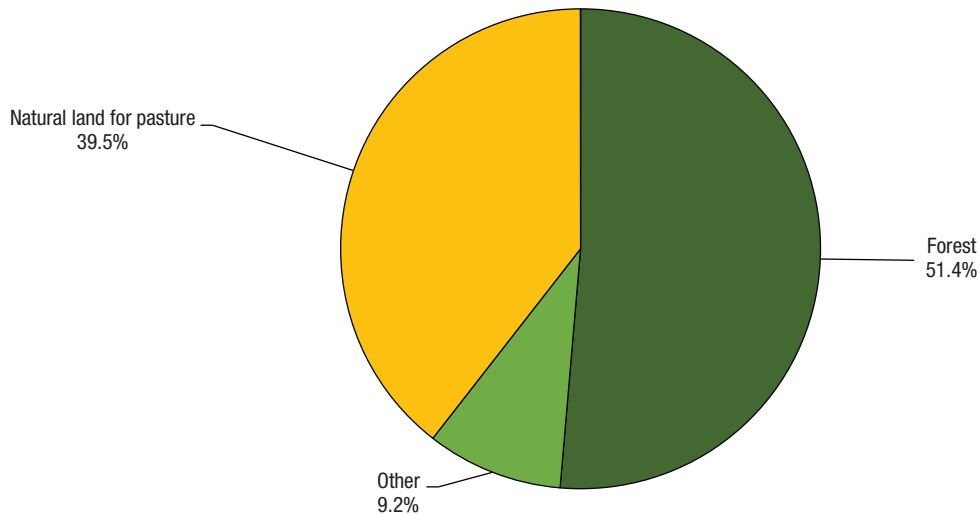
**Notes:** CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area statistics for a visual representation of the CMA-E boundaries. Built-up area for 1971 is based on *Canada Land Inventory: Land Use (CLI: LU)* and *Canada Land Use Monitoring Program (CLUMP)*, with modeling of roads. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCAN, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCAN, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.14

Natural and semi-natural land lost to settled area, by selected land class, Guelph census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.19**

**Population and dwellings, total and settled area, Guelph census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2,3</sup>	
	Total area	Settled area <sup>4</sup>	Total area	Settled area <sup>4</sup>
	number			
<b>1971</b>				
Population	69,329	61,588	217,540	186,180
Dwellings	20,055	17,943	61,978	53,827
<b>1991</b>				
Population	102,857	98,949	315,103	301,357
Dwellings	37,111	35,917	109,895	105,598
<b>2001</b>				
Population	123,229	119,581	372,137	352,735
Dwellings	48,282	47,063	139,611	132,660
<b>2011</b>				
Population	141,097	137,738	422,245	405,273
Dwellings	59,362	58,209	166,366	160,516
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	104	124	94	118
Dwellings	196	224	168	198

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.

4. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population; Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.20**

**Land cover and land use, Guelph census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2,3</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	594	2,599	23
<b>1971</b>			
Total built-up <sup>4</sup>	35	112	31
Settled	22	68	33
Roads	13	44	29
Arable <sup>5</sup>	..	1,289	..
Natural and semi-natural <sup>6</sup>	..	1,198	..
<b>1991</b>			
Total built-up <sup>7</sup>	84	295	28
Settled	54	180	30
Roads	30	115	26
Arable <sup>5</sup>	..	1,288	..
Natural and semi-natural <sup>6</sup>	..	1,016	..
<b>2001</b>			
Total built-up <sup>7</sup>	107	378	28
Settled	77	263	29
Roads	30	115	26
Arable <sup>5</sup>	..	1,159	..
Natural and semi-natural <sup>6</sup>	..	1,062	..
<b>2011</b>			
Total built-up <sup>7</sup>	112	398	28
Settled	82	281	29
Roads	31	117	26
Arable <sup>5</sup>	..	1,226	..
Natural and semi-natural <sup>6</sup>	..	975	..
Forest	..	641	..
Water	..	39	..
Other	..	295	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>4,7</sup>	220	255	...
Arable <sup>5</sup>	...	-5	...
Natural and semi-natural <sup>6</sup>	...	-19	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.

4. Built-up area for 1971 is based on *Canada Land Inventory Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), code B – Urban Built-up. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

5. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

6. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

7. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

8. For 2011, forest and water are broken out separately based on data from AAFC *Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](http://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](http://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <http://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.21**

**Ecosystem asset account, Guelph census metropolitan area-ecosystem (CMA-E), 1971 to 2011**

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	68	44	1,289	1,198
Land lost to settled area	...	...	-132	-80
Balance of change <sup>4</sup>	212	74	69	-143
Closing stock 2011	281	117	1,226	975

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP). CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).
  2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.
  3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.
  4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.
- Note:** CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.
- Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

### Links to more information

Tables by metropolitan area, Guelph

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met107-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met107-eng.htm)

Guelph CMA, population change, 2006 to 2011 by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-550-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-550-013-01-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Guelph CMA, Census Profile

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=550&Geo2=PR&Code2=35&Data=Count&SearchText=guelph&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=550&Geo2=PR&Code2=35&Data=Count&SearchText=guelph&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Guelph CMA, NHS Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=550&Data=Count&SearchText=guelph&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=550&Data=Count&SearchText=guelph&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1)

### Halifax, Nova Scotia

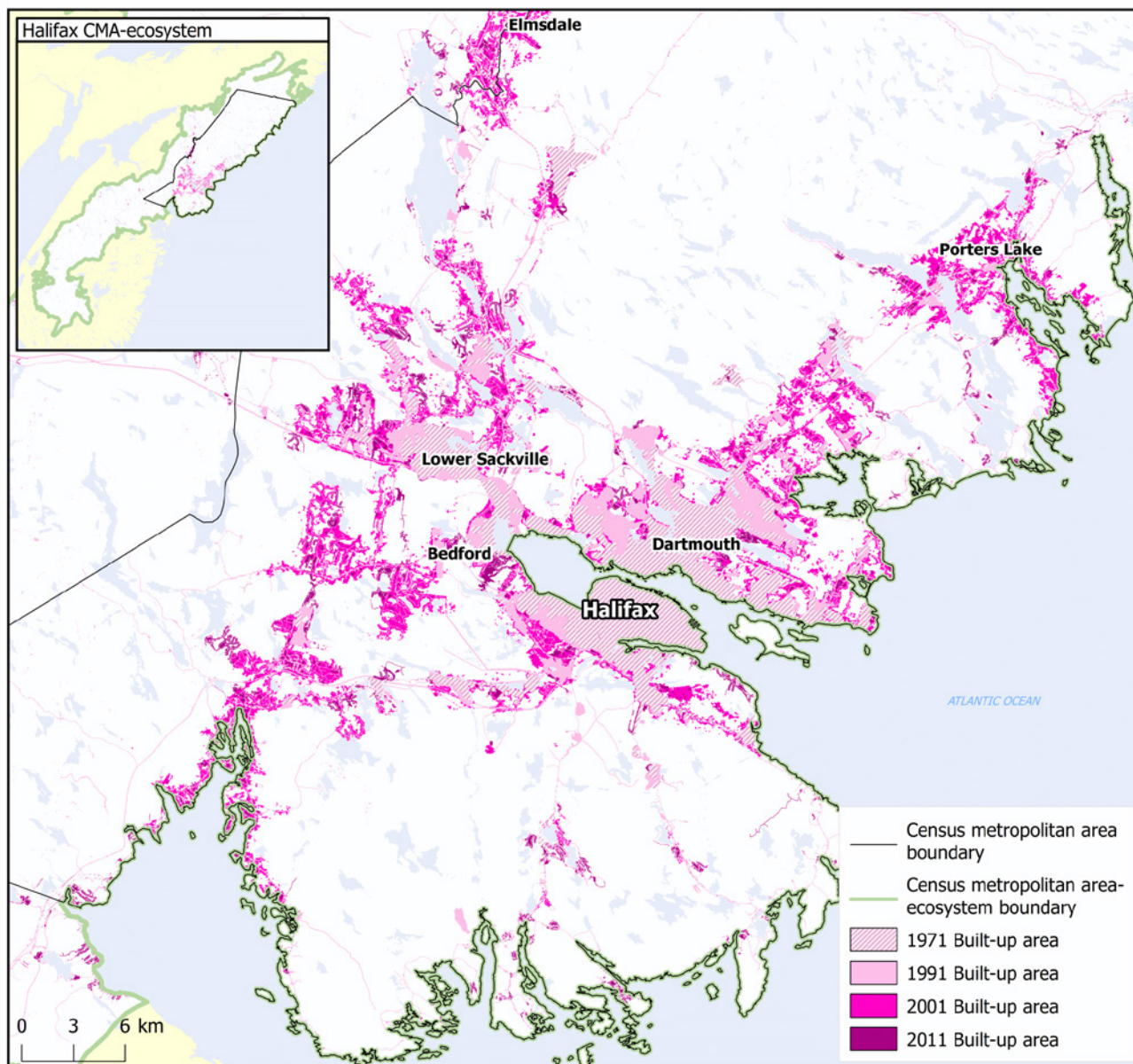
#### Highlights

- At the CMA level, built-up area increased from 148 km<sup>2</sup> in 1971 to 467 km<sup>2</sup> in 2011, an increase of 217%.
- At the CMA-E level, built-up area increased from 168 km<sup>2</sup> in 1971 to 636 km<sup>2</sup> in 2011, an increase of 279%.
- In 2011, the natural and semi-natural land class was divided into forest (78%), water (7%) and other (15%).
- From 1971 to 2011, 50 km<sup>2</sup> of arable land and 297 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 95.1% was forest, 0.6% was natural land for pasture and 4.3% was classed as other.
- Population in the CMA increased by 50% from 260,672 to 390,328 between 1971 and 2011.
- The number of dwellings in the CMA increased by 156% from 69,192 to 177,295 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.8

Built-up area, Halifax census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Note:** Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

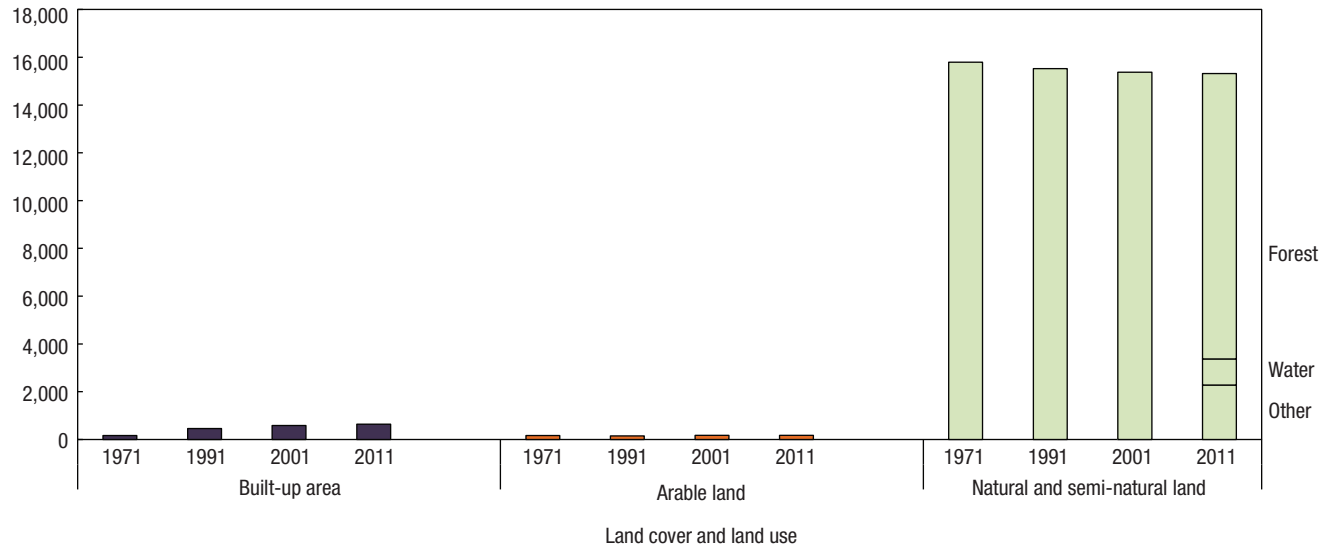
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.nrcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.15

### Land cover and land use, Halifax census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres



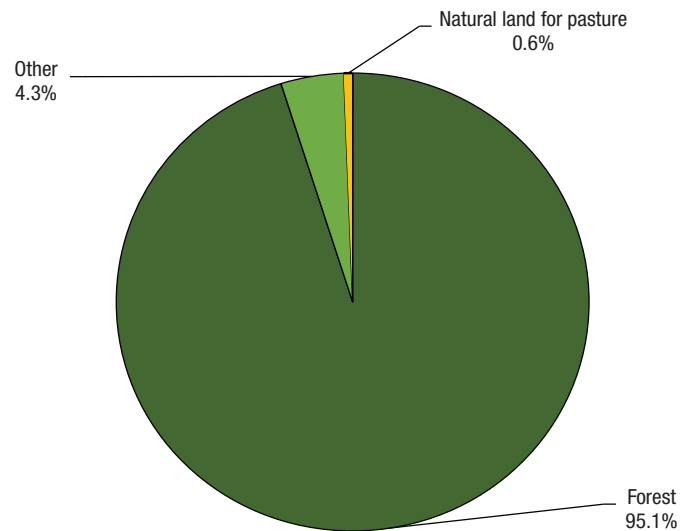
**Notes:** Built-up area for 1971 is based on *Canada Land Inventory: Land Use (CLI: LU)* and *Canada Land Use Monitoring Program (CLUMP)*, with modeling of roads. CLI: LU and CLUMP built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geotit/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geotit/cli_250k/landuse/) (accessed September 15, 2015); NRCAN, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geotit/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geotit/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCAN, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.16

Natural and semi-natural land lost to settled area, by selected land class, Halifax census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes :** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources :** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.22**

**Population and dwellings, total and settled area, Halifax census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2</sup>	
	Total area	Settled area <sup>3</sup>	Total area	Settled area <sup>3</sup>
	number			
<b>1971</b>				
Population	260,672	225,552	281,850	229,782
Dwellings	69,192	60,605	74,856	61,668
<b>1991</b>				
Population	323,542	296,797	358,033	318,848
Dwellings	118,732	109,585	130,661	117,195
<b>2001</b>				
Population	347,902	323,744	383,893	342,956
Dwellings	147,779	137,950	164,867	146,513
<b>2011</b>				
Population	390,328	370,811	428,380	391,336
Dwellings	177,295	168,351	196,350	178,585
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	50	64	52	70
Dwellings	156	178	162	190

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population; Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.23**

**Land cover and land use, Halifax census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	5,496	16,127	34
<b>1971</b>			
Total built-up <sup>3</sup>	148	168	88
Settled	96	100	96
Roads	52	68	76
Arable <sup>4</sup>	..	166	..
Natural and semi-natural <sup>5</sup>	..	15,793	..
<b>1991</b>			
Total built-up <sup>6</sup>	313	455	69
Settled	204	271	75
Roads	110	184	59
Arable <sup>4</sup>	..	149	..
Natural and semi-natural <sup>5</sup>	..	15,522	..
<b>2001</b>			
Total built-up <sup>6</sup>	428	581	74
Settled	318	397	80
Roads	110	185	60
Arable <sup>4</sup>	..	170	..
Natural and semi-natural <sup>5</sup>	..	15,375	..
<b>2011</b>			
Total built-up <sup>6</sup>	467	636	73
Settled	354	446	79
Roads	113	189	60
Arable <sup>4</sup>	..	168	..
Natural and semi-natural <sup>7</sup>	..	15,322	..
Forest	..	11,952	..
Water	..	1,096	..
Other	..	2,275	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>3,6</sup>	217	279	...
Arable <sup>4</sup>	...	2	...
Natural and semi-natural <sup>5</sup>	...	-3	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. Built-up area for 1971 is based on *Canada Land Inventory Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), code B – Urban Built-up. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

4. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

5. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

6. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

7. For 2011, forest and water are broken out separately based on data from AAFC *Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCAN, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCAN, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.24**

**Ecosystem asset account, Halifax census metropolitan area-ecosystem (CMA-E), 1971 to 2011**

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	100	68	166	15,793
Land lost to settled area	...	...	-50	-297
Balance of change <sup>4</sup>	346	121	53	-174
Closing stock 2011	446	189	168	15,322

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP). CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads—primary, secondary and tertiary).
  2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.
  3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.
  4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.
- Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

### Links to more information

Tables by metropolitan area, Halifax

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met108-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met108-eng.htm)

Halifax CMA, population change, 2006 to 2011, by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-205-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-205-013-01-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Halifax CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=205&Geo2=PR&Code2=12&Data=Count&SearchText=halifax&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=205&Geo2=PR&Code2=12&Data=Count&SearchText=halifax&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Halifax CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=205&Data=Count&SearchText=halifax&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=205&Data=Count&SearchText=halifax&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

### Hamilton, Ontario

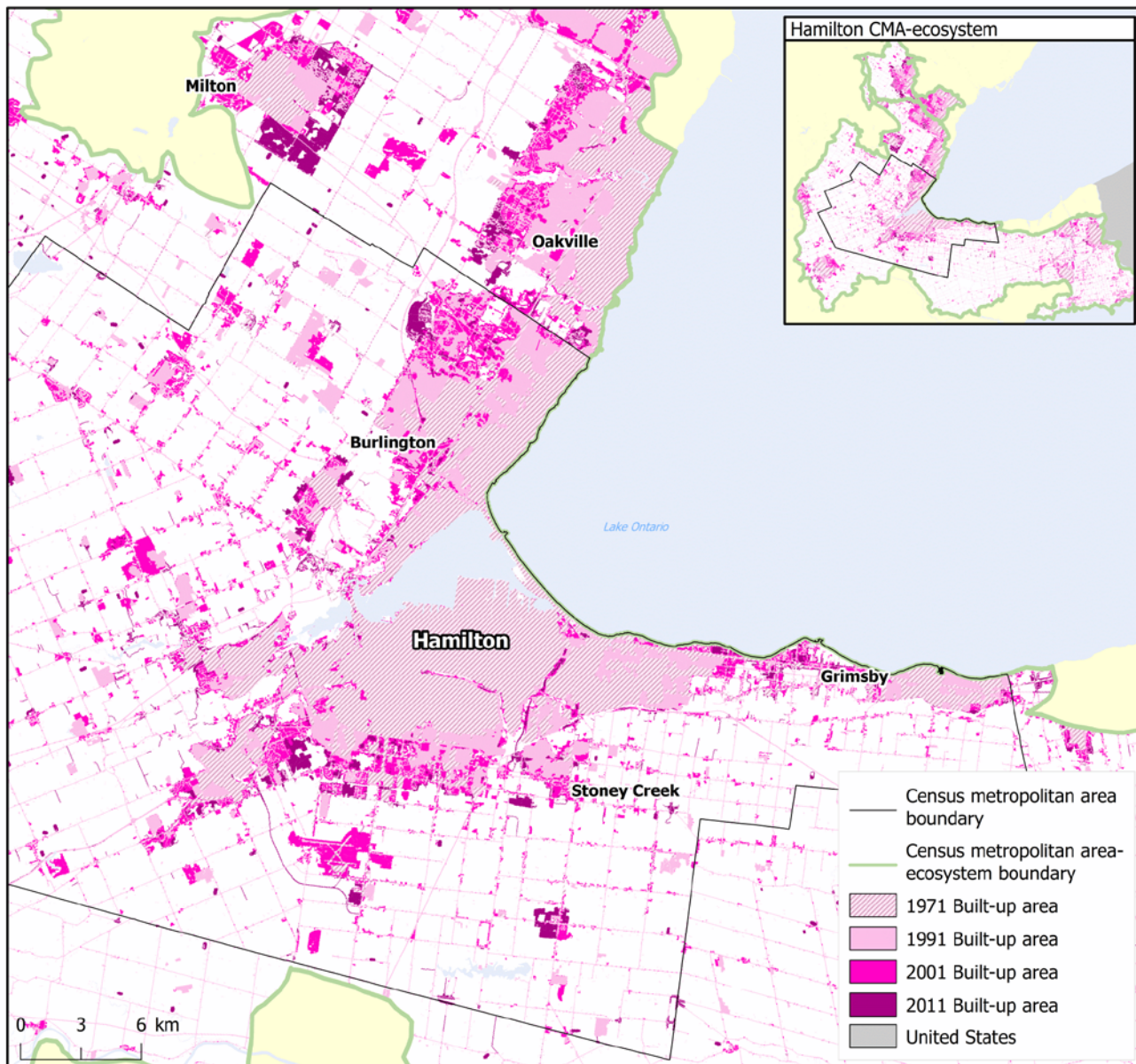
#### Highlights

- At the CMA level, built-up area increased from 187 km<sup>2</sup> in 1971 to 420 km<sup>2</sup> in 2011, an increase of 124%.
- At the CMA-E level, built-up area increased from 512 km<sup>2</sup> in 1971 to 1,389 km<sup>2</sup> in 2011, an increase of 172%.
- In 2011, the natural and semi-natural land class was divided into forest (49%), water (5%) and other (46%).
- From 1971 to 2011, 487 km<sup>2</sup> of arable land and 191 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 35.9% was forest, 55.9% was natural land for pasture and 8.2% was classed as other.
- Population in the CMA increased by 43% from 503,189 to 721,053 between 1971 and 2011.
- The number of dwellings in the CMA increased by 99% from 147,550 to 294,150 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.9

Built-up area, Hamilton census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Note:** Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

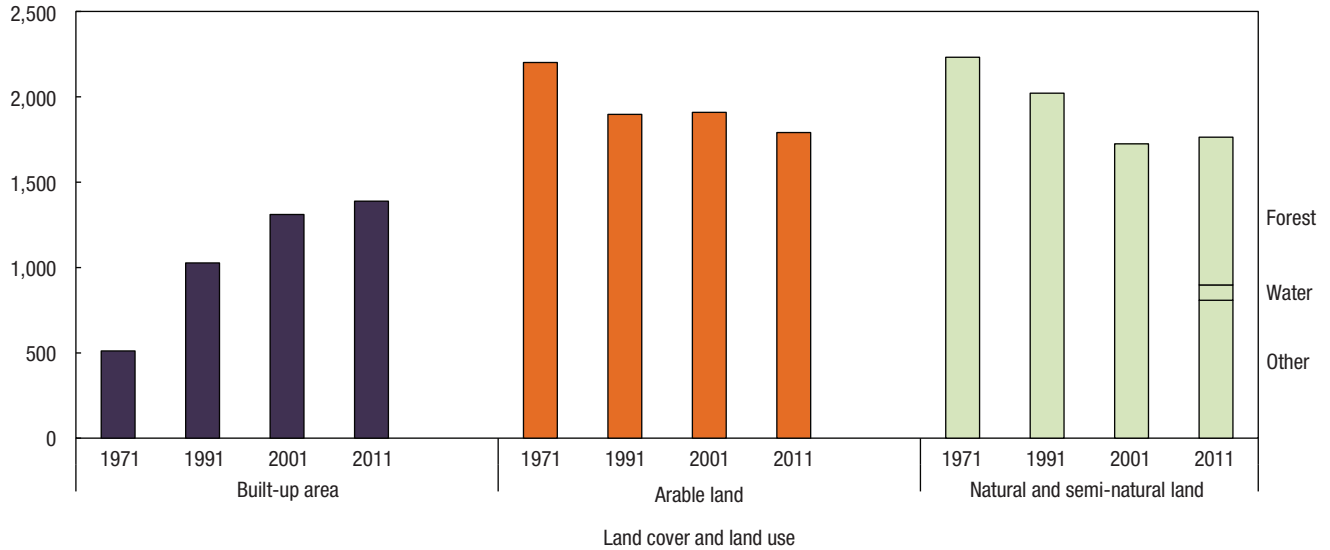
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): Land Use (1971)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.rncan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015); United States Census Bureau, 2014, *Digital cartographic file in shapefile format – States*, file: cb\_2014\_us\_state\_500k.zip, [http://www.census.gov/geo/maps-data/data/cbf/cbf\\_state.html](http://www.census.gov/geo/maps-data/data/cbf/cbf_state.html) (accessed October 29, 2015).

## The changing landscape of Canadian metropolitan areas

**Chart 3.17**

### Land cover and land use, Hamilton census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres



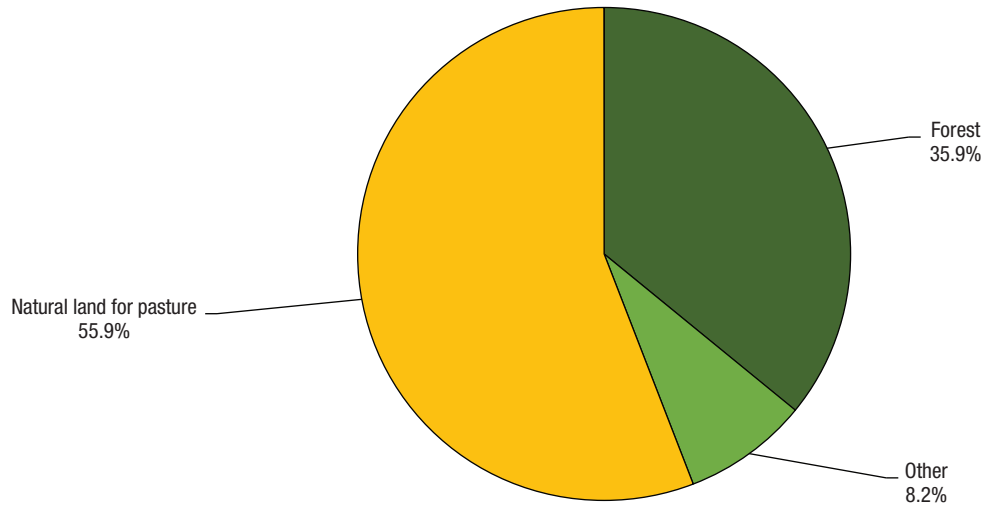
**Notes:** CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries. Built-up area for 1971 is based on *Canada Land Inventory: Land Use (CLI: LU)* and *Canada Land Use Monitoring Program (CLUMP)*, with modeling of roads. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geotit/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geotit/cli_250k/landuse/) (accessed September 15, 2015); NRCAN, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geotit/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geotit/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCAN, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.18

Natural and semi-natural land lost to settled area, by selected land class, Hamilton census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geotit/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geotit/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geotit/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geotit/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.25**

**Population and dwellings, total and settled area, Hamilton census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2,3</sup>	
	Total area	Settled area <sup>4</sup>	Total area	Settled area <sup>4</sup>
	number			
<b>1971</b>				
Population	503,189	474,600	1,041,889	958,892
Dwellings	147,550	140,156	299,404	277,914
<b>1991</b>				
Population	598,345	586,141	1,633,967	1,608,728
Dwellings	220,851	216,963	564,251	556,158
<b>2001</b>				
Population	659,005	646,300	1,976,870	1,942,949
Dwellings	259,206	254,813	712,851	701,349
<b>2011</b>				
Population	721,053	707,165	2,438,897	2,402,686
Dwellings	294,150	289,263	894,030	881,411
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	43	49	134	151
Dwellings	99	106	199	217

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.

4. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population; Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.26**

**Land cover and land use, Hamilton census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2,3</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	1,372	4,944	28
<b>1971</b>			
Total built-up <sup>4</sup>	187	512	37
Settled	125	332	38
Roads	62	179	35
Arable <sup>5</sup>	..	2,201	..
Natural and semi-natural <sup>6</sup>	..	2,232	..
<b>1991</b>			
Total built-up <sup>7</sup>	323	1,027	31
Settled	216	667	32
Roads	107	359	30
Arable <sup>5</sup>	..	1,897	..
Natural and semi-natural <sup>6</sup>	..	2,021	..
<b>2001</b>			
Total built-up <sup>7</sup>	397	1,310	30
Settled	288	947	30
Roads	109	363	30
Arable <sup>5</sup>	..	1,909	..
Natural and semi-natural <sup>6</sup>	..	1,725	..
<b>2011</b>			
Total built-up <sup>7</sup>	420	1,389	30
Settled	305	1,010	30
Roads	115	379	30
Arable <sup>5</sup>	..	1,791	..
Natural and semi-natural <sup>8</sup>	..	1,764	..
Forest	..	866	..
Water	..	91	..
Other	..	808	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>4,7</sup>	124	172	...
Arable <sup>5</sup>	...	-19	...
Natural and semi-natural <sup>6</sup>	...	-21	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.

4. Built-up area for 1971 is based on *Canada Land Inventory Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), code B – Urban Built-up. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

5. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

6. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

7. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

8. For 2011, forest and water are broken out separately based on data from AAFC *Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](http://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](http://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <http://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.27**

**Ecosystem asset account, Hamilton census metropolitan area-ecosystem (CMA-E), 1971 to 2011**

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	332	179	2,201	2,232
Land lost to settled area	...	...	-487	-191
Balance of change <sup>4</sup>	678	200	78	-277
Closing stock 2011	1,010	379	1,791	1,764

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use (CLI: LU)* and *Canada Land Use Monitoring Program (CLUMP)*. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).
  2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.
  3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.
  4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.
- Note:** CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.
- Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

### Links to more information

Tables by metropolitan area, Hamilton

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met109-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met109-eng.htm)

Hamilton CMA, population change, 2006 to 2011, by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-537-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-537-013-01-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Hamilton CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=537&Geo2=PR&Code2=35&Data=Count&SearchText=hamilton&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=537&Geo2=PR&Code2=35&Data=Count&SearchText=hamilton&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Hamilton CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=537&Data=Count&SearchText=hamilton&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=537&Data=Count&SearchText=hamilton&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1)

### Kelowna, British Columbia

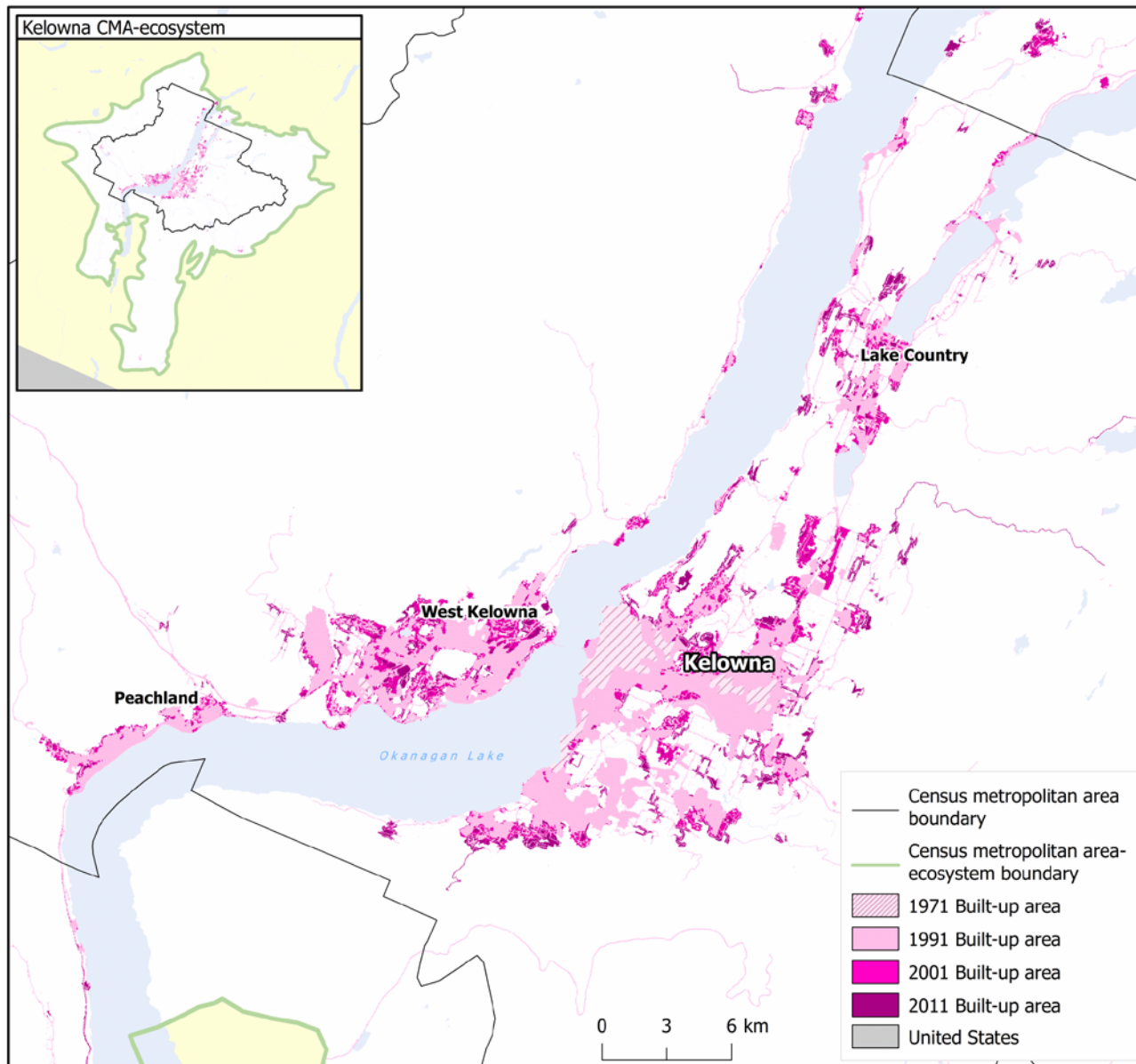
#### Highlights

- At the CMA level, built-up area increased from 12 km<sup>2</sup> in 1971 to 185 km<sup>2</sup> in 2011, an increase of 1,402%.
- At the CMA-E level, built-up area increased from 14 km<sup>2</sup> in 1971 to 210 km<sup>2</sup> in 2011, an increase of 1,429%.
- In 2011, the natural and semi-natural land class was divided into forest (78%), water (5%) and other (17%).
- From 1971 to 2011, 43 km<sup>2</sup> of arable land and 93 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 43.0% was forest, 53.3% was natural land for pasture and 3.7% was classed as other.
- Population in the CMA increased by 258% from 50,177 to 179,839 between 1971 and 2011.
- The number of dwellings in the CMA increased by 449% from 15,283 to 83,836 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.10

Built-up area, Kelowna census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Notes:** Canada Land Use Monitoring Program (CLUMP) data were not available—the 1971 built-up area may be underestimated. Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

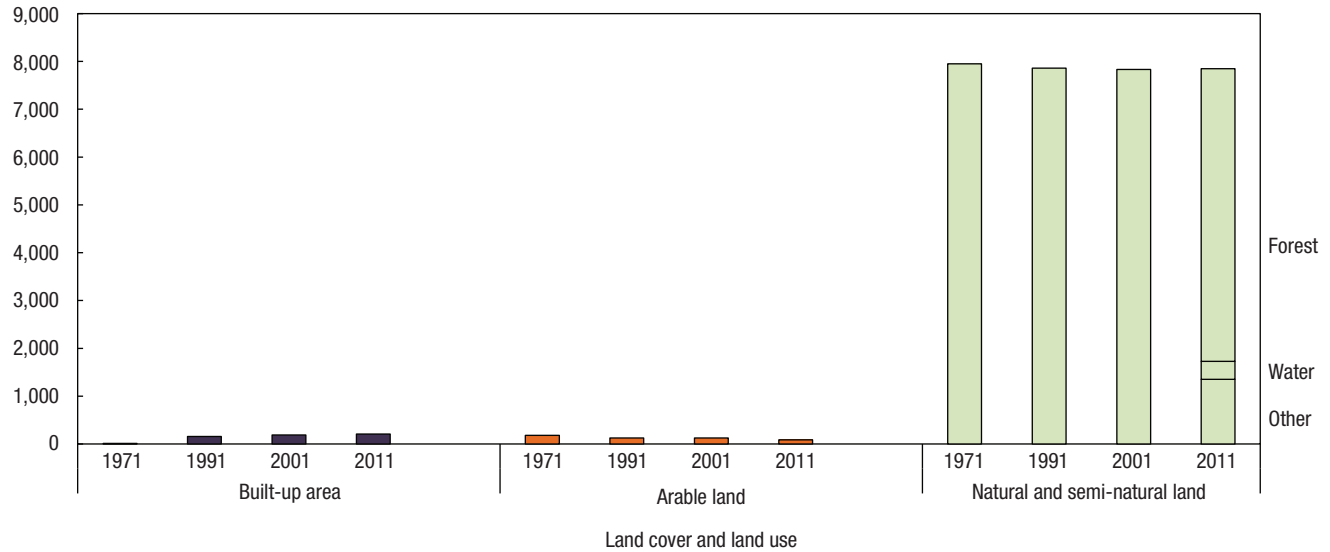
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/di\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/di_250k/landuse/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCAN, Canada Centre for Mapping and Earth Observation 2014, *CanVec+*, <ftp://ftp2.cits.nrcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015); United States Census Bureau, 2014, *Digital cartographic file in shapefile format – States*, file: cb\_2014\_us\_state\_500k.zip, [http://www.census.gov/geo/maps-data/data/cbf/cbf\\_state.html](http://www.census.gov/geo/maps-data/data/cbf/cbf_state.html) (accessed October 29, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.19

### Land cover and land use, Kelowna census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres



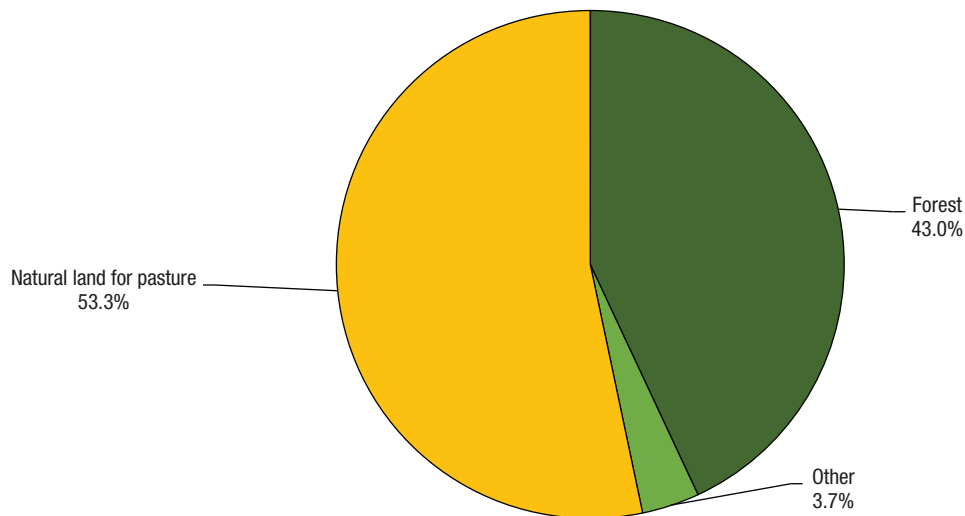
**Notes:** Built-up area for 1971 is based on *Canada Land Inventory: Land Use* (CLI: LU), with modeling of roads. *Canada Land Use Monitoring Program* (CLUMP) data exclude the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up areas may be underestimated for these CMAs. CLI: LU built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.20

Natural and semi-natural land lost to settled area, Kelowna census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

Table 3.28

Population and dwellings, total and settled area, Kelowna census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

	CMA <sup>1</sup>		CMA-ecosystem <sup>2</sup>	
	Total area	Settled area <sup>3</sup>	Total area	Settled area <sup>3</sup>
	number			
<b>1971</b>				
Population	50,177	27,511	53,816	28,211
Dwellings	15,283	8,734	16,305	8,965
<b>1991</b>				
Population	111,846	99,991	117,321	104,234
Dwellings	43,440	39,300	45,451	40,840
<b>2001</b>				
Population	147,739	138,301	153,349	140,586
Dwellings	62,675	58,573	65,933	60,081
<b>2011</b>				
Population	179,839	172,048	185,768	175,007
Dwellings	83,836	80,558	89,760	84,830
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	258	525	245	520
Dwellings	449	822	451	846

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population and Natural Resources Canada, Canada Centre for Remote Sensing, 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.29**

**Land cover and land use, Kelowna census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	2,905	8,145	36
<b>1971</b>			
Total built-up <sup>3</sup>	12	14	89
Settled	8	8	94
Roads	4	5	81
Arable <sup>4</sup>	..	180	..
Natural and semi-natural <sup>5</sup>	..	7,951	..
<b>1991</b>			
Total built-up <sup>6</sup>	140	160	88
Settled	91	99	93
Roads	49	61	80
Arable <sup>4</sup>	..	126	..
Natural and semi-natural <sup>5</sup>	..	7,858	..
<b>2001</b>			
Total built-up <sup>6</sup>	165	188	88
Settled	116	126	92
Roads	49	62	80
Arable <sup>4</sup>	..	127	..
Natural and semi-natural <sup>5</sup>	..	7,830	..
<b>2011</b>			
Total built-up <sup>6</sup>	185	210	88
Settled	133	145	92
Roads	52	65	80
Arable <sup>4</sup>	..	86	..
Natural and semi-natural <sup>7</sup>	..	7,849	..
Forest	..	6,119	..
Water	..	377	..
Other	..	1,353	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>3,6</sup>	1,402	1,429	...
Arable <sup>4</sup>	...	-52	...
Natural and semi-natural <sup>5</sup>	...	-1	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. Built-up area for 1971 is based on *Canada Land Inventory: Land Use* (CLI: LU), code B – Urban Built-up. *Canada Land Use Monitoring Program* (CLUMP) data exclude the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up areas may be underestimated for these CMAs. CLI: LU built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

4. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

5. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

6. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

7. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing, 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](http://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <http://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.30**

**Ecosystem asset account, Kelowna census metropolitan area-ecosystem (CMA-E), 1971 to 2011**

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	8	5	180	7,951
Land lost to settled area	...	...	-43	-93
Balance of change <sup>4</sup>	137	60	-51	-8
Closing stock 2011	145	65	86	7,849

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use* (CLI: LU). *Canada Land Use Monitoring Program* (CLUMP) data exclude the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up may be underestimated for these CMAs. CLI: LU built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.

3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.

4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing, 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.rncan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

### Links to more information

Tables by metropolitan area, Kelowna

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met110-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met110-eng.htm)

Kelowna CMA, population change, 2006 to 2011, by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-915-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-915-013-01-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Kelowna CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=915&Geo2=PR&Code2=59&Data=Count&SearchText=kelowna&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=915&Geo2=PR&Code2=59&Data=Count&SearchText=kelowna&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Kelowna CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=915&Data=Count&SearchText=kelowna&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=915&Data=Count&SearchText=kelowna&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1)

### Kingston, Ontario

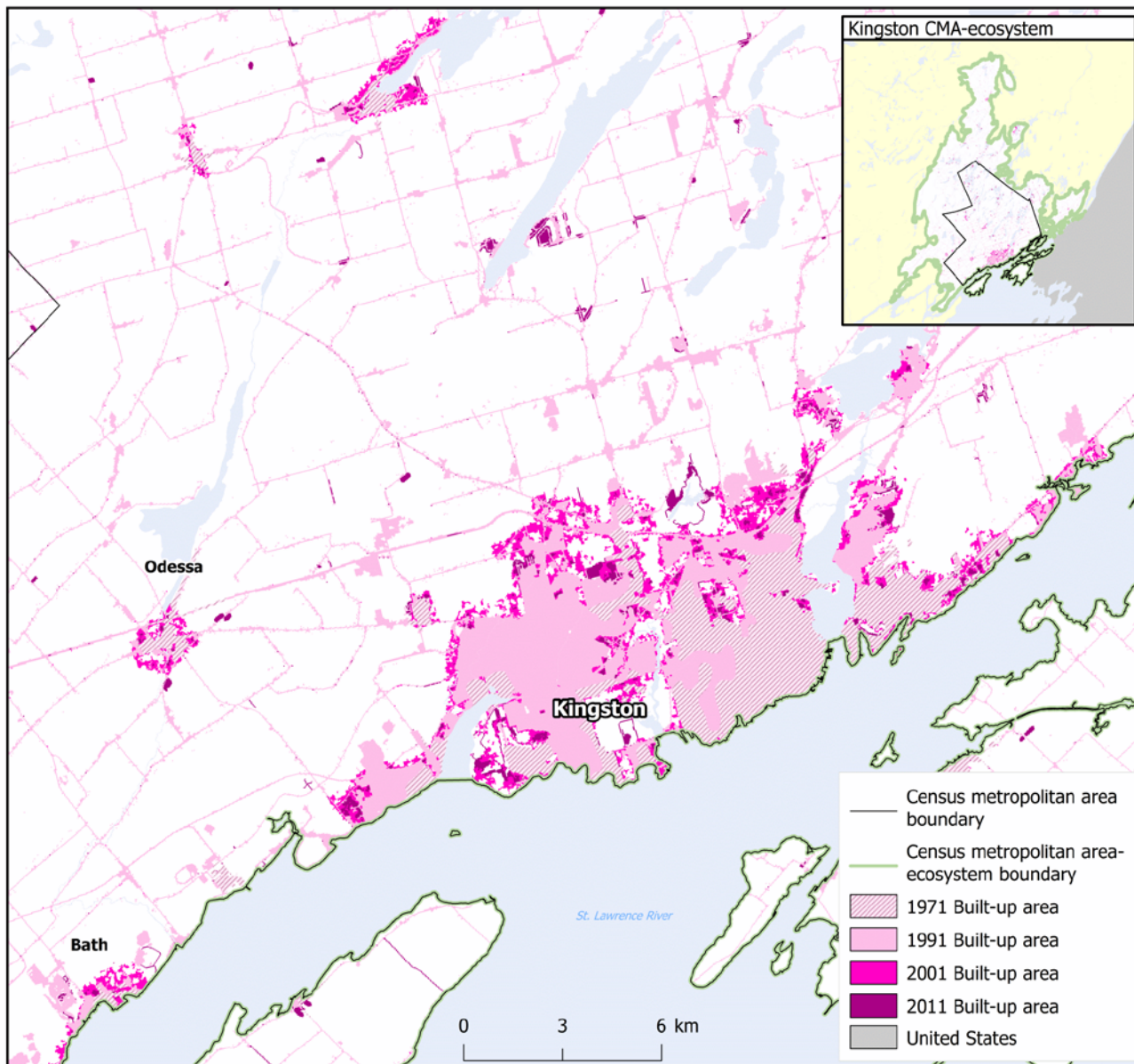
#### Highlights

- At the CMA level, built-up area increased from 43 km<sup>2</sup> in 1971 to 208 km<sup>2</sup> in 2011, an increase of 382%.
- At the CMA-E level, built-up area increased from 58 km<sup>2</sup> in 1971 to 361 km<sup>2</sup> in 2011, an increase of 526%.
- In 2011, the natural and semi-natural land class was divided into forest (51%), water (12%) and other (37%).
- From 1971 to 2011, 83 km<sup>2</sup> of arable land and 98 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 52.3% was forest, 40.9% was natural land for pasture and 6.8% was classed as other.
- Population in the CMA increased by 51% from 105,669 to 159,561 between 1971 and 2011.
- The number of dwellings in the CMA increased by 146% from 30,056 to 73,889 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.11

Built-up area, Kingston census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Notes:** Canada Land Use Monitoring Program (CLUMP) data were not available—the 1971 built-up area may be underestimated. Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

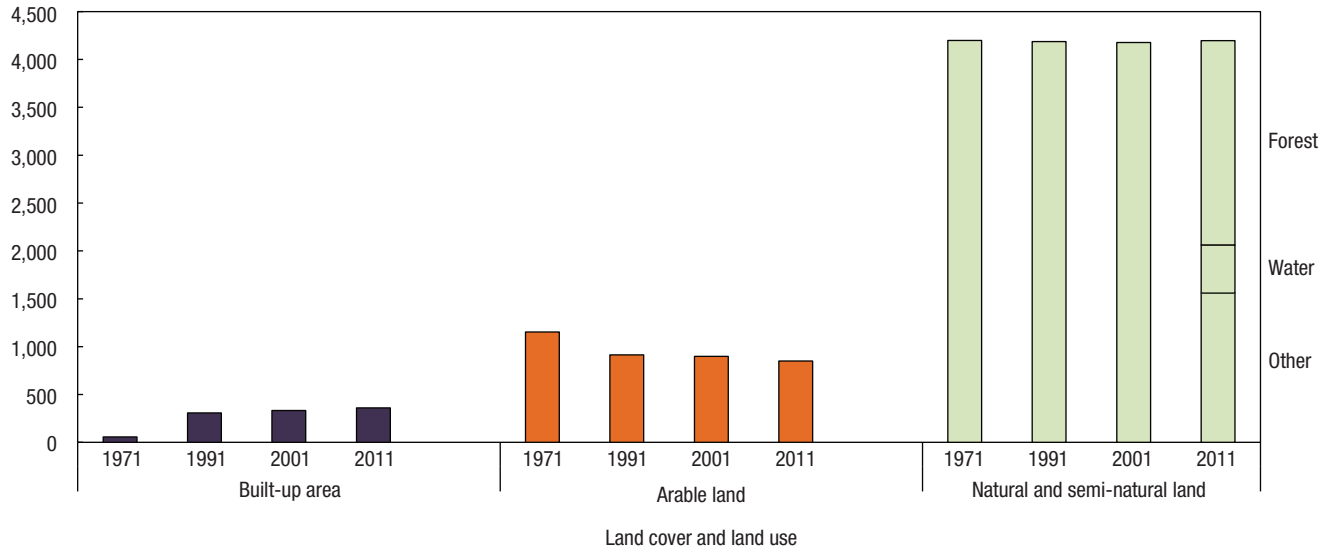
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCAN, Canada Centre for Mapping and Earth Observation 2014, *CanVec+*, <ftp://ftp2.cits.nrcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015); United States Census Bureau, 2014, *Digital cartographic file in shapefile format – States*, file: cb\_2014\_us\_state\_500k.zip, [http://www.census.gov/geo/maps-data/data/cbf/cbf\\_state.html](http://www.census.gov/geo/maps-data/data/cbf/cbf_state.html) (accessed October 29, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.21

### Land cover and land use, Kingston census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres



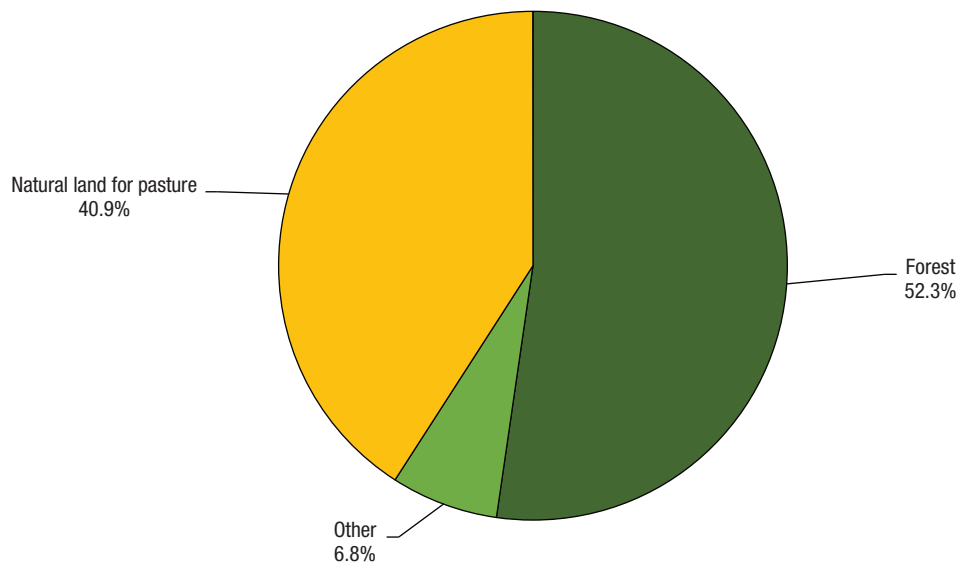
**Notes:** Built-up area for 1971 is based on *Canada Land Inventory: Land Use* (CLI: LU), with modeling of roads. *Canada Land Use Monitoring Program* (CLUMP) data exclude the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up areas may be underestimated for these CMAs. CLI: LU built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.22

Natural and semi-natural land lost to settled area, Kingston census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.31**

**Population and dwellings, total and settled area, Kingston census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2</sup>	
	Total area	Settled area <sup>3</sup>	Total area	Settled area <sup>3</sup>
	number			
<b>1971</b>				
Population	105,669	78,517	134,692	87,631
Dwellings	30,056	23,119	38,411	25,887
<b>1991</b>				
Population	135,204	132,715	168,766	165,257
Dwellings	50,881	49,892	62,908	61,575
<b>2001</b>				
Population	144,106	130,812	181,838	155,001
Dwellings	64,530	58,091	83,111	70,669
<b>2011</b>				
Population	159,561	143,949	198,914	169,134
Dwellings	73,889	67,373	94,173	80,672
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	51	83	48	93
Dwellings	146	191	145	212

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population and Natural Resources Canada, Canada Centre for Remote Sensing, 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.32**

**Land cover and land use, Kingston census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	1,939	5,409	36
<b>1971</b>			
Total built-up <sup>3</sup>	43	58	75
Settled	25	30	84
Roads	18	27	65
Arable <sup>4</sup>	..	1,154	..
Natural and semi-natural <sup>5</sup>	..	4,198	..
<b>1991</b>			
Total built-up <sup>6</sup>	176	307	57
Settled	104	162	64
Roads	72	145	50
Arable <sup>4</sup>	..	914	..
Natural and semi-natural <sup>5</sup>	..	4,187	..
<b>2001</b>			
Total built-up <sup>6</sup>	194	334	58
Settled	122	188	65
Roads	72	146	50
Arable <sup>4</sup>	..	899	..
Natural and semi-natural <sup>5</sup>	..	4,176	..
<b>2011</b>			
Total built-up <sup>6</sup>	208	361	58
Settled	134	211	63
Roads	74	150	49
Arable <sup>4</sup>	..	850	..
Natural and semi-natural <sup>7</sup>	..	4,197	..
Forest	..	2,134	..
Water	..	503	..
Other	..	1,560	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>3,6</sup>	382	526	...
Arable <sup>4</sup>	...	-26	...
Natural and semi-natural <sup>5</sup>	...	-0	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. Built-up area for 1971 is based on *Canada Land Inventory: Land Use* (CLI: LU), code B – Urban Built-up. *Canada Land Use Monitoring Program* (CLUMP) data exclude the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up areas may be underestimated for these CMAs. CLI: LU built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

4. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

5. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

6. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

7. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing, 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](http://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <http://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

Table 3.33

Ecosystem asset account, Kingston census metropolitan area-ecosystem (CMA-E), 1971 to 2011

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	30	27	1,154	4,198
Land lost to settled area	...	...	-83	-98
Balance of change <sup>4</sup>	181	123	-221	98
Closing stock 2011	211	150	850	4,197

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use* (CLI: LU). *Canada Land Use Monitoring Program* (CLUMP) data exclude the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up may be underestimated for these CMAs. CLI: LU built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.

3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.

4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing, 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.rncan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

### Links to more information

Tables by metropolitan area, Kingston

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met111-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met111-eng.htm)

Kingston CMA, population change, 2006 to 2011, by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-521-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-521-013-01-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Kingston CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=521&Geo2=PR&Code2=35&Data=Count&SearchText=kingston&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=521&Geo2=PR&Code2=35&Data=Count&SearchText=kingston&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Kingston CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=521&Data=Count&SearchText=kingston&SearchType=Begins&SearchPR=01&BI=All&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=521&Data=Count&SearchText=kingston&SearchType=Begins&SearchPR=01&BI=All&BI=All&Custom=&TABID=1)

### Kitchener–Cambridge–Waterloo, Ontario

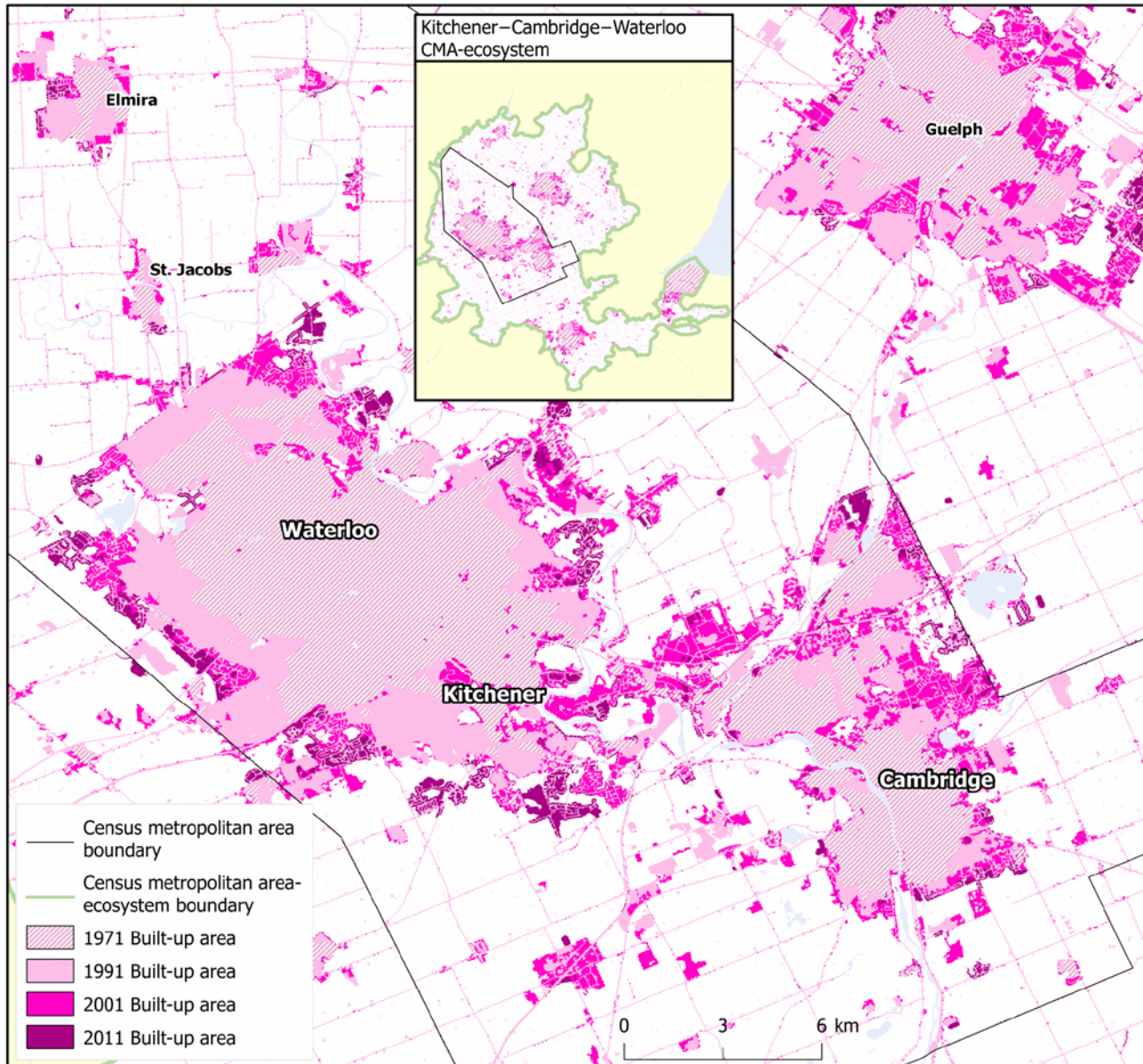
#### Highlights

- At the CMA level, built-up area increased from 119 km<sup>2</sup> in 1971 to 281 km<sup>2</sup> in 2011, an increase of 137%.
- At the CMA-E level, built-up area increased from 281 km<sup>2</sup> in 1971 to 693 km<sup>2</sup> in 2011, an increase of 146%.
- In 2011, the natural and semi-natural land class was divided into forest (61%), water (6%) and other (33%).
- From 1971 to 2011, 214 km<sup>2</sup> of arable land and 102 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 43.6% was forest, 49.1% was natural land for pasture and 7.3% was classed as other.
- Population in the CMA increased by 100% from 238,628 to 477,160 between 1971 and 2011.
- The number of dwellings in the CMA increased by 175% from 69,707 to 191,739 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.12

Built-up area, Kitchener–Cambridge–Waterloo census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Note:** Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

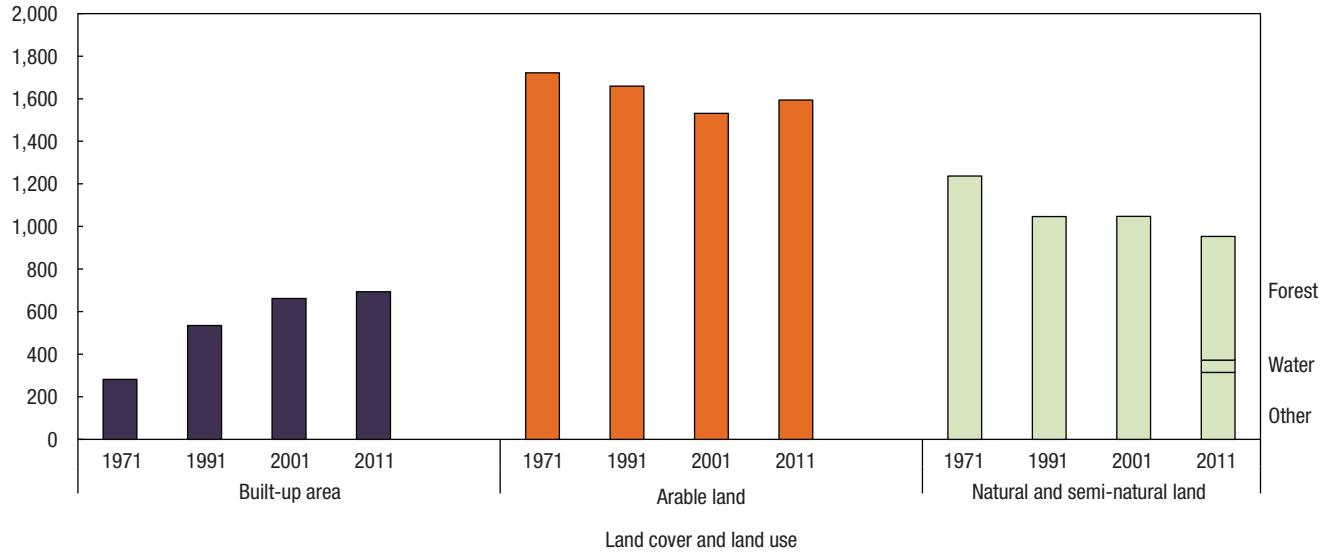
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.nrcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.23

### Land cover and land use, Kitchener–Cambridge–Waterloo census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres



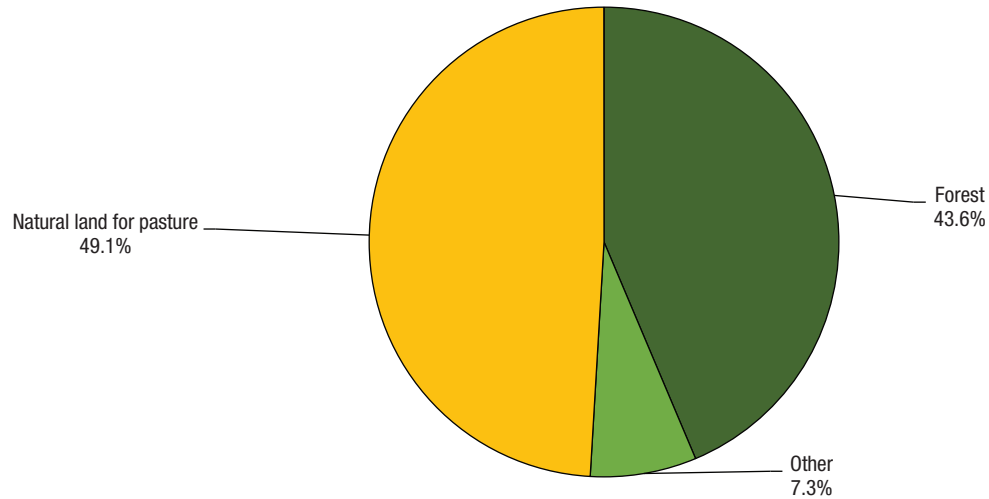
**Notes:** CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries. Built-up area for 1971 is based on *Canada Land Inventory: Land Use (CLI: LU)* and *Canada Land Use Monitoring Program (CLUMP)*, with modeling of roads. CLI: LU and CLUMP built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCAN, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCAN, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.24

Natural and semi-natural land lost to settled area, by selected land class, Kitchener–Cambridge–Waterloo census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.34**

**Population and dwellings, total and settled area, Kitchener–Cambridge–Waterloo census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2,3</sup>	
	Total area	Settled area <sup>4</sup>	Total area	Settled area <sup>4</sup>
	number			
<b>1971</b>				
Population	238,628	229,348	699,307	650,181
Dwellings	69,707	67,399	207,135	194,540
<b>1991</b>				
Population	356,421	351,815	853,073	837,455
Dwellings	128,111	126,668	315,878	310,946
<b>2001</b>				
Population	414,284	409,449	951,374	928,897
Dwellings	158,735	157,158	376,340	368,786
<b>2011</b>				
Population	477,160	474,062	1,047,637	1,026,623
Dwellings	191,739	190,725	435,211	427,944
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	100	107	50	58
Dwellings	175	183	110	120

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.

4. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population; Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.35**

**Land cover and land use, Kitchener–Cambridge–Waterloo census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2,3</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	827	3,240	26
<b>1971</b>			
Total built-up <sup>4</sup>	119	281	42
Settled	80	181	44
Roads	38	101	38
Arable <sup>5</sup>	..	1,722	..
Natural and semi-natural <sup>6</sup>	..	1,237	..
<b>1991</b>			
Total built-up <sup>7</sup>	217	534	41
Settled	147	343	43
Roads	70	191	37
Arable <sup>5</sup>	..	1,659	..
Natural and semi-natural <sup>6</sup>	..	1,046	..
<b>2001</b>			
Total built-up <sup>7</sup>	265	661	40
Settled	194	469	41
Roads	71	193	37
Arable <sup>5</sup>	..	1,531	..
Natural and semi-natural <sup>6</sup>	..	1,047	..
<b>2011</b>			
Total built-up <sup>7</sup>	281	693	41
Settled	209	497	42
Roads	73	197	37
Arable <sup>5</sup>	..	1,594	..
Natural and semi-natural <sup>6</sup>	..	953	..
Forest	..	580	..
Water	..	58	..
Other	..	314	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>4,7</sup>	137	146	...
Arable <sup>5</sup>	...	-7	...
Natural and semi-natural <sup>6</sup>	...	-23	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.

4. Built-up area for 1971 is based on *Canada Land Inventory Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), code B – Urban Built-up. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

5. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

6. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

7. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

8. For 2011, forest and water are broken out separately based on data from AAFC *Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](http://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](http://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <http://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.36**

**Ecosystem asset account, Kitchener–Cambridge–Waterloo census metropolitan area-ecosystem (CMA-E), 1971 to 2011**

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	181	101	1,722	1,237
Land lost to settled area	...	...	-214	-102
Balance of change <sup>4</sup>	316	96	86	-182
Closing stock 2011	497	197	1,594	953

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use (CLI: LU)* and *Canada Land Use Monitoring Program (CLUMP)*. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).
  2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.
  3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.
  4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.
- Note:** CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.
- Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

### Links to more information

Tables by metropolitan area, Kitchener–Cambridge–Waterloo

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met112-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met112-eng.htm)

Kitchener–Cambridge–Waterloo CMA, population change, 2006 to 2011, by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-541-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-541-013-01-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Kitchener–Cambridge–Waterloo CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=541&Geo2=PR&Code2=35&Data=Count&SearchText=kitchener&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=541&Geo2=PR&Code2=35&Data=Count&SearchText=kitchener&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Kitchener–Cambridge–Waterloo CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=541&Data=Count&SearchText=kitchener&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=541&Data=Count&SearchText=kitchener&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1)

### London, Ontario

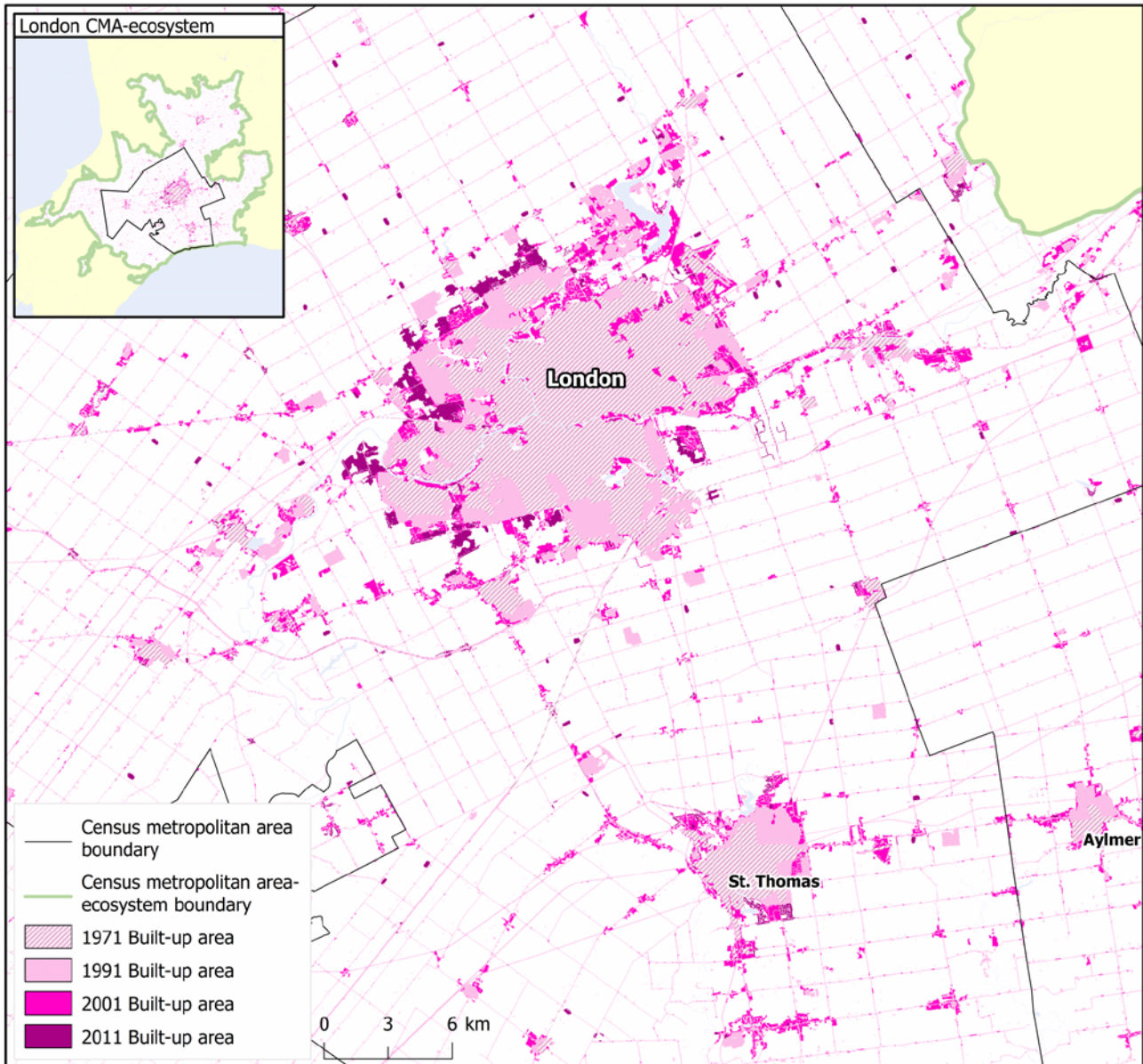
#### Highlights

- At the CMA level, built-up area increased from 167 km<sup>2</sup> in 1971 to 415 km<sup>2</sup> in 2011, an increase of 148%.
- At the CMA-E level, built-up area increased from 253 km<sup>2</sup> in 1971 to 798 km<sup>2</sup> in 2011, an increase of 215%.
- In 2011, the natural and semi-natural land class was divided into forest (52%), water (4%) and other (44%).
- From 1971 to 2011, 256 km<sup>2</sup> of arable land and 94 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 34.3% was forest, 58.5% was natural land for pasture and 7.2% was classed as other.
- Population in the CMA increased by 54% from 307,743 to 474,786 between 1971 and 2011.
- The number of dwellings in the CMA increased by 127% from 93,018 to 211,260 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.13

Built-up area, London census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Note:** Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

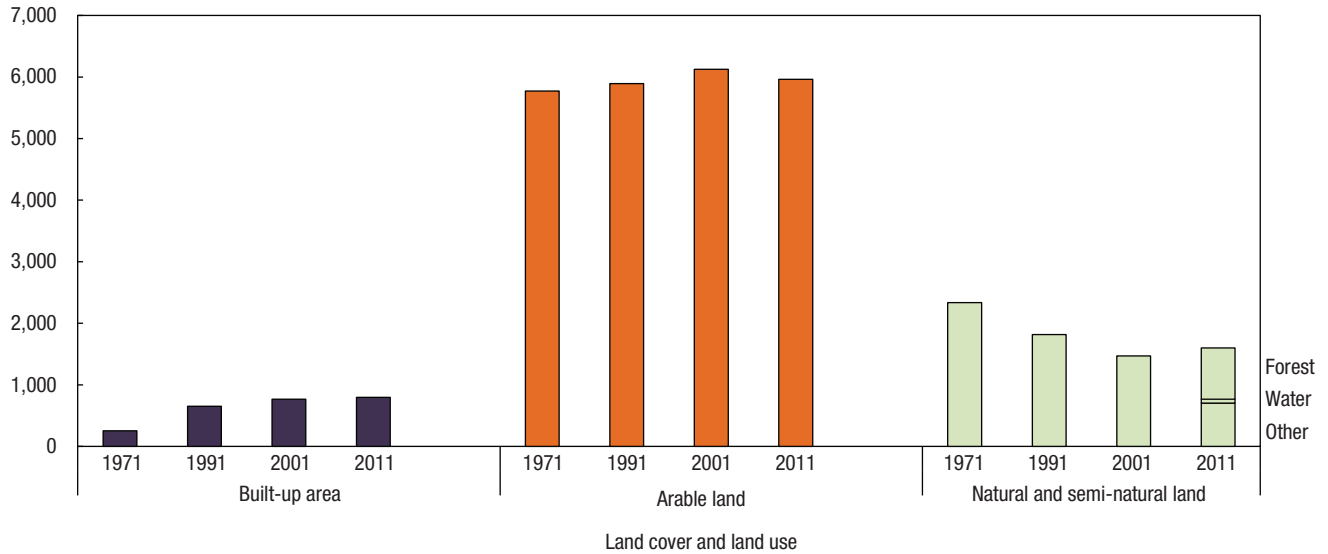
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.nrcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.25

### Land cover and land use, London census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres



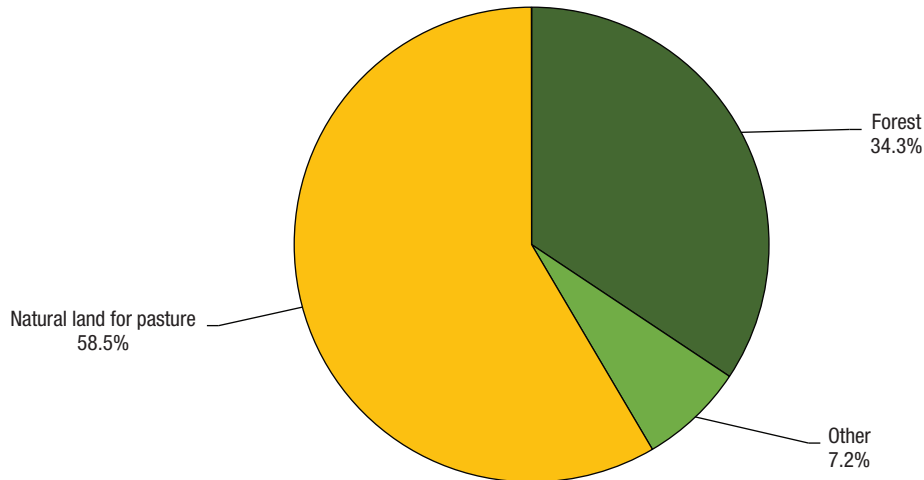
**Notes:** Built-up area for 1971 is based on *Canada Land Inventory: Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), with modeling of roads. CLI: LU and CLUMP built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCAN, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCAN, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.26

Natural and semi-natural land lost to settled area, by selected land class, London census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geotit/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geotit/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geotit/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geotit/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.37**

**Population and dwellings, total and settled area, London census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2</sup>	
	Total area	Settled area <sup>3</sup>	Total area	Settled area <sup>3</sup>
	number			
<b>1971</b>				
Population	307,743	272,709	440,607	338,024
Dwellings	93,018	83,689	131,207	104,180
<b>1991</b>				
Population	401,191	390,842	551,729	532,505
Dwellings	153,586	150,107	205,288	199,101
<b>2001</b>				
Population	435,007	417,436	589,585	535,075
Dwellings	184,310	178,105	241,778	223,458
<b>2011</b>				
Population	474,786	456,004	637,821	578,946
Dwellings	211,260	204,263	274,943	254,035
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	54	67	45	71
Dwellings	127	144	110	144

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population; Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.38**

**Land cover and land use, London census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	2,666	8,361	32
<b>1971</b>			
Total built-up <sup>3</sup>	167	253	66
Settled	104	135	77
Roads	63	118	54
Arable <sup>4</sup>	..	5,771	..
Natural and semi-natural <sup>5</sup>	..	2,337	..
<b>1991</b>			
Total built-up <sup>6</sup>	331	652	51
Settled	205	347	59
Roads	126	305	41
Arable <sup>4</sup>	..	5,892	..
Natural and semi-natural <sup>5</sup>	..	1,817	..
<b>2001</b>			
Total built-up <sup>6</sup>	397	767	52
Settled	270	460	59
Roads	127	307	41
Arable <sup>4</sup>	..	6,124	..
Natural and semi-natural <sup>5</sup>	..	1,470	..
<b>2011</b>			
Total built-up <sup>6</sup>	415	798	52
Settled	285	485	59
Roads	130	313	42
Arable <sup>4</sup>	..	5,963	..
Natural and semi-natural <sup>7</sup>	..	1,600	..
Forest	..	833	..
Water	..	62	..
Other	..	705	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>3,6</sup>	148	215	...
Arable <sup>4</sup>	...	3	...
Natural and semi-natural <sup>5</sup>	...	-32	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. Built-up area for 1971 is based on *Canada Land Inventory Land Use (CLI: LU)* and *Canada Land Use Monitoring Program (CLUMP)*, code B – Urban Built-up. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

4. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

5. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

6. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

7. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [http://ftp2.cits.mcan.gc.ca/pub/geot/CLI\\_250k/landuse/](http://ftp2.cits.mcan.gc.ca/pub/geot/CLI_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [http://ftp2.cits.mcan.gc.ca/pub/geot/clump/clump\\_1971/](http://ftp2.cits.mcan.gc.ca/pub/geot/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <http://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.39**

**Ecosystem asset account, London census metropolitan area-ecosystem (CMA-E), 1971 to 2011**

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	135	118	5,771	2,337
Land lost to settled area	...	...	-256	-94
Balance of change <sup>4</sup>	350	194	448	-643
Closing stock 2011	485	313	5,963	1,600

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP). CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).
  2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.
  3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.
  4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.
- Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

### Links to more information

Tables by metropolitan area, London

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met113-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met113-eng.htm)

London CMA, population change, 2006 to 2011, by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-555-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-555-013-01-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

London CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=555&Geo2=PR&Code2=35&Data=Count&SearchText=london&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=555&Geo2=PR&Code2=35&Data=Count&SearchText=london&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

London CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=555&Data=Count&SearchText=london&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=555&Data=Count&SearchText=london&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1)

### Moncton, New Brunswick

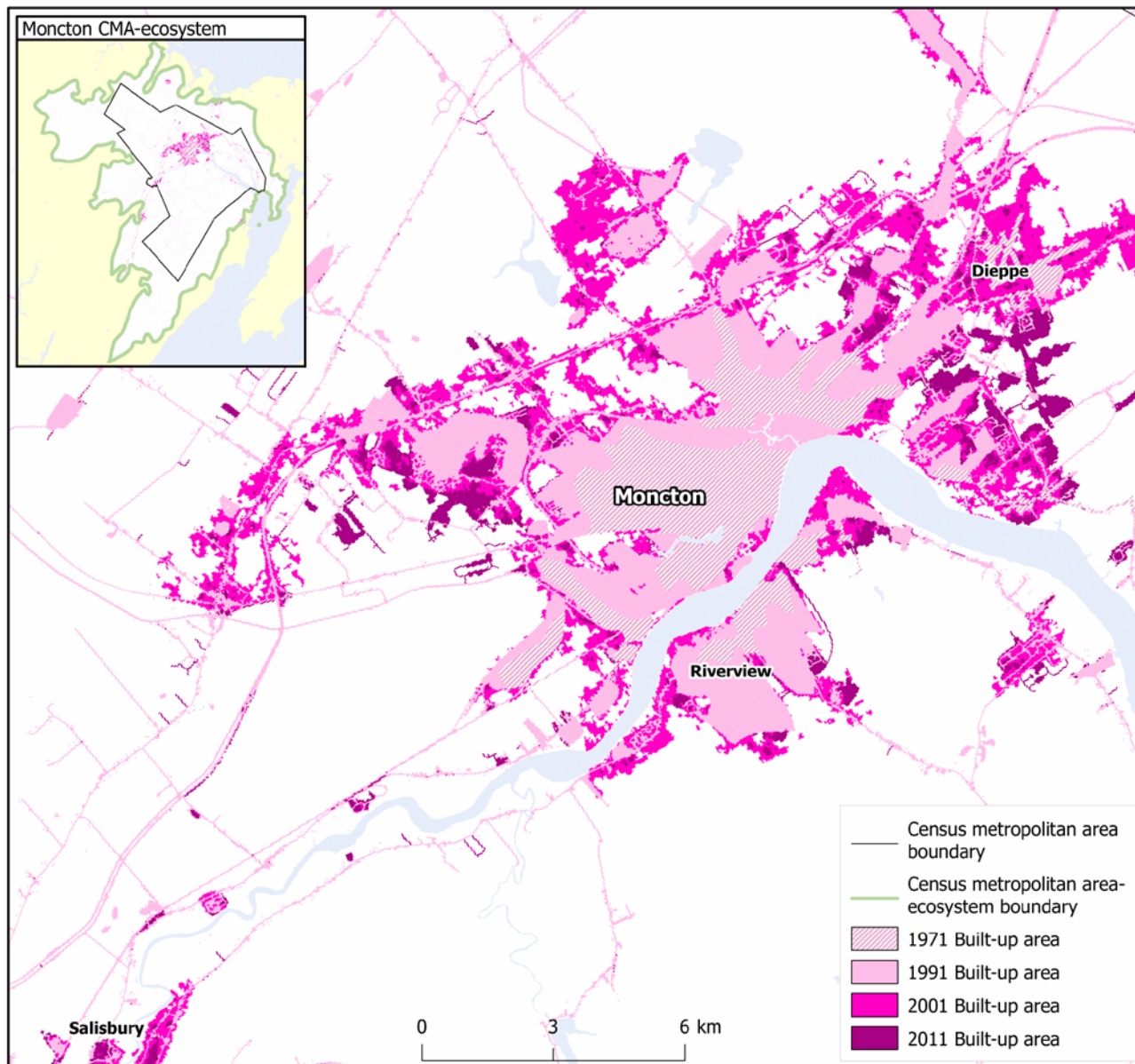
#### Highlights

- At the CMA level, built-up area increased from 30 km<sup>2</sup> in 1971 to 182 km<sup>2</sup> in 2011, an increase of 504%.
- At the CMA-E level, built-up area increased from 42 km<sup>2</sup> in 1971 to 262 km<sup>2</sup> in 2011, an increase of 522%.
- In 2011, the natural and semi-natural land class was divided into forest (79%), water (2%) and other (19%).
- From 1971 to 2011, 52 km<sup>2</sup> of arable land and 85 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 73.2% was forest, 21.2% was natural land for pasture and 5.7% was classed as other.
- Population in the CMA increased by 59% from 87,046 to 138,644 between 1971 and 2011.
- The number of dwellings in the CMA increased by 172% from 22,906 to 62,403 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.14

Built-up area, Moncton census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Notes:** Canada Land Use Monitoring Program (CLUMP) data were not available—the 1971 built-up area may be underestimated. Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

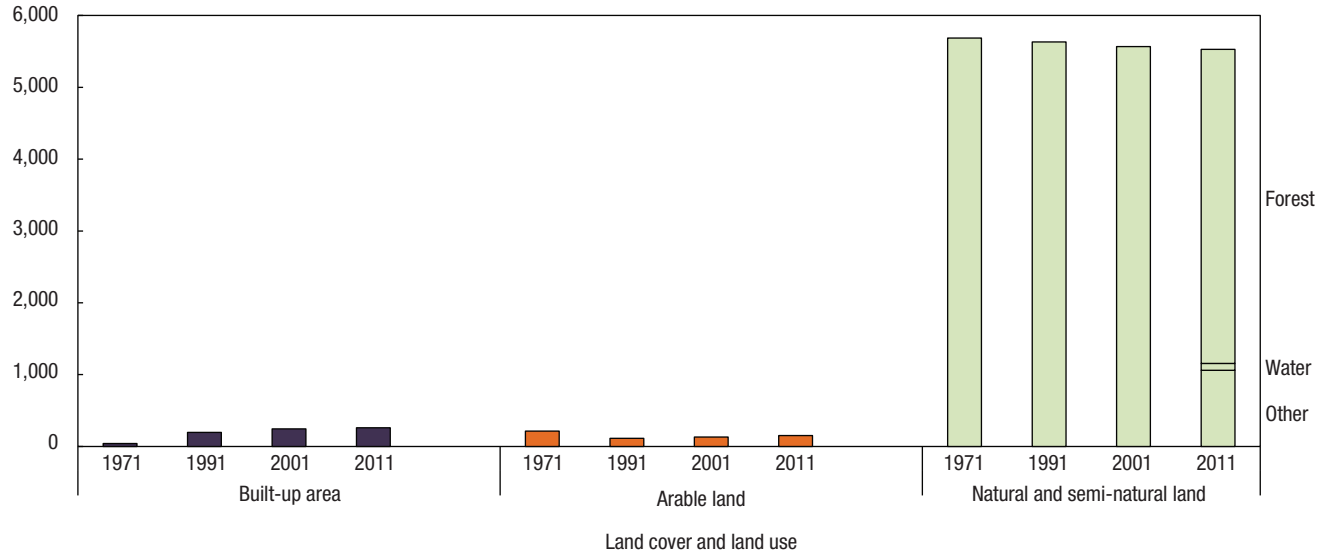
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/di\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/di_250k/landuse/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCAN, Canada Centre for Mapping and Earth Observation 2014, *CanVec+*, <ftp://ftp2.cits.nrcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.27

### Land cover and land use, Moncton census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres



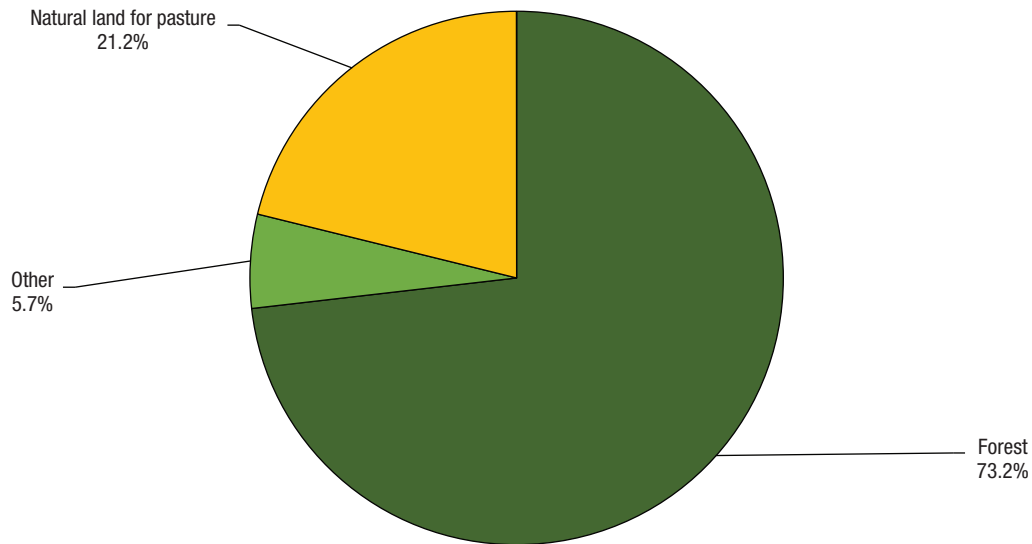
**Notes:** Built-up area for 1971 is based on *Canada Land Inventory: Land Use* (CLI: LU), with modeling of roads. *Canada Land Use Monitoring Program* (CLUMP) data exclude the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up areas may be underestimated for these CMAs. CLI: LU built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.28

Natural and semi-natural land lost to settled area, Moncton census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.40**

**Population and dwellings, total and settled area, Moncton census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2</sup>	
	Total area	Settled area <sup>3</sup>	Total area	Settled area <sup>3</sup>
	number			
<b>1971</b>				
Population	87,046	66,466	103,533	72,757
Dwellings	22,906	17,843	26,984	19,420
<b>1991</b>				
Population	108,449	98,250	129,606	111,685
Dwellings	39,410	36,159	46,688	40,832
<b>2001</b>				
Population	118,678	104,278	139,572	116,431
Dwellings	49,332	43,592	58,158	48,689
<b>2011</b>				
Population	138,644	124,273	160,180	136,642
Dwellings	62,403	56,426	72,281	62,110
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	59	87	55	88
Dwellings	172	216	168	220

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population and Natural Resources Canada, Canada Centre for Remote Sensing, 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.41**

**Land cover and land use, Moncton census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	2,406	5,941	41
<b>1971</b>			
Total built-up <sup>3</sup>	30	42	72
Settled	17	21	83
Roads	13	21	61
Arable <sup>4</sup>	..	214	..
Natural and semi-natural <sup>5</sup>	..	5,685	..
<b>1991</b>			
Total built-up <sup>6</sup>	129	195	66
Settled	73	96	76
Roads	55	99	56
Arable <sup>4</sup>	..	114	..
Natural and semi-natural <sup>5</sup>	..	5,632	..
<b>2001</b>			
Total built-up <sup>6</sup>	168	244	69
Settled	112	144	78
Roads	56	100	56
Arable <sup>4</sup>	..	131	..
Natural and semi-natural <sup>5</sup>	..	5,566	..
<b>2011</b>			
Total built-up <sup>6</sup>	182	262	70
Settled	123	158	78
Roads	59	103	57
Arable <sup>4</sup>	..	151	..
Natural and semi-natural <sup>7</sup>	..	5,528	..
Forest	..	4,372	..
Water	..	97	..
Other	..	1,060	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>3,6</sup>	504	522	...
Arable <sup>4</sup>	...	-29	...
Natural and semi-natural <sup>5</sup>	...	-3	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. Built-up area for 1971 is based on *Canada Land Inventory: Land Use* (CLI: LU), code B – Urban Built-up. *Canada Land Use Monitoring Program* (CLUMP) data exclude the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up areas may be underestimated for these CMAs. CLI: LU built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

4. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

5. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

6. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

7. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing, 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.rncan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.42**

**Ecosystem asset account, Moncton census metropolitan area-ecosystem (CMA-E), 1971 to 2011**

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	21	21	214	5,685
Land lost to settled area	...	...	-52	-85
Balance of change <sup>4</sup>	137	82	-11	-71
Closing stock 2011	158	103	151	5,528

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use* (CLI: LU). *Canada Land Use Monitoring Program* (CLUMP) data exclude the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up may be underestimated for these CMAs. CLI: LU built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.

3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.

4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing, 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.rncan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

### Links to more information

Tables by metropolitan area, Moncton

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met114-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met114-eng.htm)

Moncton CMA, population change, 2006 to 2011, by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-305-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-305-013-01-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Moncton CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=305&Geo2=PR&Code2=13&Data=Count&SearchText=moncton&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=305&Geo2=PR&Code2=13&Data=Count&SearchText=moncton&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Moncton CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=305&Data=Count&SearchText=moncton&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=305&Data=Count&SearchText=moncton&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

### Montréal, Quebec

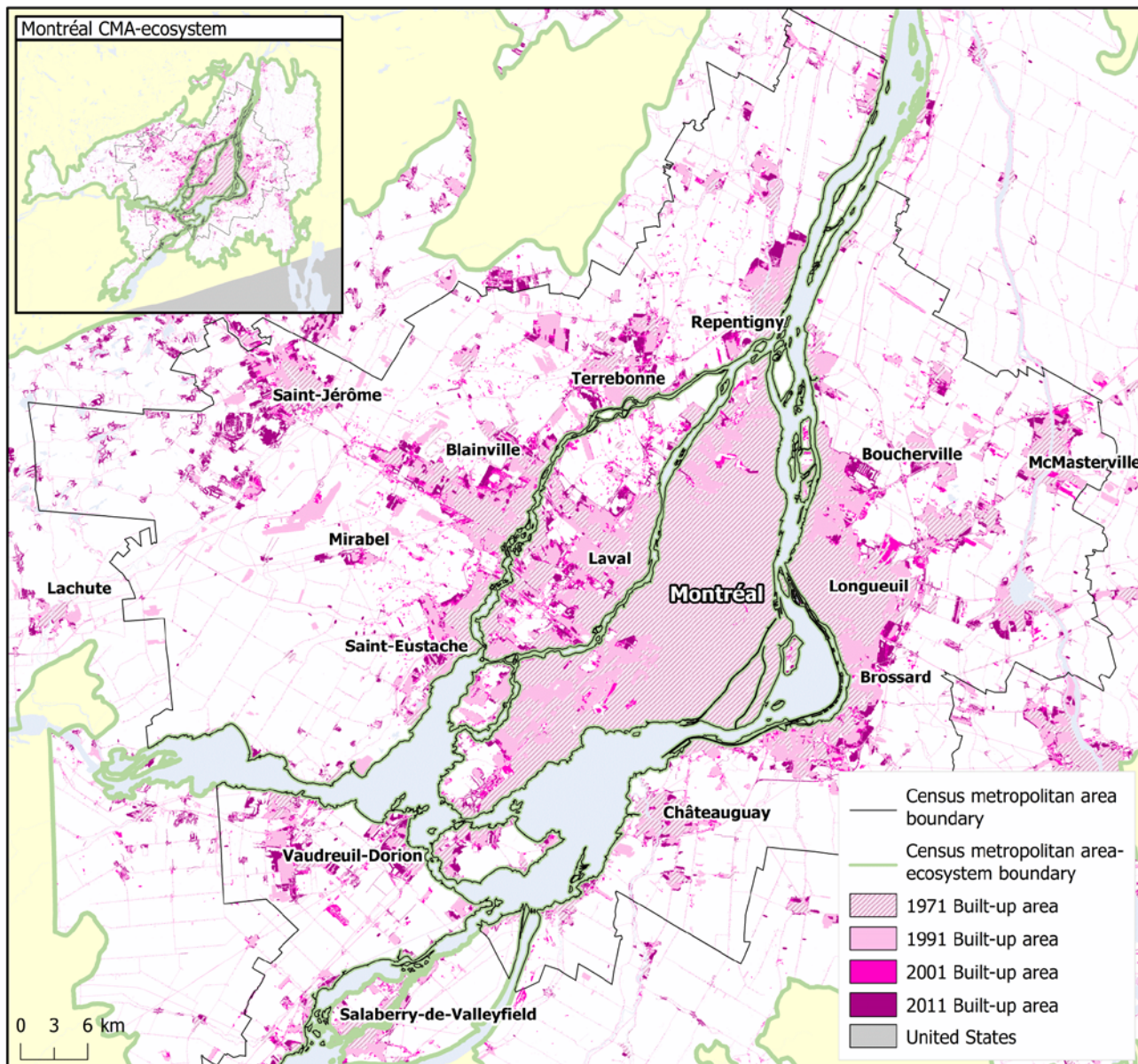
#### Highlights

- At the CMA level, built-up area increased from 755 km<sup>2</sup> in 1971 to 1,571 km<sup>2</sup> in 2011, an increase of 108%.
- At the CMA-E level, built-up area increased from 875 km<sup>2</sup> in 1971 to 2,135 km<sup>2</sup> in 2011, an increase of 144%.
- In 2011, the natural and semi-natural land class was divided into forest (66%), water (5%) and other (28%).
- From 1971 to 2011, 448 km<sup>2</sup> of arable land and 462 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 60.3% was forest, 24.3% was natural land for pasture and 15.4% was classed as other.
- Population in the CMA increased by 35% from 2,823,639 to 3,824,221 between 1971 and 2011.
- The number of dwellings in the CMA increased by 105% from 826,231 to 1,696,210 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.15

Built-up area, Montréal census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Note:** Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

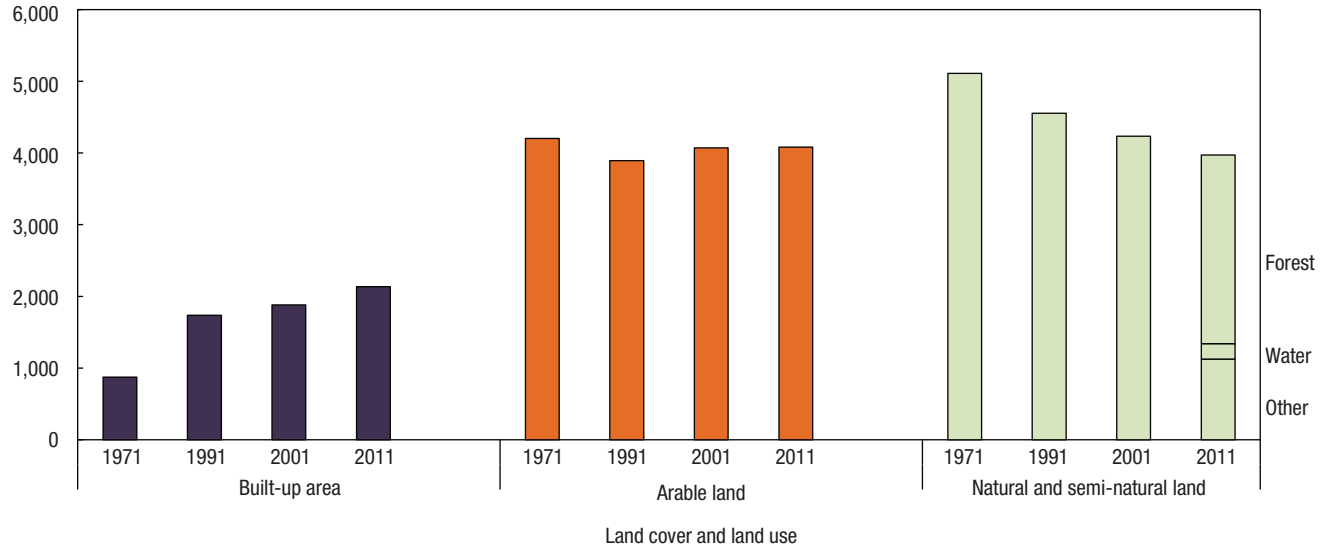
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.nrcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015); United States Census Bureau, 2014, *Digital cartographic file in shapefile format – States*, file: cb\_2014\_us\_state\_500k.zip, [http://www.census.gov/geo/maps-data/data/cbf/cbf\\_state.html](http://www.census.gov/geo/maps-data/data/cbf/cbf_state.html) (accessed October 29, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.29

### Land cover and land use, Montréal census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres

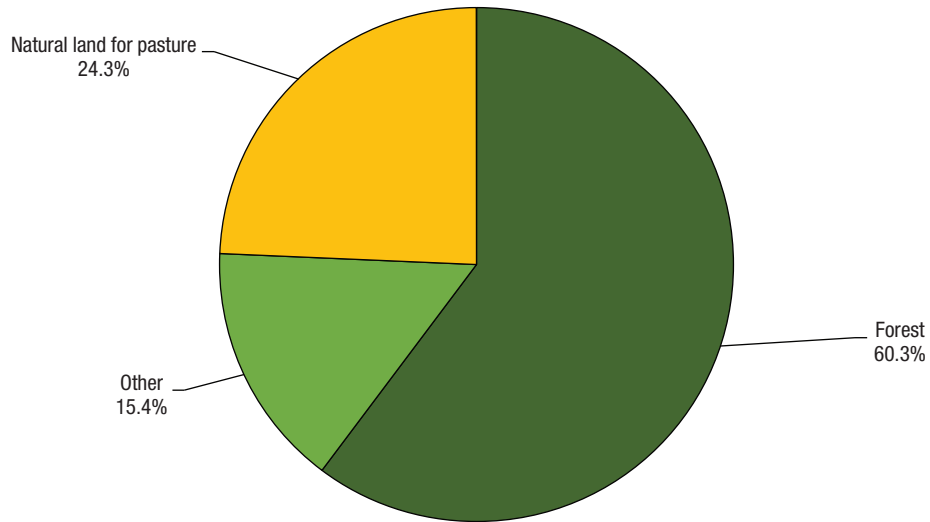


**Notes:** Built-up area for 1971 is based on *Canada Land Inventory: Land Use (CLI: LU)* and *Canada Land Use Monitoring Program (CLUMP)*, with modeling of roads. CLI: LU and CLUMP built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the *Interpolated Census of Agriculture*. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCAN, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCAN, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

Chart 3.30

Natural and semi-natural land lost to settled area, by selected land class, Montréal census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.43**

**Population and dwellings, total and settled area, Montréal census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2</sup>	
	Total area	Settled area <sup>3</sup>	Total area	Settled area <sup>3</sup>
	number			
<b>1971</b>				
Population	2,823,639	2,758,768	3,124,315	2,973,546
Dwellings	826,231	810,470	903,950	867,375
<b>1991</b>				
Population	3,222,845	3,180,063	3,598,555	3,529,718
Dwellings	1,271,255	1,256,706	1,412,311	1,388,874
<b>2001</b>				
Population	3,398,965	3,361,378	3,793,042	3,701,182
Dwellings	1,458,594	1,444,556	1,630,258	1,594,313
<b>2011</b>				
Population	3,824,221	3,786,936	4,282,453	4,187,393
Dwellings	1,696,210	1,681,399	1,905,583	1,866,568
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	35	37	37	41
Dwellings	105	107	111	115

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population; Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.44**

**Land cover and land use, Montréal census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	4,258	10,186	42
<b>1971</b>			
Total built-up <sup>3</sup>	755	875	86
Settled	520	581	89
Roads	235	294	80
Arable <sup>4</sup>	..	4,201	..
Natural and semi-natural <sup>5</sup>	..	5,110	..
<b>1991</b>			
Total built-up <sup>6</sup>	1,297	1,737	75
Settled	893	1,153	77
Roads	404	584	69
Arable <sup>4</sup>	..	3,894	..
Natural and semi-natural <sup>5</sup>	..	4,555	..
<b>2001</b>			
Total built-up <sup>6</sup>	1,410	1,882	75
Settled	999	1,291	77
Roads	410	591	69
Arable <sup>4</sup>	..	4,070	..
Natural and semi-natural <sup>5</sup>	..	4,234	..
<b>2011</b>			
Total built-up <sup>6</sup>	1,571	2,135	74
Settled	1,128	1,491	76
Roads	443	643	69
Arable <sup>4</sup>	..	4,081	..
Natural and semi-natural <sup>7</sup>	..	3,970	..
Forest	..	2,629	..
Water	..	216	..
Other	..	1,125	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>3,6</sup>	108	144	...
Arable <sup>4</sup>	...	-3	...
Natural and semi-natural <sup>5</sup>	...	-22	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. Built-up area for 1971 is based on *Canada Land Inventory Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), code B – Urban Built-up. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

4. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

5. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

6. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

7. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](http://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](http://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <http://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.45**

**Ecosystem asset account, Montréal census metropolitan area-ecosystem (CMA-E), 1971 to 2011**

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	581	294	4,201	5,110
Land lost to settled area	...	...	-448	-462
Balance of change <sup>4</sup>	911	349	328	-677
Closing stock 2011	1,491	643	4,081	3,970

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use (CLI: LU)* and *Canada Land Use Monitoring Program (CLUMP)*. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).
  2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.
  3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.
  4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.
- Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

### Links to more information

Tables by metropolitan area, Montréal

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met115-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met115-eng.htm)

Montréal CMA, percentage of private dwellings owned by a member of the household, 2011 (Map 1 of 2)

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-462-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-462-013-01-00-eng.pdf)

Montréal CMA, percentage of private dwellings owned by a member of the household, 2011 (Map 2 of 2)

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-462-013-01-01-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-462-013-01-01-eng.pdf)

Montréal CMA, percentage of owner households spending 30% or more in shelter costs, 2011 (Map 1 of 2)

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-462-013-02-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-462-013-02-00-eng.pdf)

Montréal CMA, percentage of owner households spending 30% or more in shelter costs, 2011 (Map 2 of 2)

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-462-013-02-01-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-462-013-02-01-eng.pdf)

Montréal CMA, percentage of renter households spending 30% or more in shelter costs, 2011 (Map 1 of 2)

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-462-013-03-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-462-013-03-00-eng.pdf)

Montréal CMA, percentage of renter households spending 30% or more in shelter costs, 2011 (Map 2 of 2)

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-462-013-03-01-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-462-013-03-01-eng.pdf)

Montréal CMA average value of owned private dwellings, 2011 (Map 1 of 2)

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-462-013-04-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-462-013-04-00-eng.pdf)

Montréal CMA average value of owned private dwellings, 2011 (Map 2 of 2)

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-462-013-04-01-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-462-013-04-01-eng.pdf)

Montréal CMA, population change, 2006 to 2011, by 2011 census tract (Map 1 of 2)

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-462-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-462-013-01-00-eng.pdf)

Montréal CMA, population change, 2006 to 2011, by 2011 census tract (Map 2 of 2)

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-462-013-01-01-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-462-013-01-01-eng.pdf)

Montréal CMA, percentage of the employed labour force using a car, truck or van to get to work in 2011, by 2011 census tract (Map 1 of 2)

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99012-005-462-013-07-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99012-005-462-013-07-00-eng.pdf)

Montréal CMA, percentage of the employed labour force using a car, truck or van to get to work in 2011, by 2011 census tract (Map 2 of 2)

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99012-005-462-013-07-01-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99012-005-462-013-07-01-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Montréal CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=462&Geo2=PR&Code2=24&Data=Count&SearchText=montreal&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=462&Geo2=PR&Code2=24&Data=Count&SearchText=montreal&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Montréal CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=462&Data=Count&SearchText=montreal&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=462&Data=Count&SearchText=montreal&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1)

### Oshawa, Ontario

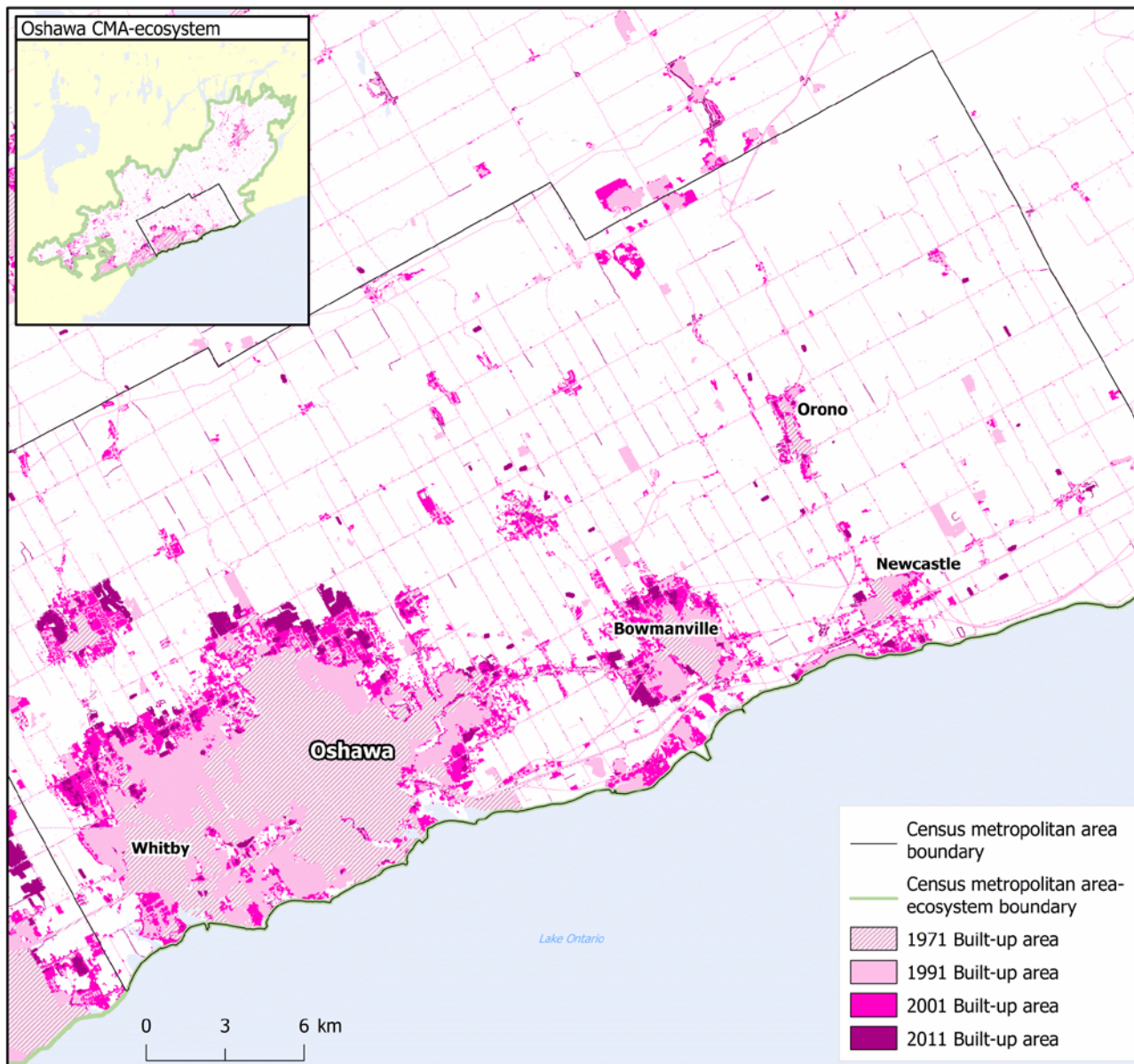
#### Highlights

- At the CMA level, built-up area increased from 77 km<sup>2</sup> in 1971 to 236 km<sup>2</sup> in 2011, an increase of 207%.
- At the CMA-E level, built-up area increased from 202 km<sup>2</sup> in 1971 to 816 km<sup>2</sup> in 2011, an increase of 303%.
- In 2011, the natural and semi-natural land class was divided into forest (42%), water (8%) and other (51%).
- From 1971 to 2011, 290 km<sup>2</sup> of arable land and 155 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 42.7% was forest, 45.7% was natural land for pasture and 11.6% was classed as other.
- Population in the CMA increased by 141% from 147,516 to 356,177 between 1971 and 2011.
- The number of dwellings in the CMA increased by 224% from 41,350 to 134,034 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.16

Built-up area, Oshawa census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Note:** Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

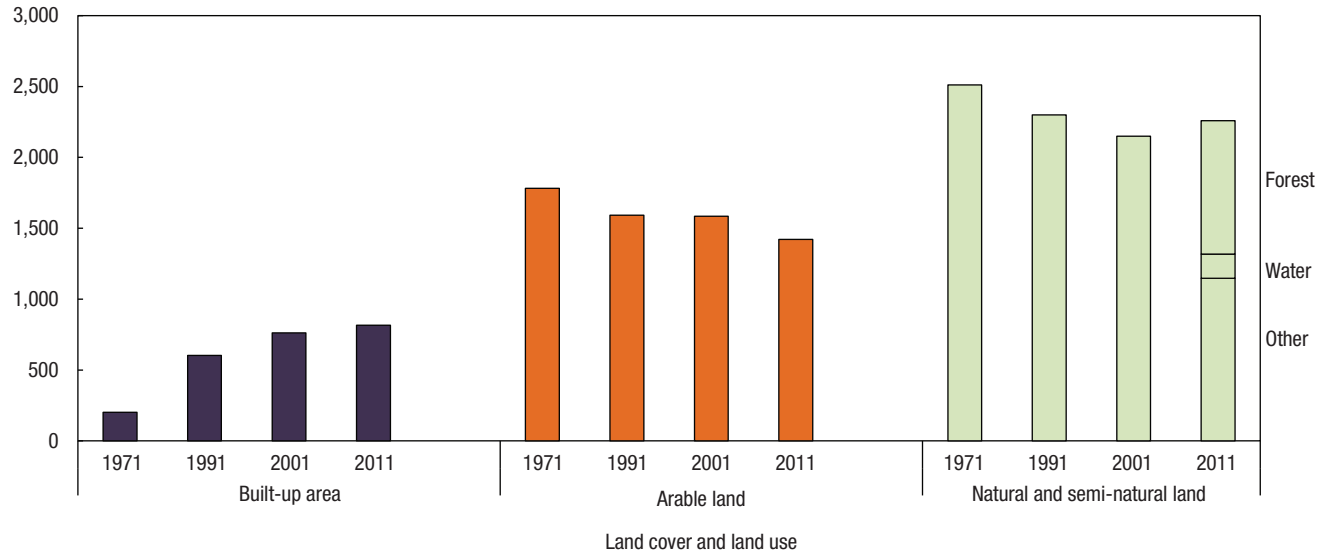
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.nrcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.31

### Land cover and land use, Oshawa census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres



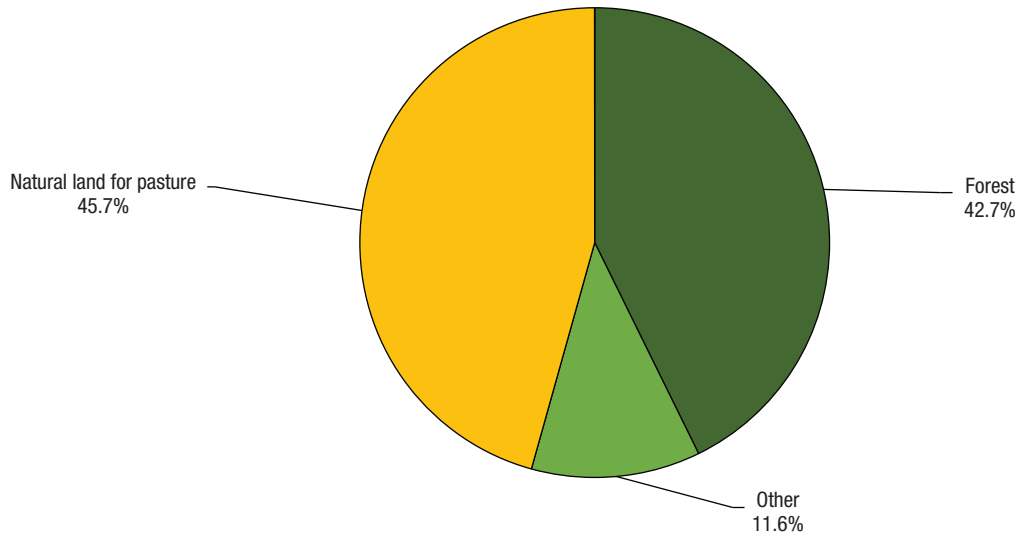
**Notes:** CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries. Built-up area for 1971 is based on *Canada Land Inventory: Land Use (CLI: LU)* and *Canada Land Use Monitoring Program (CLUMP)*, with modeling of roads. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC Land Use 1990 dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from Land Use, 1990, 2000 and 2010. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCAN, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCAN, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.32

Natural and semi-natural land lost to settled area, by selected land class, Oshawa census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geotit/cli\\_250k/landuse/](http://ftp2.cits.mcan.gc.ca/pub/geotit/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geotit/clump/clump\\_1971/](http://ftp2.cits.mcan.gc.ca/pub/geotit/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.46**

**Population and dwellings, total and settled area, Oshawa census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2,3</sup>	
	Total area	Settled area <sup>4</sup>	Total area	Settled area <sup>4</sup>
	number			
<b>1971</b>				
Population	147,516	131,523	351,653	286,139
Dwellings	41,350	37,266	97,204	80,006
<b>1991</b>				
Population	240,104	234,530	756,935	729,969
Dwellings	82,909	81,140	244,856	236,289
<b>2001</b>				
Population	294,878	291,542	941,207	913,072
Dwellings	106,004	104,867	316,265	306,313
<b>2011</b>				
Population	356,177	351,762	1,217,480	1,189,779
Dwellings	134,034	132,431	422,493	411,841
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	141	167	246	316
Dwellings	224	255	335	415

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.

4. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population; Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.47**

**Land cover and land use, Oshawa census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2,3</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	904	4,496	20
<b>1971</b>			
Total built-up <sup>4</sup>	77	202	38
Settled	51	126	40
Roads	26	76	34
Arable <sup>5</sup>	..	1,782	..
Natural and semi-natural <sup>6</sup>	..	2,512	..
<b>1991</b>			
Total built-up <sup>7</sup>	173	603	29
Settled	114	377	30
Roads	59	227	26
Arable <sup>5</sup>	..	1,592	..
Natural and semi-natural <sup>6</sup>	..	2,300	..
<b>2001</b>			
Total built-up <sup>7</sup>	220	762	29
Settled	159	530	30
Roads	62	232	27
Arable <sup>5</sup>	..	1,584	..
Natural and semi-natural <sup>6</sup>	..	2,149	..
<b>2011</b>			
Total built-up <sup>7</sup>	236	816	29
Settled	170	571	30
Roads	66	244	27
Arable <sup>5</sup>	..	1,421	..
Natural and semi-natural <sup>8</sup>	..	2,259	..
Forest	..	941	..
Water	..	171	..
Other	..	1,146	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>4,7</sup>	207	303	...
Arable <sup>5</sup>	...	-20	...
Natural and semi-natural <sup>6</sup>	...	-10	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.

4. Built-up area for 1971 is based on *Canada Land Inventory Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), code B – Urban Built-up. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

5. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

6. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

7. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

8. For 2011, forest and water are broken out separately based on data from AAFC *Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](http://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](http://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <http://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.48**

**Ecosystem asset account, Oshawa census metropolitan area-ecosystem (CMA-E), 1971 to 2011**

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	126	76	1,782	2,512
Land lost to settled area	...	...	-290	-155
Balance of change <sup>4</sup>	445	168	-70	-98
Closing stock 2011	571	244	1,421	2,259

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use (CLI: LU)* and *Canada Land Use Monitoring Program (CLUMP)*. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).
  2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.
  3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.
  4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.
- Note:** CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.
- Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

### Links to more information

Tables by metropolitan area, Oshawa

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met116-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met116-eng.htm)

Oshawa CMA, population change, 2006 to 2011, by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-532-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-532-013-01-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Oshawa CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=532&Geo2=PR&Code2=35&Data=Count&SearchText=oshowa&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=532&Geo2=PR&Code2=35&Data=Count&SearchText=oshowa&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Oshawa CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=532&Data=Count&SearchText=oshowa&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=532&Data=Count&SearchText=oshowa&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1)

### Ottawa–Gatineau, Ontario

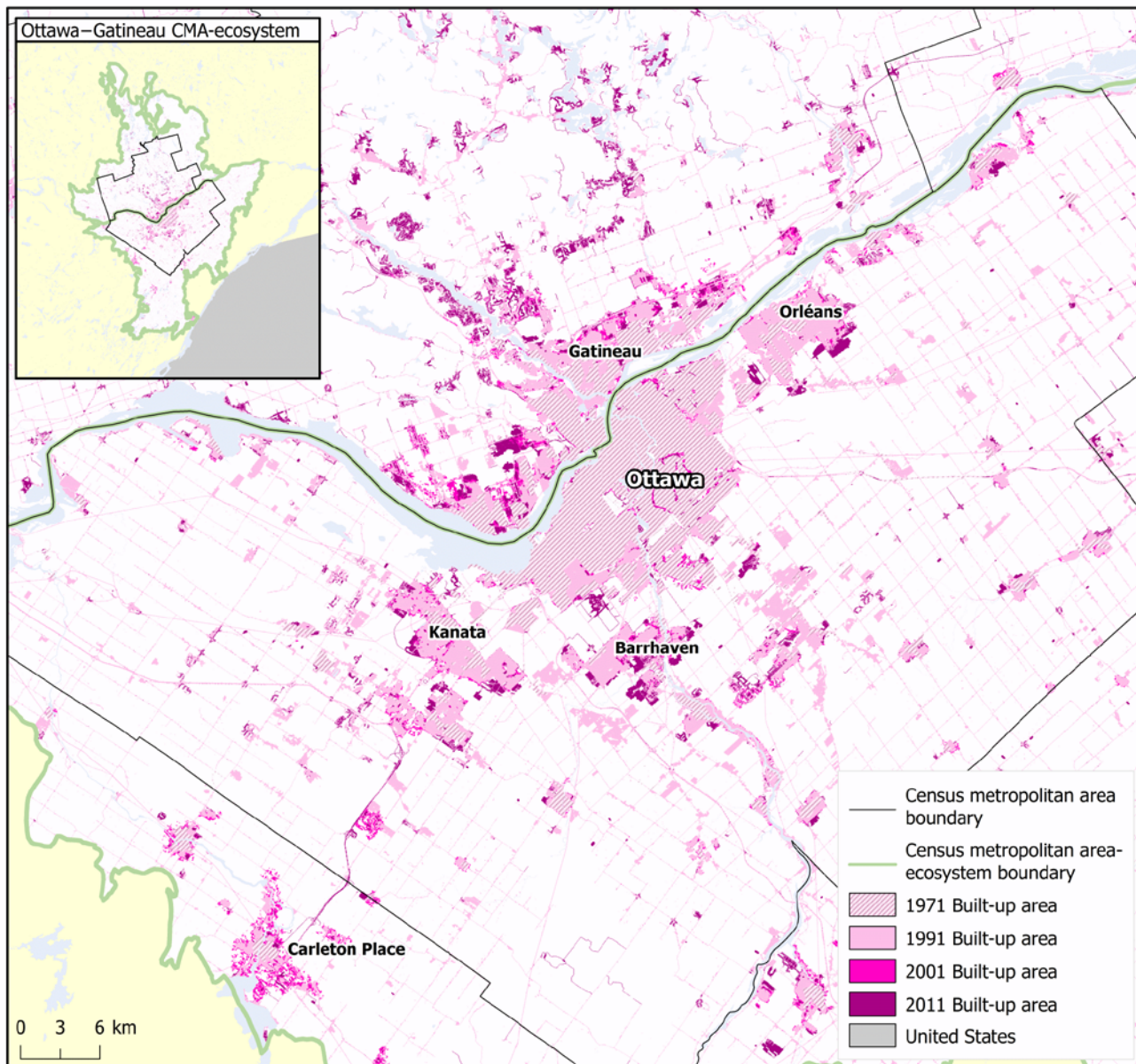
#### Highlights

- At the CMA level, built-up area increased from 219 km<sup>2</sup> in 1971 to 635 km<sup>2</sup> in 2011, an increase of 191%.
- At the CMA-E level, built-up area increased from 280 km<sup>2</sup> in 1971 to 1,017 km<sup>2</sup> in 2011, an increase of 264%.
- In 2011, the natural and semi-natural land class was divided into forest (54%), water (9%) and other (37%).
- From 1971 to 2011, 295 km<sup>2</sup> of arable land and 217 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 55.3% was forest, 36.5% was natural land for pasture and 8.1% was classed as other.
- Population in the CMA increased by 90% from 484,326 to 921,823 between 1971 and 2011.
- The number of dwellings in the CMA increased by 174% from 140,225 to 384,358 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.17

Built-up area, Ottawa–Gatineau (Ontario part) census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Note:** Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

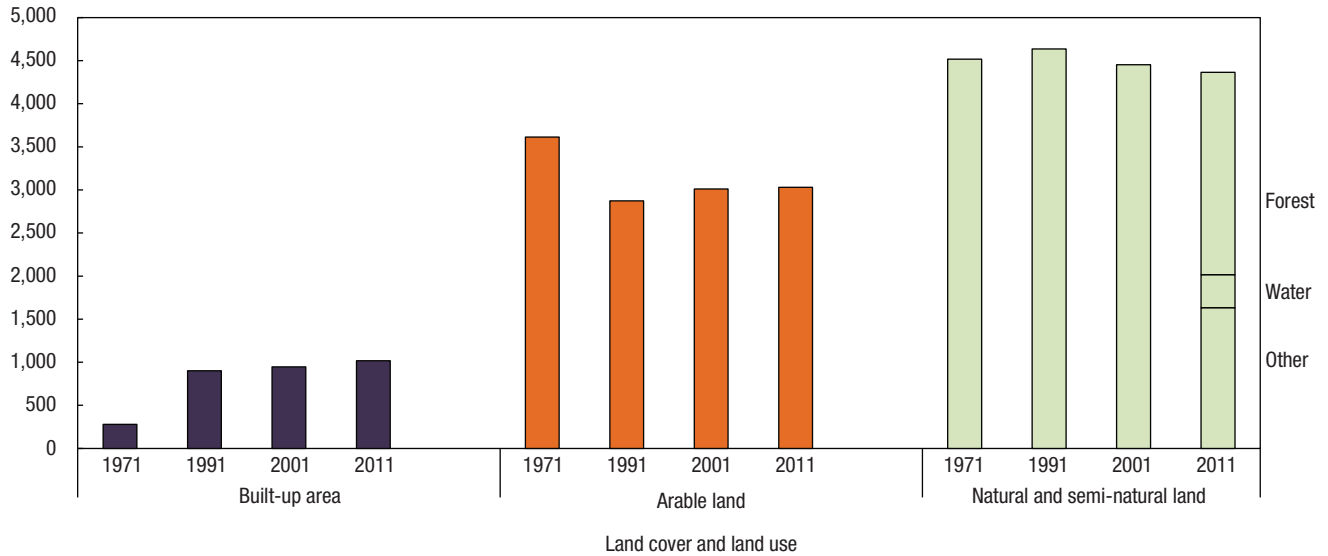
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.nrcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015); United States Census Bureau, 2014, *Digital cartographic file in shapefile format – States*, file: cb\_2014\_us\_state\_500k.zip, [http://www.census.gov/geo/maps-data/data/cbf/cbf\\_state.html](http://www.census.gov/geo/maps-data/data/cbf/cbf_state.html) (accessed October 29, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.33

### Land cover and land use, Ottawa–Gatineau (Ontario part) census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres

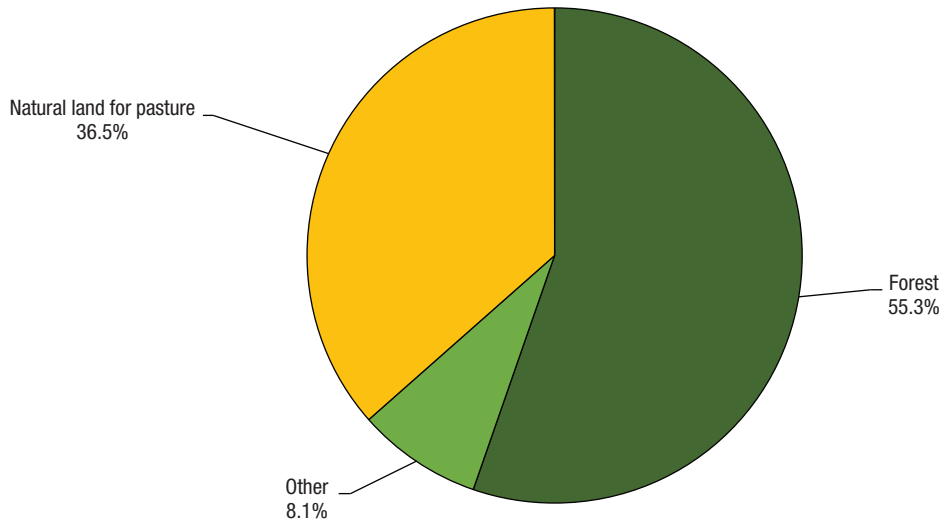


**Notes:** Built-up area for 1971 is based on *Canada Land Inventory: Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), with modeling of roads. CLI: LU and CLUMP built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the *Interpolated Census of Agriculture*. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCAN, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCAN, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

Chart 3.34

Natural and semi-natural land lost to settled area, by selected land class, Ottawa–Gatineau (Ontario part) census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geotit/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geotit/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geotit/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geotit/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.49**

**Population and dwellings, total and settled area, Ottawa–Gatineau (Ontario part) census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2</sup>	
	Total area	Settled area <sup>3</sup>	Total area	Settled area <sup>3</sup>
	number			
<b>1971</b>				
Population	484,326	449,959	603,460	522,805
Dwellings	140,225	131,410	173,692	153,145
<b>1991</b>				
Population	704,559	675,322	852,377	815,688
Dwellings	268,313	258,717	322,661	310,600
<b>2001</b>				
Population	806,096	777,929	967,863	900,059
Dwellings	321,083	311,425	388,156	363,931
<b>2011</b>				
Population	921,823	888,782	1,090,459	1,022,344
Dwellings	384,358	372,368	458,027	432,218
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	90	98	81	96
Dwellings	174	183	164	182

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population; Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.50**

**Land cover and land use, Ottawa–Gatineau (Ontario part) census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	3,287	8,411	39
<b>1971</b>			
Total built-up <sup>3</sup>	219	280	78
Settled	153	185	83
Roads	65	95	69
Arable <sup>4</sup>	..	3,614	..
Natural and semi-natural <sup>5</sup>	..	4,517	..
<b>1991</b>			
Total built-up <sup>6</sup>	572	902	63
Settled	401	596	67
Roads	171	305	56
Arable <sup>4</sup>	..	2,873	..
Natural and semi-natural <sup>5</sup>	..	4,636	..
<b>2001</b>			
Total built-up <sup>6</sup>	591	947	62
Settled	419	641	65
Roads	171	306	56
Arable <sup>4</sup>	..	3,010	..
Natural and semi-natural <sup>5</sup>	..	4,454	..
<b>2011</b>			
Total built-up <sup>6</sup>	635	1,017	62
Settled	455	697	65
Roads	180	320	56
Arable <sup>4</sup>	..	3,030	..
Natural and semi-natural <sup>7</sup>	..	4,364	..
Forest	..	2,349	..
Water	..	382	..
Other	..	1,634	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>3,6</sup>	191	264	...
Arable <sup>4</sup>	...	-16	...
Natural and semi-natural <sup>5</sup>	...	-3	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. Built-up area for 1971 is based on *Canada Land Inventory Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), code B – Urban Built-up. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

4. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

5. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

6. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

7. For 2011, forest and water are broken out separately based on data from AAFC *Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](http://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](http://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <http://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.51**

**Ecosystem asset account, Ottawa–Gatineau (Ontario part) census metropolitan area-ecosystem (CMA-E), 1971 to 2011**

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	185	95	3,614	4,517
Land lost to settled area	...	...	-295	-217
Balance of change <sup>4</sup>	512	226	-289	64
Closing stock 2011	697	320	3,030	4,364

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use (CLI: LU)* and *Canada Land Use Monitoring Program (CLUMP)*. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).
  2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.
  3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.
  4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.
- Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

### Links to more information

Tables by metropolitan area, Ottawa–Gatineau (Ont.–Que.)

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met117-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met117-eng.htm)

Ottawa–Gatineau (Ont.–Que.) CMA, percentage of private dwellings owned by a member of the household, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-505-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-505-013-01-00-eng.pdf)

Ottawa–Gatineau (Ont.–Que.) CMA, percentage of owner households spending 30% or more in shelter costs, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-505-013-02-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-505-013-02-00-eng.pdf)

Ottawa–Gatineau (Ont.–Que.) CMA, percentage of renter households spending 30% or more in shelter costs, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-505-013-03-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-505-013-03-00-eng.pdf)

Ottawa–Gatineau (Ont.–Que.) CMA average value of owned private dwellings, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-505-013-04-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-505-013-04-00-eng.pdf)

Ottawa–Gatineau (Ont.–Que.) CMA, population change, 2006 to 2011, by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-505-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-505-013-01-00-eng.pdf)

Ottawa–Gatineau (Ont.–Que.) CMA, percentage of the employed labour force using a car, truck or van to get to work in 2011, by 2011 census tract

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99012-005-505-013-07-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99012-005-505-013-07-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Ottawa–Gatineau (Ont.) CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=50535&Geo2=PR&Code2=35&Data=Count&SearchText=ottawa&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=50535&Geo2=PR&Code2=35&Data=Count&SearchText=ottawa&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Ottawa–Gatineau (Ont.) CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=50535&Data=Count&SearchText=ottawa&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=50535&Data=Count&SearchText=ottawa&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1)

### Ottawa–Gatineau, Quebec

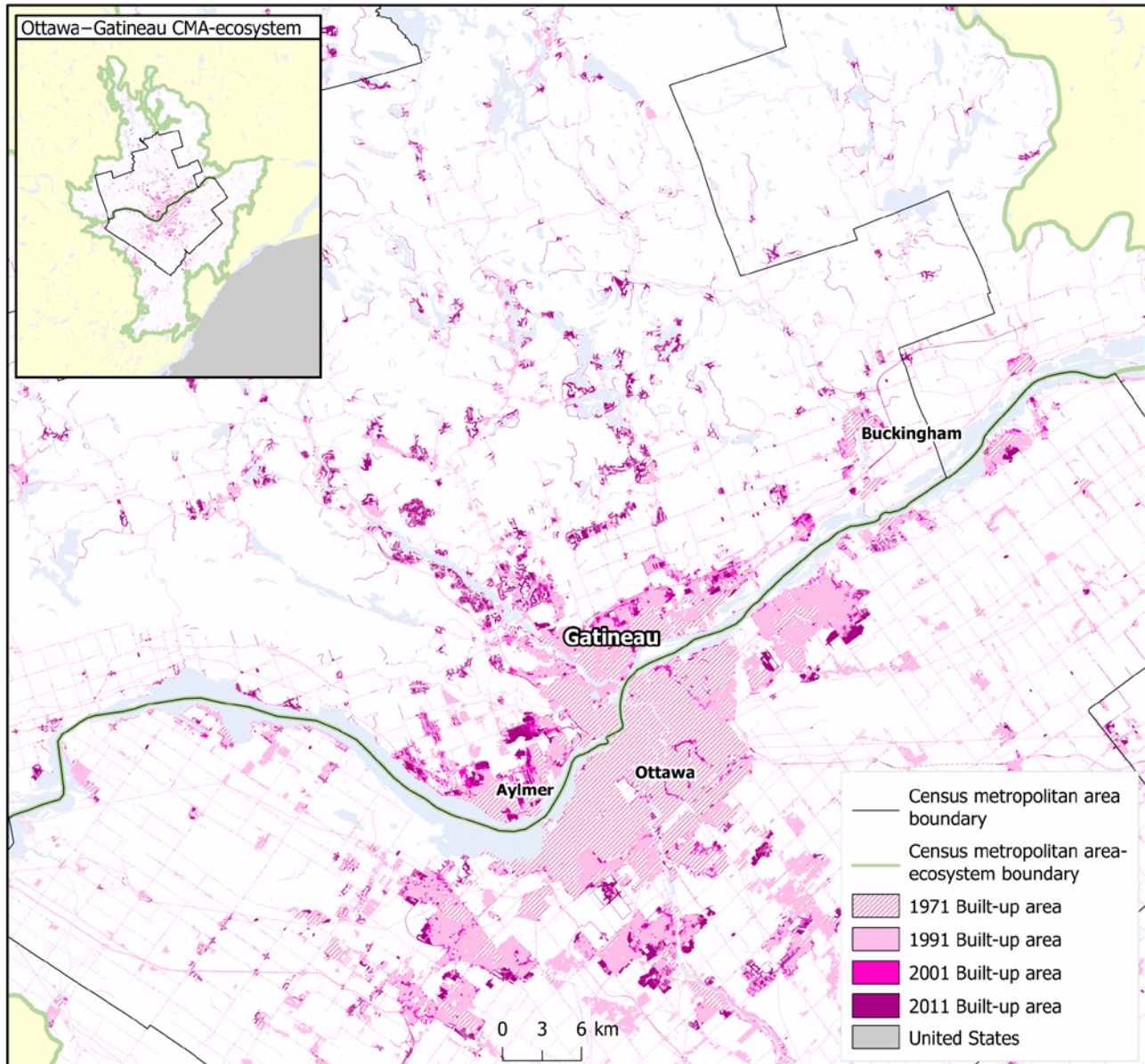
#### Highlights

- At the CMA level, built-up area increased from 67 km<sup>2</sup> in 1971 to 328 km<sup>2</sup> in 2011, an increase of 391%.
- At the CMA-E level, built-up area increased from 77 km<sup>2</sup> in 1971 to 463 km<sup>2</sup> in 2011, an increase of 505%.
- In 2011, the natural and semi-natural land class was divided into forest (85%), water (12%) and other (3%).
- From 1971 to 2011, 72 km<sup>2</sup> of arable land and 168 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 63.7% was forest, 21.1% was natural land for pasture and 15.2% was classed as other.
- Population in the CMA increased by 93% from 162,709 to 314,501 between 1971 and 2011.
- The number of dwellings in the CMA increased by 246% from 41,176 to 142,269 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.18

Built-up area, Ottawa–Gatineau (Quebec part) census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Note:** Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

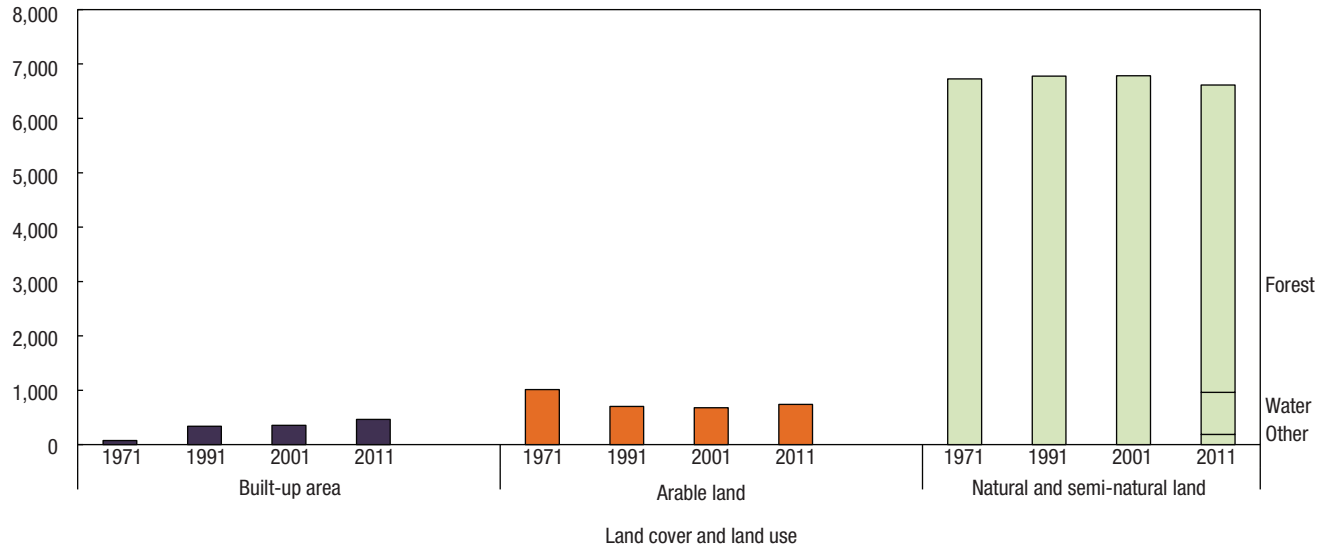
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.nrcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015); United States Census Bureau, 2014, *Digital cartographic file in shapefile format – States*, file: cb\_2014\_us\_state\_500k.zip, [http://www.census.gov/geo/maps-data/data/cbf/cbf\\_state.html](http://www.census.gov/geo/maps-data/data/cbf/cbf_state.html) (accessed October 29, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.35

### Land cover and land use, Ottawa–Gatineau (Quebec part) census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres



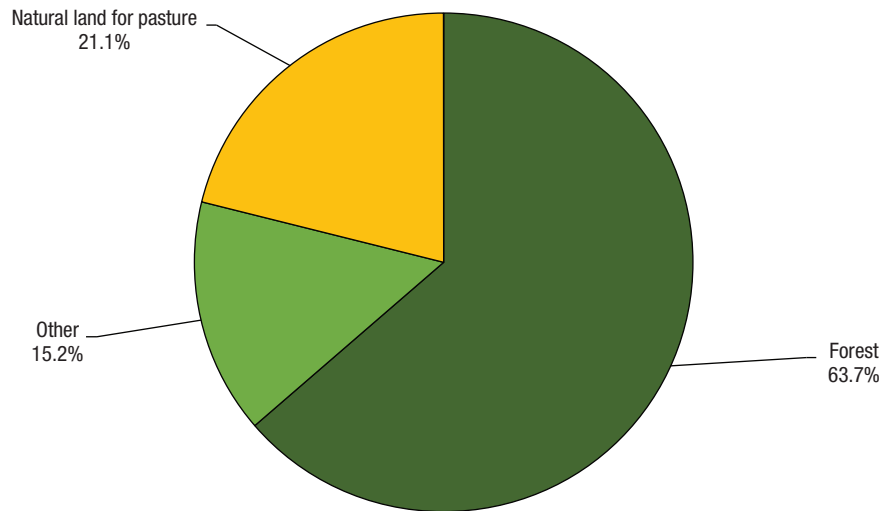
**Notes:** Built-up area for 1971 is based on *Canada Land Inventory: Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), with modeling of roads. CLI: LU and CLUMP built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the *Interpolated Census of Agriculture*. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.36

Natural and semi-natural land lost to settled area, by selected land class, Ottawa–Gatineau (Quebec part) census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.52**

**Population and dwellings, total and settled area, Ottawa–Gatineau (Quebec part) census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2</sup>	
	Total area	Settled area <sup>3</sup>	Total area	Settled area <sup>3</sup>
	number			
<b>1971</b>				
Population	162,709	147,493	181,157	154,631
Dwellings	41,176	37,471	45,856	39,371
<b>1991</b>				
Population	232,314	220,788	251,565	239,554
Dwellings	86,197	82,189	93,411	89,216
<b>2001</b>				
Population	264,148	247,605	283,064	257,732
Dwellings	113,665	104,488	126,351	110,778
<b>2011</b>				
Population	314,501	301,075	334,492	313,249
Dwellings	142,269	135,180	156,241	143,507
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	93	104	85	103
Dwellings	246	261	241	264

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population; Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.53**

**Land cover and land use, Ottawa–Gatineau (Quebec part) census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	3,000	7,817	38
<b>1971</b>			
Total built-up <sup>3</sup>	67	77	87
Settled	41	45	92
Roads	25	32	80
Arable <sup>4</sup>	..	1,014	..
Natural and semi-natural <sup>5</sup>	..	6,726	..
<b>1991</b>			
Total built-up <sup>6</sup>	235	337	70
Settled	146	197	74
Roads	90	140	64
Arable <sup>4</sup>	..	703	..
Natural and semi-natural <sup>5</sup>	..	6,777	..
<b>2001</b>			
Total built-up <sup>6</sup>	252	355	71
Settled	161	214	75
Roads	91	141	64
Arable <sup>4</sup>	..	679	..
Natural and semi-natural <sup>5</sup>	..	6,783	..
<b>2011</b>			
Total built-up <sup>6</sup>	328	463	71
Settled	216	284	76
Roads	112	179	63
Arable <sup>4</sup>	..	740	..
Natural and semi-natural <sup>7</sup>	..	6,614	..
Forest	..	5,651	..
Water	..	775	..
Other	..	188	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>3,6</sup>	391	505	...
Arable <sup>4</sup>	...	-27	...
Natural and semi-natural <sup>5</sup>	...	-2	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. Built-up area for 1971 is based on *Canada Land Inventory Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), code B – Urban Built-up. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

4. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

5. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

6. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

7. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](http://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](http://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <http://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.54**

**Ecosystem asset account, Ottawa–Gatineau (Quebec part) census metropolitan area-ecosystem (CMA-E), 1971 to 2011**

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	45	32	1,014	6,726
Land lost to settled area	...	...	-72	-168
Balance of change <sup>4</sup>	239	147	-203	55
Closing stock 2011	284	179	740	6,614

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use (CLI: LU)* and *Canada Land Use Monitoring Program (CLUMP)*. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).
  2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.
  3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.
  4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.
- Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

### Links to more information

Tables by metropolitan area, Ottawa–Gatineau (Ont.–Que.)

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met117-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met117-eng.htm)

Ottawa–Gatineau (Ont.–Que.) CMA, percentage of private dwellings owned by a member of the household, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-505-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-505-013-01-00-eng.pdf)

Ottawa–Gatineau (Ont.–Que.) CMA, percentage of owner households spending 30% or more in shelter costs, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-505-013-02-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-505-013-02-00-eng.pdf)

Ottawa–Gatineau (Ont.–Que.) CMA, percentage of renter households spending 30% or more in shelter costs, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-505-013-03-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-505-013-03-00-eng.pdf)

Ottawa–Gatineau (Ont.–Que.) CMA average value of owned private dwellings, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-505-013-04-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-505-013-04-00-eng.pdf)

Ottawa–Gatineau (Ont.–Que.) CMA, population change, 2006 to 2011, by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-505-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-505-013-01-00-eng.pdf)

Ottawa–Gatineau (Ont.–Que.) CMA, percentage of the employed labour force using a car, truck or van to get to work in 2011, by 2011 census tract

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99012-005-505-013-07-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99012-005-505-013-07-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Ottawa–Gatineau (Que.) CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=50524&Geo2=PR&Code2=24&Data=Count&SearchText=ottawa&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=50524&Geo2=PR&Code2=24&Data=Count&SearchText=ottawa&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Ottawa–Gatineau (Que.) CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=50524&Data=Count&SearchText=ottawa&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=50524&Data=Count&SearchText=ottawa&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1)

### Peterborough, Ontario

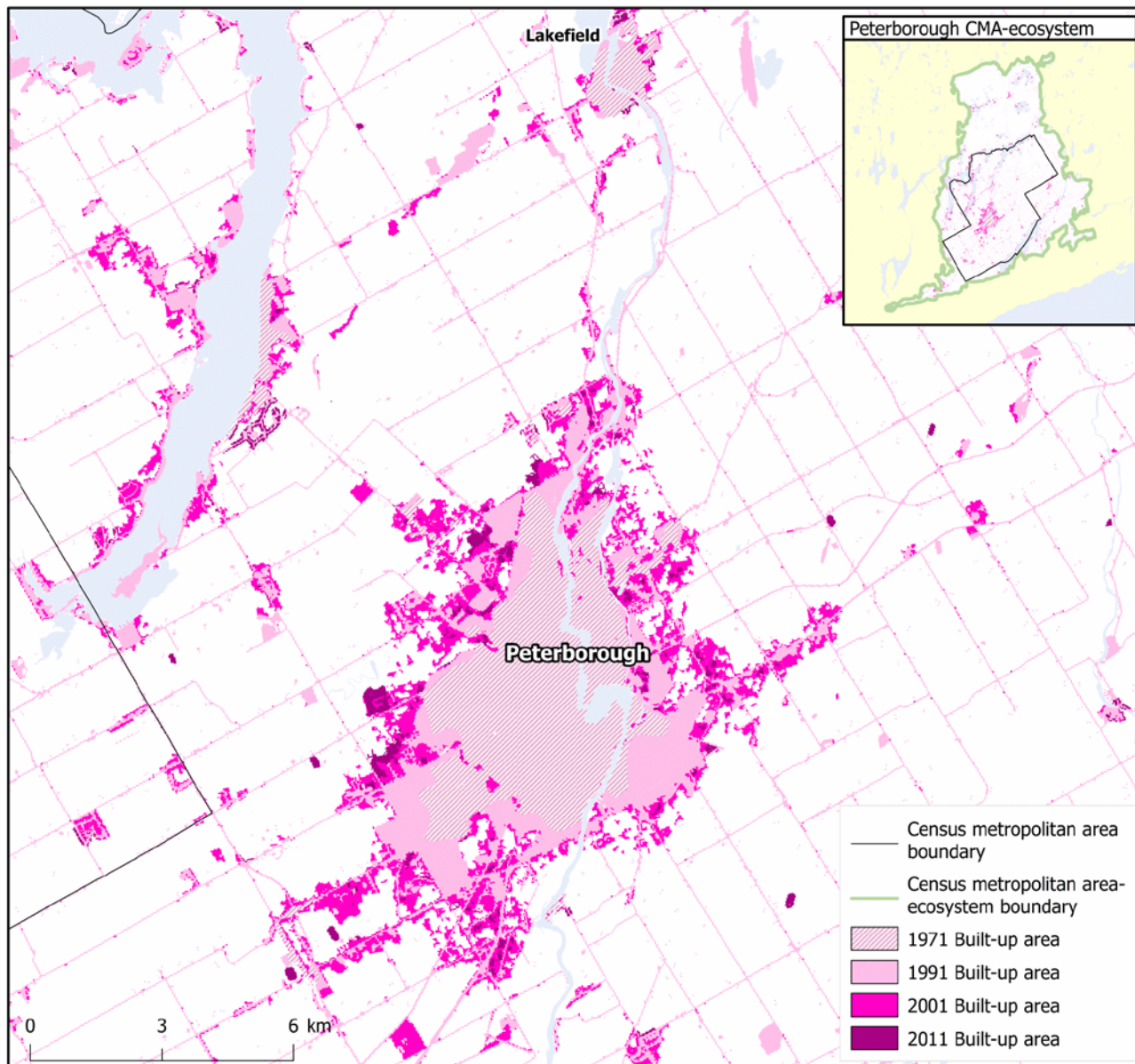
#### Highlights

- At the CMA level, built-up area increased from 38 km<sup>2</sup> in 1971 to 166 km<sup>2</sup> in 2011, an increase of 336%.
- At the CMA-E level, built-up area increased from 46 km<sup>2</sup> in 1971 to 302 km<sup>2</sup> in 2011, an increase of 550%.
- In 2011, the natural and semi-natural land class was divided into forest (57%), water (14%) and other (30%).
- From 1971 to 2011, 70 km<sup>2</sup> of arable land and 91 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 54.2% was forest, 33.1% was natural land for pasture and 12.7% was classed as other.
- Population in the CMA increased by 42% from 83,774 to 118,975 between 1971 and 2011.
- The number of dwellings in the CMA increased by 121% from 24,276 to 53,730 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.19

Built-up area, Peterborough census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Notes:** Canada Land Use Monitoring Program (CLUMP) data were not available—the 1971 built-up area may be underestimated. Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

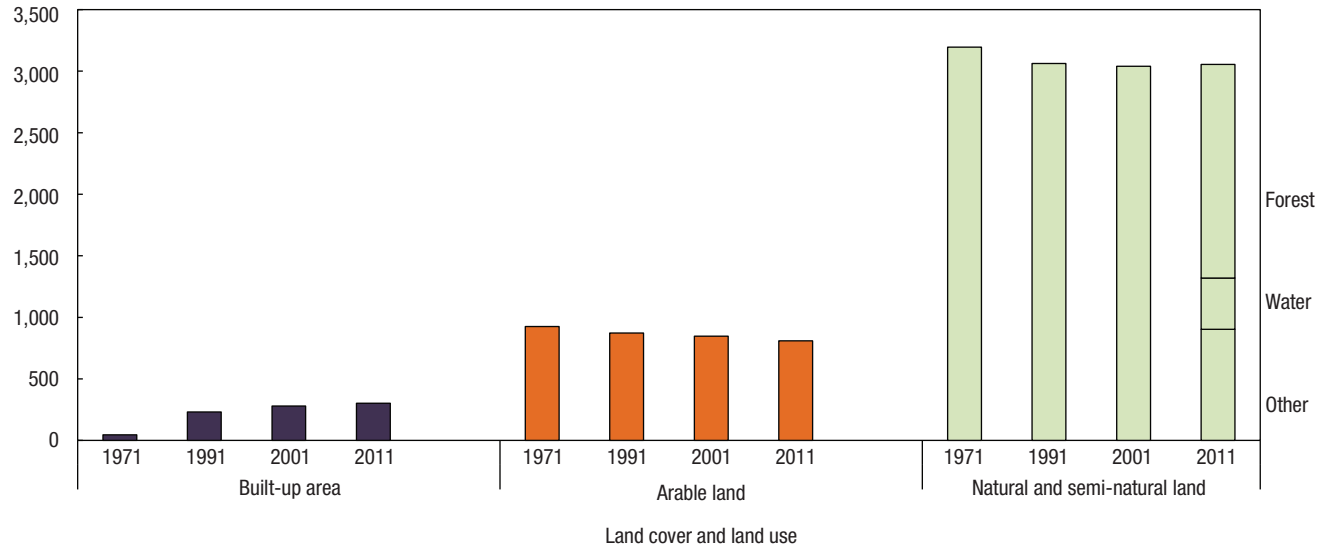
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCAN, Canada Centre for Mapping and Earth Observation 2014, *CanVec+*, <ftp://ftp2.cits.nrcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.37

### Land cover and land use, Peterborough census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres



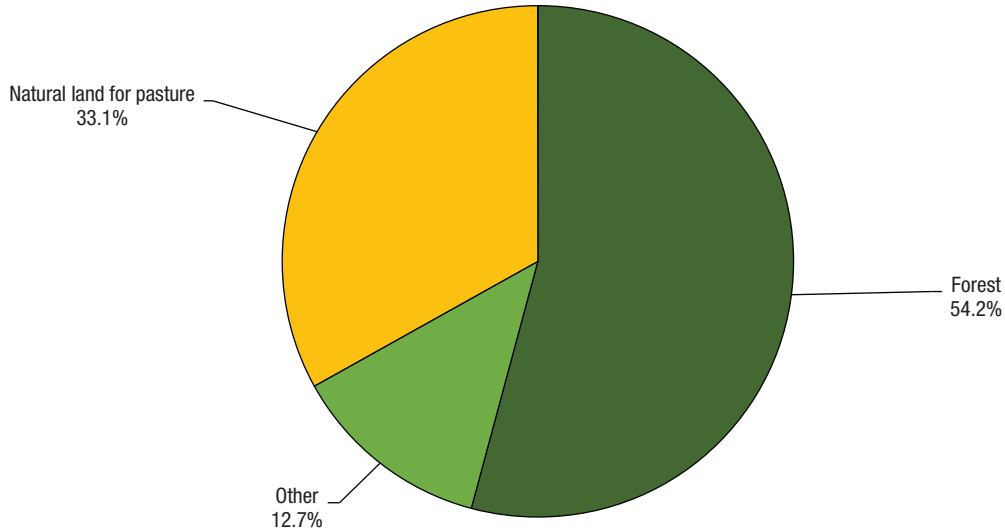
**Notes:** Built-up area for 1971 is based on *Canada Land Inventory: Land Use* (CLI: LU), with modeling of roads. *Canada Land Use Monitoring Program* (CLUMP) data exclude the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up areas may be underestimated for these CMAs. CLI: LU built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCAN, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCAN, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.38

Natural and semi-natural land lost to settled area, by selected land class, Peterborough census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.55**

**Population and dwellings, total and settled area, Peterborough census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2</sup>	
	Total area	Settled area <sup>3</sup>	Total area	Settled area <sup>3</sup>
	number			
<b>1971</b>				
Population	83,774	62,372	99,148	65,453
Dwellings	24,276	18,588	28,972	19,620
<b>1991</b>				
Population	106,211	99,370	134,961	126,056
Dwellings	39,389	37,181	49,726	46,806
<b>2001</b>				
Population	110,876	100,482	142,841	121,188
Dwellings	47,784	43,763	66,415	55,826
<b>2011</b>				
Population	118,975	108,343	151,124	131,286
Dwellings	53,730	49,476	72,770	62,821
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	42	74	52	101
Dwellings	121	166	151	220

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population and Natural Resources Canada, Canada Centre for Remote Sensing, 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.56**

**Land cover and land use, Peterborough census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	1,507	4,167	36
<b>1971</b>			
Total built-up <sup>3</sup>	38	46	82
Settled	21	23	89
Roads	17	23	75
Arable <sup>4</sup>	..	925	..
Natural and semi-natural <sup>5</sup>	..	3,196	..
<b>1991</b>			
Total built-up <sup>6</sup>	127	232	55
Settled	69	115	60
Roads	58	117	50
Arable <sup>4</sup>	..	873	..
Natural and semi-natural <sup>5</sup>	..	3,062	..
<b>2001</b>			
Total built-up <sup>6</sup>	158	280	56
Settled	99	163	61
Roads	58	117	50
Arable <sup>4</sup>	..	847	..
Natural and semi-natural <sup>5</sup>	..	3,039	..
<b>2011</b>			
Total built-up <sup>6</sup>	166	302	55
Settled	107	184	58
Roads	59	119	50
Arable <sup>4</sup>	..	810	..
Natural and semi-natural <sup>7</sup>	..	3,055	..
Forest	..	1,736	..
Water	..	416	..
Other	..	903	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>3,6</sup>	336	550	...
Arable <sup>4</sup>	...	-12	...
Natural and semi-natural <sup>5</sup>	...	-4	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. Built-up area for 1971 is based on *Canada Land Inventory: Land Use* (CLI: LU), code B – Urban Built-up. *Canada Land Use Monitoring Program* (CLUMP) data exclude the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up areas may be underestimated for these CMAs. CLI: LU built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

4. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

5. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

6. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

7. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing, 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](http://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <http://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.57**

**Ecosystem asset account, Peterborough census metropolitan area-ecosystem (CMA-E), 1971 to 2011**

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	23	23	925	3,196
Land lost to settled area	...	...	-70	-91
Balance of change <sup>4</sup>	160	95	-45	-50
Closing stock 2011	184	119	810	3,055

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use* (CLI: LU). *Canada Land Use Monitoring Program* (CLUMP) data exclude the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up may be underestimated for these CMAs. CLI: LU built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.

3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.

4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing, 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.rncan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

### Links to more information

Tables by metropolitan area, Peterborough

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met118-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met118-eng.htm)

Peterborough CMA, population change, 2006 to 2011, by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-529-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-529-013-01-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Peterborough CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=529&Geo2=PR&Code2=35&Data=Count&SearchText=peterborough&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=529&Geo2=PR&Code2=35&Data=Count&SearchText=peterborough&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Peterborough CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=529&Data=Count&SearchText=peterborough&SearchType=Begins&SearchPR=01&BI=All&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=529&Data=Count&SearchText=peterborough&SearchType=Begins&SearchPR=01&BI=All&BI=All&Custom=&TABID=1)

### Québec, Quebec

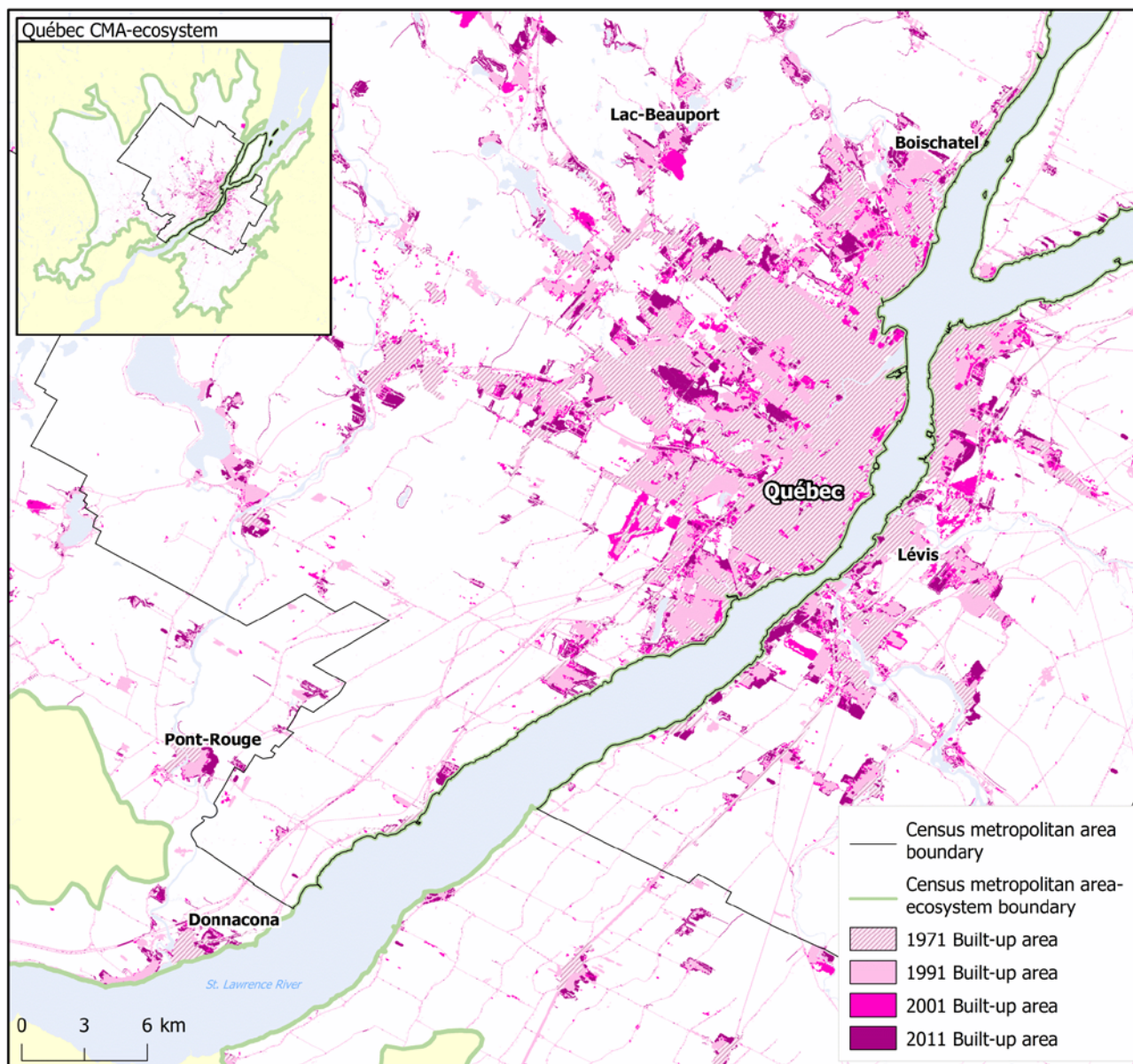
#### Highlights

- At the CMA level, built-up area increased from 183 km<sup>2</sup> in 1971 to 475 km<sup>2</sup> in 2011, an increase of 160%.
- At the CMA-E level, built-up area increased from 210 km<sup>2</sup> in 1971 to 658 km<sup>2</sup> in 2011, an increase of 213%.
- In 2011, the natural and semi-natural land class was divided into forest (82%), water (3%) and other (15%).
- From 1971 to 2011, 135 km<sup>2</sup> of arable land and 184 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 66.8% was forest, 16.8% was natural land for pasture and 16.3% was classed as other.
- Population in the CMA increased by 49% from 512,233 to 765,706 between 1971 and 2011.
- The number of dwellings in the CMA increased by 168% from 134,673 to 361,447 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.20

Built-up area, Québec census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Note:** Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

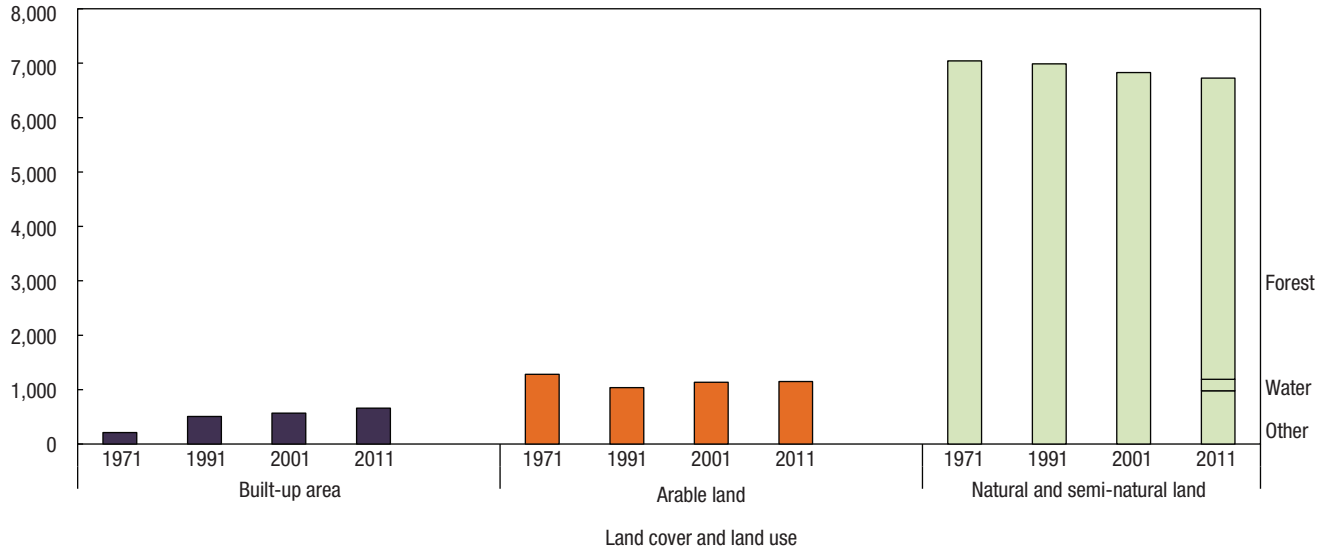
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.nrcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.39

### Land cover and land use, Québec census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres



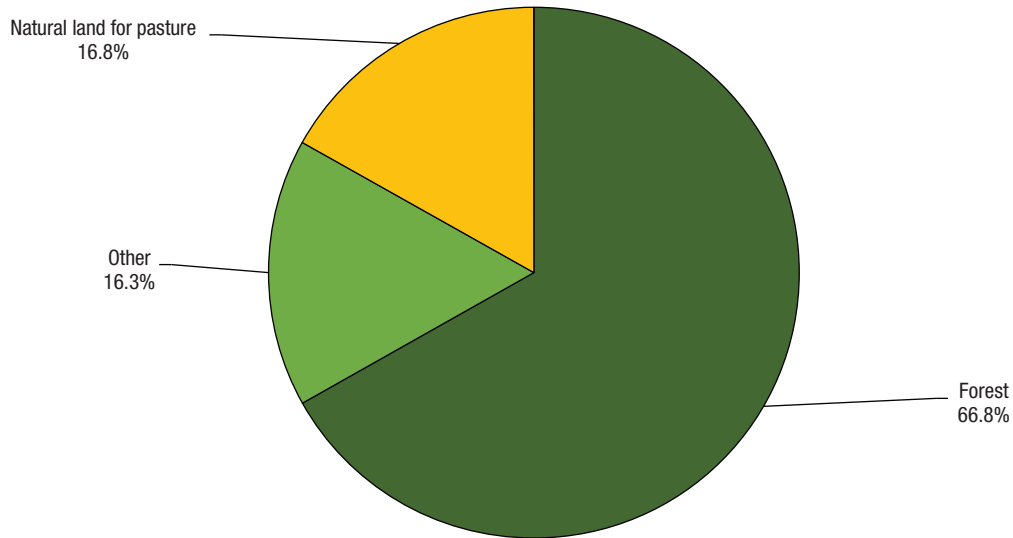
**Notes:** Built-up area for 1971 is based on *Canada Land Inventory: Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), with modeling of roads. CLI: LU and CLUMP built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.rncan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.40

Natural and semi-natural land lost to settled area, by selected land class, Québec census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.58**

**Population and dwellings, total and settled area, Québec census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2</sup>	
	Total area	Settled area <sup>3</sup>	Total area	Settled area <sup>3</sup>
	number			
<b>1971</b>				
Population	512,233	484,871	587,020	524,798
Dwellings	134,673	128,331	152,286	138,249
<b>1991</b>				
Population	652,412	639,238	731,425	717,425
Dwellings	255,695	251,404	283,692	279,151
<b>2001</b>				
Population	681,022	656,812	759,304	717,383
Dwellings	308,975	298,895	344,271	326,050
<b>2011</b>				
Population	765,706	739,243	857,087	812,077
Dwellings	361,447	350,329	404,775	384,403
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	49	52	46	55
Dwellings	168	173	166	178

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population; Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.59**

**Land cover and land use, Québec census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	3,349	8,532	39
<b>1971</b>			
Total built-up <sup>3</sup>	183	210	87
Settled	120	134	90
Roads	62	76	82
Arable <sup>4</sup>	..	1,281	..
Natural and semi-natural <sup>5</sup>	..	7,041	..
<b>1991</b>			
Total built-up <sup>6</sup>	363	507	72
Settled	239	323	74
Roads	124	184	67
Arable <sup>4</sup>	..	1,038	..
Natural and semi-natural <sup>5</sup>	..	6,987	..
<b>2001</b>			
Total built-up <sup>6</sup>	408	568	72
Settled	283	382	74
Roads	125	186	67
Arable <sup>4</sup>	..	1,137	..
Natural and semi-natural <sup>5</sup>	..	6,827	..
<b>2011</b>			
Total built-up <sup>6</sup>	475	658	72
Settled	337	453	75
Roads	138	205	67
Arable <sup>4</sup>	..	1,150	..
Natural and semi-natural <sup>7</sup>	..	6,724	..
Forest	..	5,535	..
Water	..	211	..
Other	..	978	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>3,6</sup>	160	213	...
Arable <sup>4</sup>	...	-10	...
Natural and semi-natural <sup>5</sup>	...	-4	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. Built-up area for 1971 is based on *Canada Land Inventory Land Use (CLI: LU)* and *Canada Land Use Monitoring Program (CLUMP)*, code B – Urban Built-up. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

4. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

5. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

6. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

7. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.60**

**Ecosystem asset account, Québec census metropolitan area-ecosystem (CMA-E), 1971 to 2011**

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	134	76	1,281	7,041
Land lost to settled area	...	...	-135	-184
Balance of change <sup>4</sup>	319	129	4	-133
Closing stock 2011	453	205	1,150	6,724

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use (CLI: LU)* and *Canada Land Use Monitoring Program (CLUMP)*. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).
  2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.
  3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.
  4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.
- Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

### Links to more information

Tables by metropolitan area, Québec

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met119-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met119-eng.htm)

Québec CMA, population change, 2006 to 2011, by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-421-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-421-013-01-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Québec CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=421&Geo2=PR&Code2=24&Data=Count&SearchText=quebec&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=421&Geo2=PR&Code2=24&Data=Count&SearchText=quebec&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Québec CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=421&Data=Count&SearchText=quebec&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=421&Data=Count&SearchText=quebec&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1)

### Regina, Saskatchewan

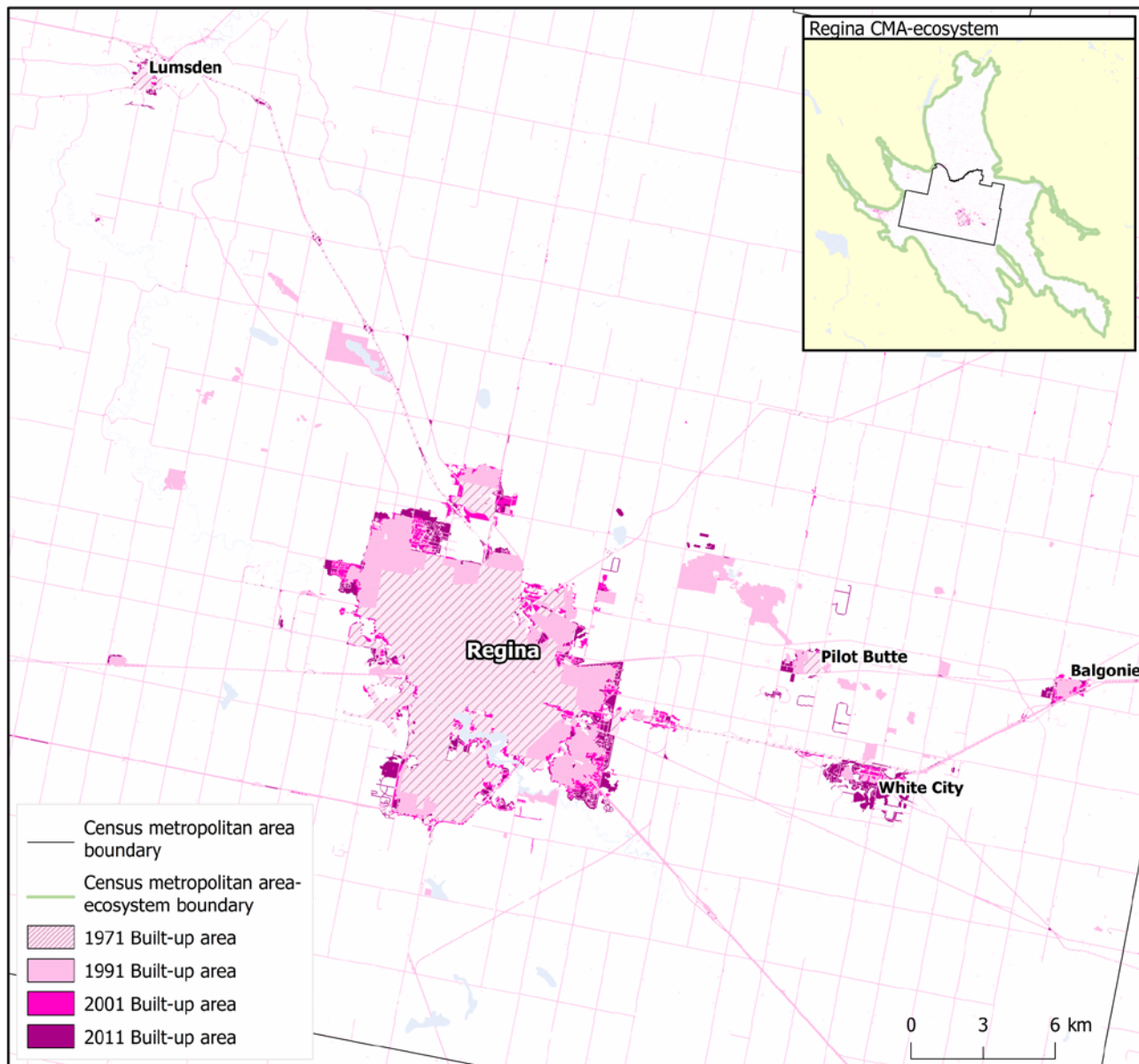
#### Highlights

- At the CMA level, built-up area increased from 102 km<sup>2</sup> in 1971 to 230 km<sup>2</sup> in 2011, an increase of 125%.
- At the CMA-E level, built-up area increased from 211 km<sup>2</sup> in 1971 to 620 km<sup>2</sup> in 2011, an increase of 194%.
- In 2011, the natural and semi-natural land class was divided into forest (10%), water (14%) and other (76%).
- From 1971 to 2011, 99 km<sup>2</sup> of arable land and 48 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 12.9% was forest, 66.9% was natural land for pasture and 20.2% was classed as other.
- Population in the CMA increased by 44% from 146,481 to 210,556 between 1971 and 2011.
- The number of dwellings in the CMA increased by 104% from 44,192 to 90,262 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.21

Built-up area, Regina census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Note:** Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

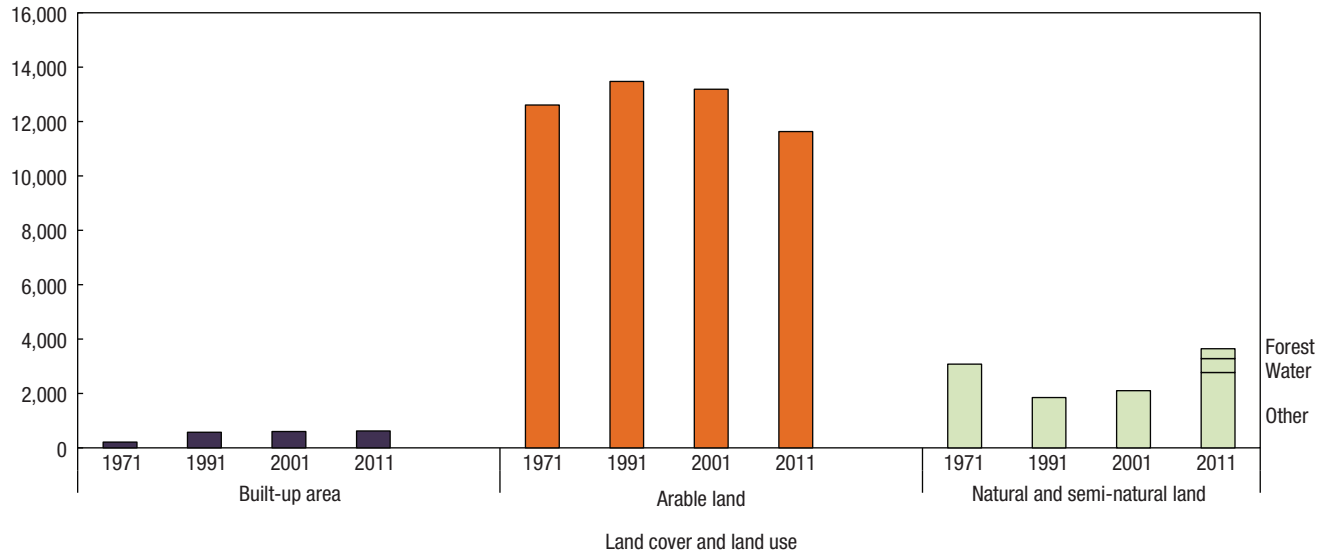
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.nrcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.41

### Land cover and land use, Regina census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres



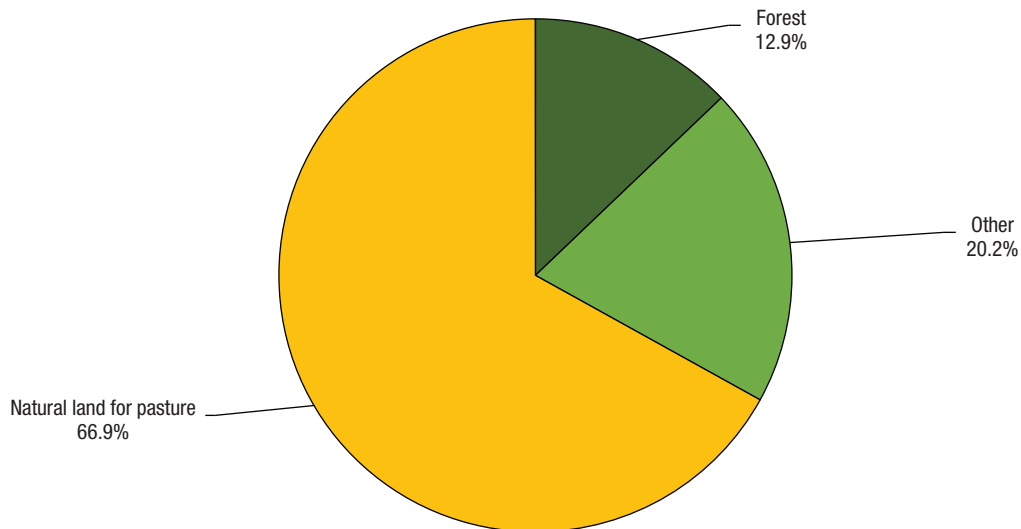
**Notes:** Built-up area for 1971 is based on *Canada Land Inventory: Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), with modeling of roads. CLI: LU and CLUMP built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the *Interpolated Census of Agriculture*. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.42

Natural and semi-natural land lost to settled area, by selected land class, Regina census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.61**

**Population and dwellings, total and settled area, Regina census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2</sup>	
	Total area	Settled area <sup>3</sup>	Total area	Settled area <sup>3</sup>
	number			
<b>1971</b>				
Population	146,481	141,031	201,851	179,116
Dwellings	44,192	42,697	60,970	55,085
<b>1991</b>				
Population	191,692	190,373	244,114	238,855
Dwellings	71,666	71,225	91,737	90,087
<b>2001</b>				
Population	192,800	189,329	243,191	232,694
Dwellings	80,772	79,510	105,470	100,938
<b>2011</b>				
Population	210,556	207,175	260,979	251,452
Dwellings	90,262	88,935	115,516	111,464
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	44	47	29	40
Dwellings	104	108	89	102

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population; Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.62**

**Land cover and land use, Regina census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	3,408	15,899	21
<b>1971</b>			
Total built-up <sup>3</sup>	102	211	48
Settled	46	61	75
Roads	56	149	37
Arable <sup>4</sup>	..	12,609	..
Natural and semi-natural <sup>5</sup>	..	3,080	..
<b>1991</b>			
Total built-up <sup>6</sup>	210	577	36
Settled	95	168	57
Roads	115	409	28
Arable <sup>4</sup>	..	13,472	..
Natural and semi-natural <sup>5</sup>	..	1,850	..
<b>2001</b>			
Total built-up <sup>6</sup>	219	604	36
Settled	104	195	53
Roads	115	409	28
Arable <sup>4</sup>	..	13,189	..
Natural and semi-natural <sup>5</sup>	..	2,106	..
<b>2011</b>			
Total built-up <sup>6</sup>	230	620	37
Settled	113	209	54
Roads	117	411	28
Arable <sup>4</sup>	..	11,633	..
Natural and semi-natural <sup>7</sup>	..	3,646	..
Forest	..	364	..
Water	..	510	..
Other	..	2,771	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>3,6</sup>	125	194	...
Arable <sup>4</sup>	...	-8	...
Natural and semi-natural <sup>5</sup>	...	18	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. Built-up area for 1971 is based on *Canada Land Inventory Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), code B – Urban Built-up. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

4. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

5. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

6. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

7. For 2011, forest and water are broken out separately based on data from AAFC *Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

Table 3.63

### Ecosystem asset account, Regina census metropolitan area-ecosystem (CMA-E), 1971 to 2011

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	61	149	12,609	3,080
Land lost to settled area	...	...	-99	-48
Balance of change <sup>4</sup>	148	262	-876	614
Closing stock 2011	209	411	11,633	3,646

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use (CLI: LU)* and *Canada Land Use Monitoring Program (CLUMP)*.

CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover.

To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.

3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.

4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

### Links to more information

Tables by metropolitan area, Regina

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met120-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met120-eng.htm)

Regina CMA, population change, 2006 to 2011, by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-705-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-705-013-01-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Regina CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=705&Geo2=PR&Code2=47&Data=Count&SearchText=regina&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=705&Geo2=PR&Code2=47&Data=Count&SearchText=regina&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Regina CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=705&Data=Count&SearchText=regina&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=705&Data=Count&SearchText=regina&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

### Saguenay, Quebec

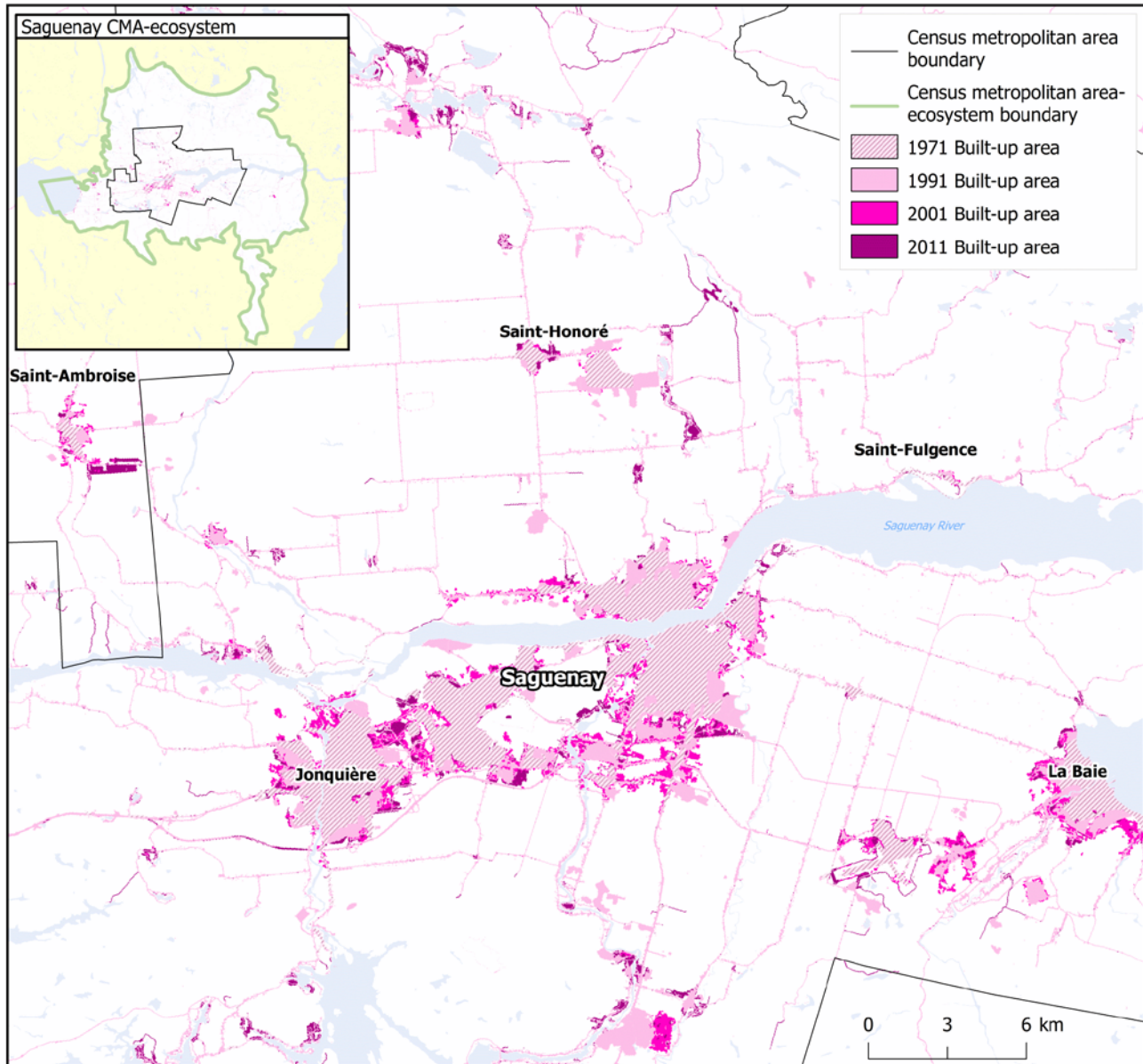
#### Highlights

- At the CMA level, built-up area increased from 63 km<sup>2</sup> in 1971 to 188 km<sup>2</sup> in 2011, an increase of 201%.
- At the CMA-E level, built-up area increased from 69 km<sup>2</sup> in 1971 to 314 km<sup>2</sup> in 2011, an increase of 355%.
- In 2011, the natural and semi-natural land class was divided into forest (77%), water (12%) and other (12%).
- From 1971 to 2011, 48 km<sup>2</sup> of arable land and 122 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 63.7% was forest, 7.7% was natural land for pasture and 28.7% was classed as other.
- Population in the CMA increased by 4% from 151,464 to 157,790 between 1971 and 2011.
- The number of dwellings in the CMA increased by 124% from 32,906 to 73,766 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.22

Built-up area, Saguenay census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Note:** Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

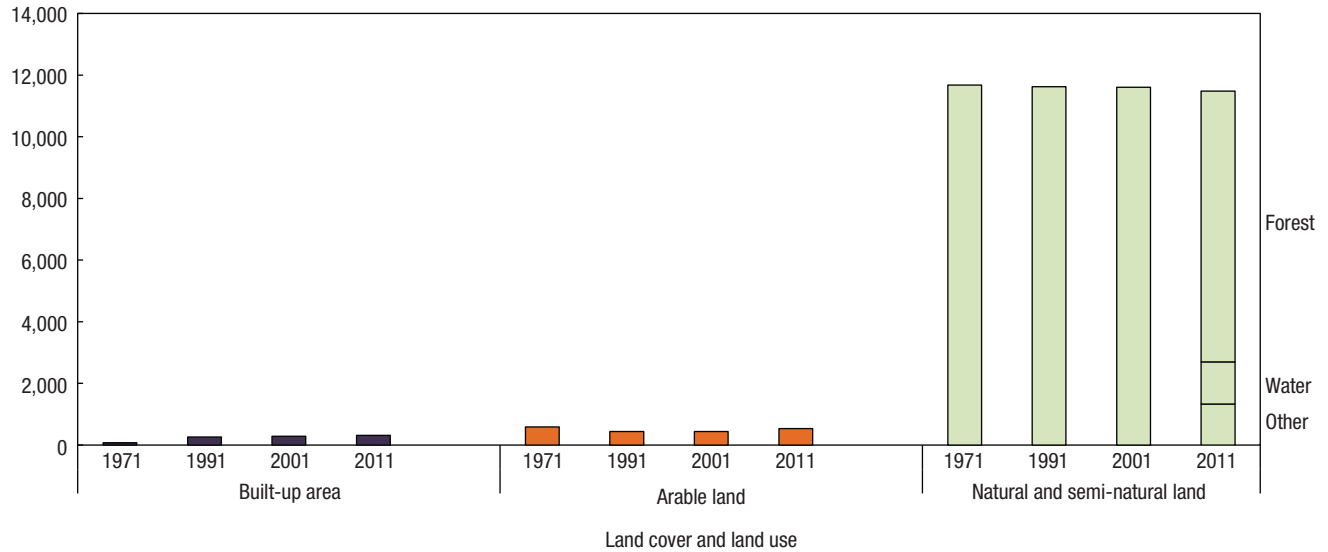
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.nrcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.43

### Land cover and land use, Saguenay census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres



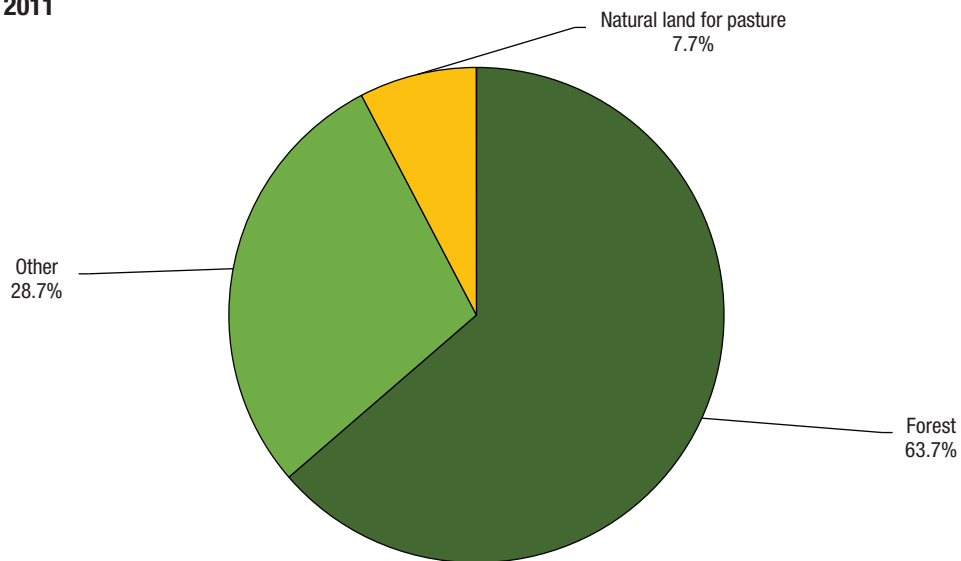
**Notes:** Built-up area for 1971 is based on *Canada Land Inventory: Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), with modeling of roads. CLI: LU and CLUMP built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCAN, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCAN, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.44

Natural and semi-natural land lost to settled area, by selected land class, Saguenay census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geotit/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geotit/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geotit/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geotit/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.64**

**Population and dwellings, total and settled area, Saguenay census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2</sup>	
	Total area	Settled area <sup>3</sup>	Total area	Settled area <sup>3</sup>
	number			
<b>1971</b>				
Population	151,464	132,852	188,079	154,702
Dwellings	32,906	29,531	40,170	34,172
<b>1991</b>				
Population	164,704	151,242	204,219	186,821
Dwellings	58,207	53,741	71,208	65,531
<b>2001</b>				
Population	159,187	140,971	200,111	170,228
Dwellings	68,228	60,095	84,623	71,798
<b>2011</b>				
Population	157,790	143,360	198,239	174,744
Dwellings	73,766	66,938	92,705	81,595
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	4	8	5	13
Dwellings	124	127	131	139

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population; Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.65**

**Land cover and land use, Saguenay census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	2,564	12,331	21
<b>1971</b>			
Total built-up <sup>3</sup>	63	69	91
Settled	40	47	85
Roads	22	22	101
Arable <sup>4</sup>	..	586	..
Natural and semi-natural <sup>5</sup>	..	11,676	..
<b>1991</b>			
Total built-up <sup>6</sup>	154	264	58
Settled	99	181	55
Roads	55	84	65
Arable <sup>4</sup>	..	443	..
Natural and semi-natural <sup>5</sup>	..	11,623	..
<b>2001</b>			
Total built-up <sup>6</sup>	168	284	59
Settled	113	199	57
Roads	55	85	65
Arable <sup>4</sup>	..	441	..
Natural and semi-natural <sup>5</sup>	..	11,606	..
<b>2011</b>			
Total built-up <sup>6</sup>	188	314	60
Settled	126	217	58
Roads	62	97	64
Arable <sup>4</sup>	..	535	..
Natural and semi-natural <sup>7</sup>	..	11,482	..
Forest	..	8,785	..
Water	..	1,365	..
Other	..	1,332	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>3,6</sup>	201	355	...
Arable <sup>4</sup>	...	-9	...
Natural and semi-natural <sup>5</sup>	...	-2	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. Built-up area for 1971 is based on *Canada Land Inventory Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), code B – Urban Built-up. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

4. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

5. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

6. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

7. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](http://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](http://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <http://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.66**

**Ecosystem asset account, Saguenay census metropolitan area-ecosystem (CMA-E), 1971 to 2011**

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	47	22	586	11,676
Land lost to settled area	...	...	-48	-122
Balance of change <sup>4</sup>	170	75	-3	-72
Closing stock 2011	217	97	535	11,482

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use (CLI: LU)* and *Canada Land Use Monitoring Program (CLUMP)*. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).
  2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.
  3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.
  4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.
- Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

### Links to more information

Tables by metropolitan area, Saguenay

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met121-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met121-eng.htm)

Saguenay CMA, population change, 2006 to 2011, by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-408-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-408-013-01-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Saguenay CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=408&Geo2=PR&Code2=24&Data=Count&SearchText=saguenay&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=408&Geo2=PR&Code2=24&Data=Count&SearchText=saguenay&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Saguenay CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=408&Data=Count&SearchText=saguenay&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=408&Data=Count&SearchText=saguenay&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

### Saint John, New Brunswick

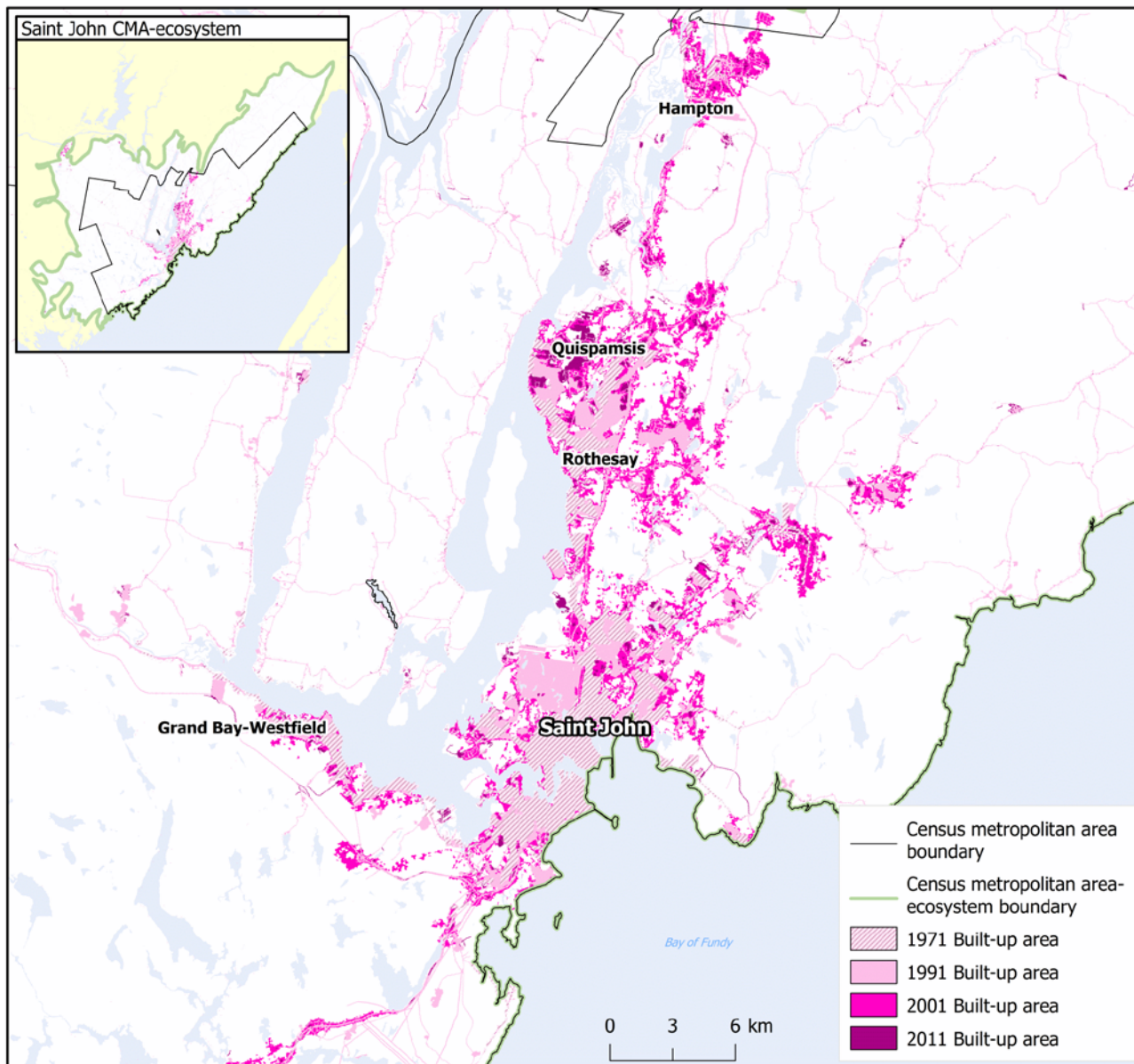
#### Highlights

- At the CMA level, built-up area increased from 74 km<sup>2</sup> in 1971 to 250 km<sup>2</sup> in 2011, an increase of 235%.
- At the CMA-E level, built-up area increased from 96 km<sup>2</sup> in 1971 to 318 km<sup>2</sup> in 2011, an increase of 232%.
- In 2011, the natural and semi-natural land class was divided into forest (78%), water (6%) and other (16%).
- From 1971 to 2011, 31 km<sup>2</sup> of arable land and 124 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 86.2% was forest, 8.4% was natural land for pasture and 5.4% was classed as other.
- Population in the CMA increased by 15% from 111,439 to 127,761 between 1971 and 2011.
- The number of dwellings in the CMA increased by 89% from 29,996 to 56,775 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.23

Built-up area, Saint John census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Note:** Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

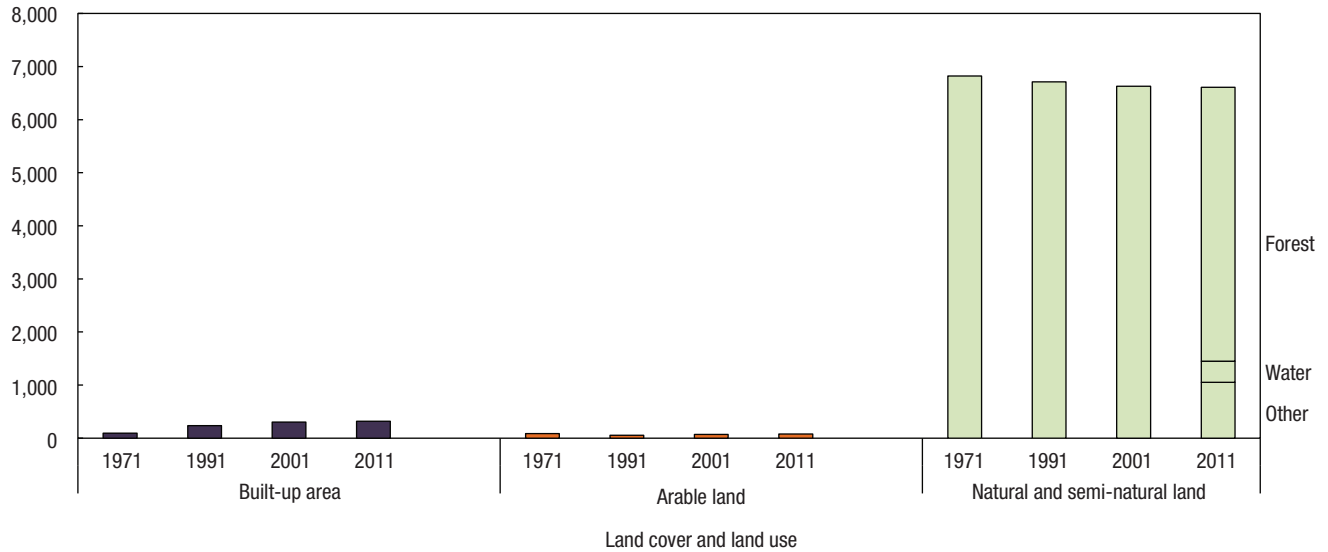
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.nrcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.45

### Land cover and land use, Saint John census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres



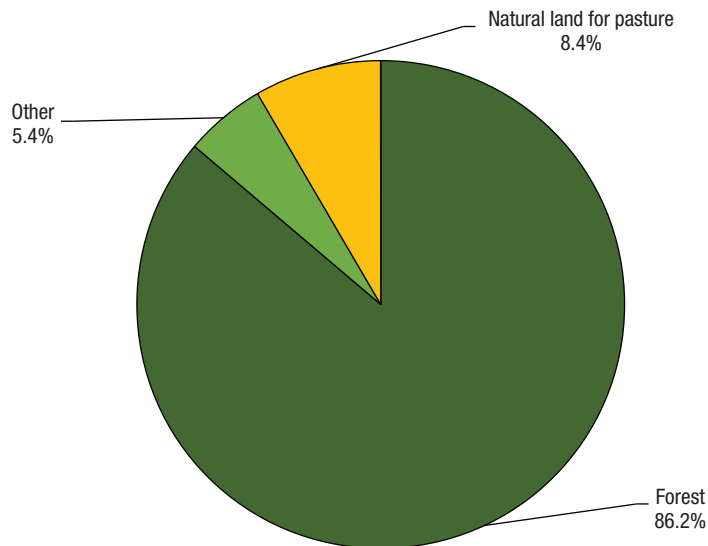
**Notes:** Built-up area for 1971 is based on *Canada Land Inventory: Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), with modeling of roads. CLI: LU and CLUMP built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.46

Natural and semi-natural land lost to settled area, by selected land class, Saint John census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geotit/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geotit/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geotit/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geotit/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.67**

**Population and dwellings, total and settled area, Saint John census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2</sup>	
	Total area	Settled area <sup>3</sup>	Total area	Settled area <sup>3</sup>
	number			
<b>1971</b>				
Population	111,439	96,610	130,488	109,580
Dwellings	29,996	26,074	34,561	29,011
<b>1991</b>				
Population	125,838	107,935	143,759	121,564
Dwellings	45,461	39,644	51,155	43,884
<b>2001</b>				
Population	121,816	107,321	139,933	118,227
Dwellings	51,278	45,366	58,954	49,798
<b>2011</b>				
Population	127,761	115,484	147,574	128,613
Dwellings	56,775	51,451	65,693	57,235
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	15	20	13	17
Dwellings	89	97	90	97

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population; Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

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**Table 3.68**

**Land cover and land use, Saint John census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	3,363	7,005	48
<b>1971</b>			
Total built-up <sup>3</sup>	74	96	78
Settled	46	52	87
Roads	29	43	66
Arable <sup>4</sup>	..	88	..
Natural and semi-natural <sup>5</sup>	..	6,821	..
<b>1991</b>			
Total built-up <sup>6</sup>	178	237	75
Settled	109	130	84
Roads	69	108	64
Arable <sup>4</sup>	..	56	..
Natural and semi-natural <sup>5</sup>	..	6,711	..
<b>2001</b>			
Total built-up <sup>6</sup>	239	304	78
Settled	170	196	86
Roads	69	108	64
Arable <sup>4</sup>	..	71	..
Natural and semi-natural <sup>5</sup>	..	6,630	..
<b>2011</b>			
Total built-up <sup>6</sup>	250	318	79
Settled	179	207	86
Roads	71	111	64
Arable <sup>4</sup>	..	80	..
Natural and semi-natural <sup>7</sup>	..	6,607	..
Forest	..	5,159	..
Water	..	398	..
Other	..	1,051	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>3,6</sup>	235	232	...
Arable <sup>4</sup>	...	-9	...
Natural and semi-natural <sup>5</sup>	...	-3	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. Built-up area for 1971 is based on *Canada Land Inventory Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), code B – Urban Built-up. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

4. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

5. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

6. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

7. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture, Census Geographic Component Base 2011 and 2001* and *Census of Agriculture, Regular Base 1991 and 1971*; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



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**Table 3.69**

**Ecosystem asset account, Saint John census metropolitan area-ecosystem (CMA-E), 1971 to 2011**

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	52	43	88	6,821
Land lost to settled area	...	...	-31	-124
Balance of change <sup>4</sup>	155	67	23	-90
Closing stock 2011	207	111	80	6,607

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use (CLI: LU)* and *Canada Land Use Monitoring Program (CLUMP)*. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).
  2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.
  3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.
  4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.
- Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

### Links to more information

Tables by metropolitan area, Saint John

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met122-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met122-eng.htm)

Saint John CMA, population change, 2006 to 2011, by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-310-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-310-013-01-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Saint John CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=310&Geo2=PR&Code2=13&Data=Count&SearchText=saint%20john&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=310&Geo2=PR&Code2=13&Data=Count&SearchText=saint%20john&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Saint John CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=310&Data=Count&SearchText=saint%20john&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=310&Data=Count&SearchText=saint%20john&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1)

### Saskatoon, Saskatchewan

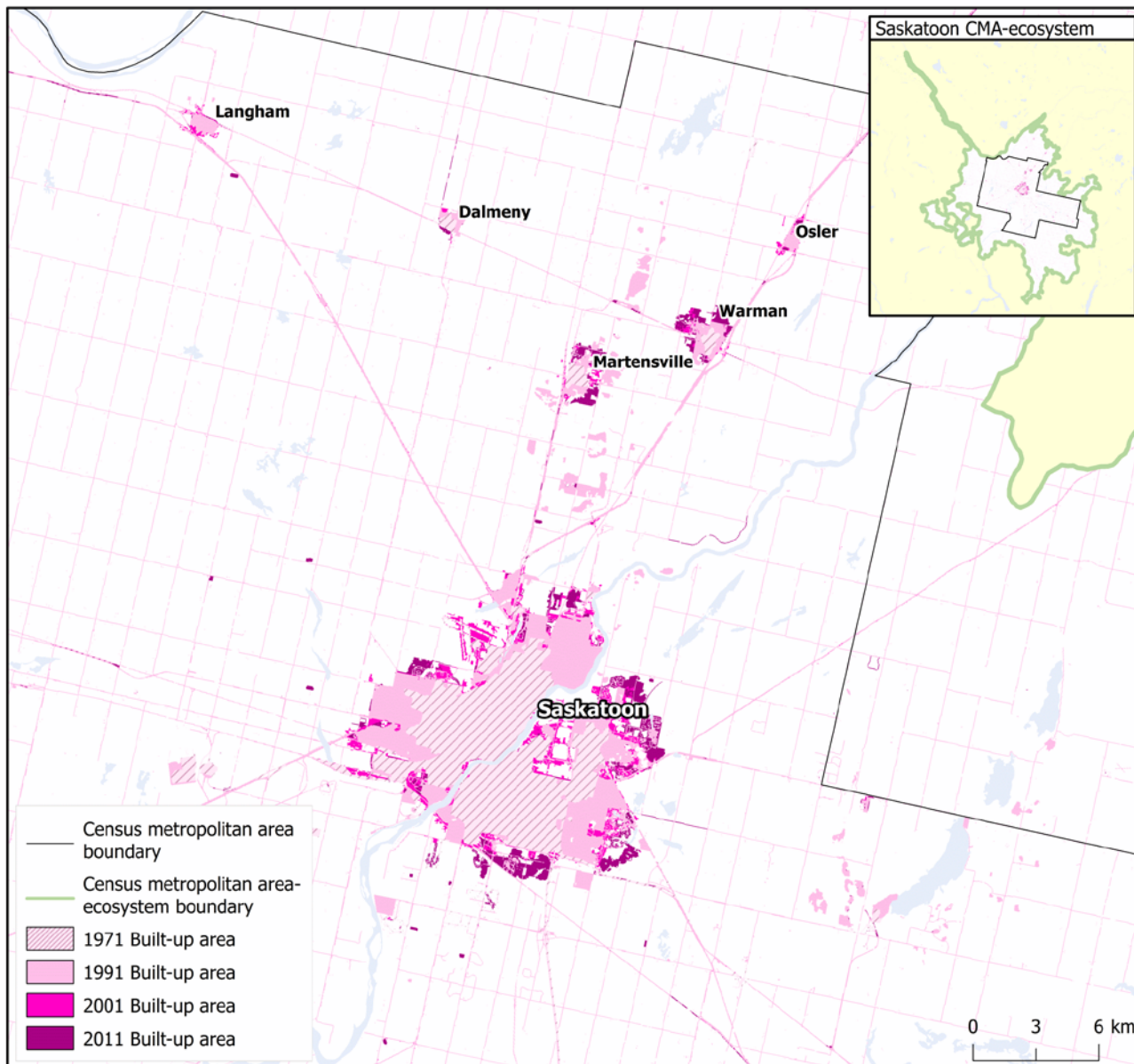
#### Highlights

- At the CMA level, built-up area increased from 103 km<sup>2</sup> in 1971 to 319 km<sup>2</sup> in 2011, an increase of 211%.
- At the CMA-E level, built-up area increased from 158 km<sup>2</sup> in 1971 to 587 km<sup>2</sup> in 2011, an increase of 270%.
- In 2011, the natural and semi-natural land class was divided into forest (5%), water (16%) and other (79%).
- From 1971 to 2011, 108 km<sup>2</sup> of arable land and 48 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 11.8% was forest, 73.1% was natural land for pasture and 15.1% was classed as other.
- Population in the CMA increased by 85% from 140,628 to 260,600 between 1971 and 2011.
- The number of dwellings in the CMA increased by 161% from 42,238 to 110,314 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.24

Built-up area, Saskatoon census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Note:** Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

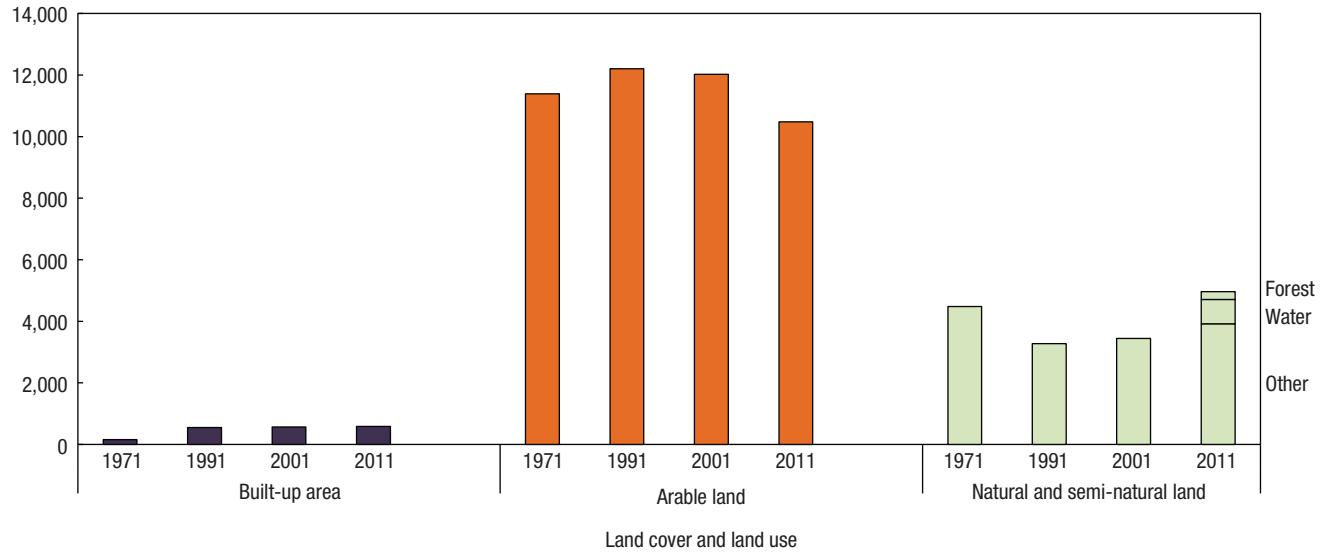
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.nrcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.47

### Land cover and land use, Saskatoon census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres



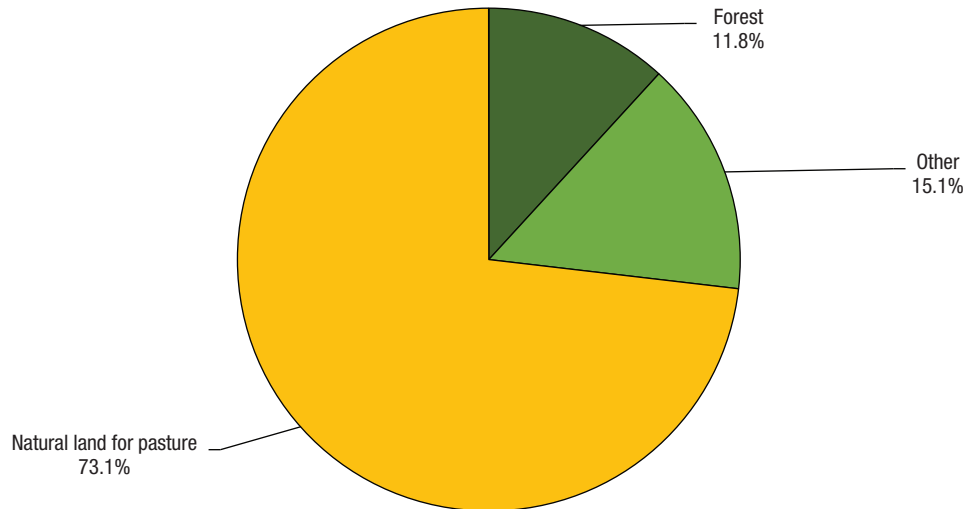
**Notes:** Built-up area for 1971 is based on *Canada Land Inventory: Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), with modeling of roads. CLI: LU and CLUMP built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the *Interpolated Census of Agriculture*. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCAN, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCAN, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

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Chart 3.48

Natural and semi-natural land lost to settled area, by selected land class, Saskatoon census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.70**

**Population and dwellings, total and settled area, Saskatoon census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2</sup>	
	Total area	Settled area <sup>3</sup>	Total area	Settled area <sup>3</sup>
	number			
<b>1971</b>				
Population	140,628	130,947	156,447	136,122
Dwellings	42,238	39,794	46,518	41,446
<b>1991</b>				
Population	210,949	210,359	225,547	222,745
Dwellings	79,577	79,391	84,544	83,671
<b>2001</b>				
Population	225,927	217,956	240,295	226,070
Dwellings	94,688	91,882	100,272	95,278
<b>2011</b>				
Population	260,600	253,069	275,509	262,337
Dwellings	110,314	107,463	116,375	111,385
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	85	93	76	93
Dwellings	161	170	150	169

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population; Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, Land Use 1990, 2000 and 2010, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.71**

**Land cover and land use, Saskatoon census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	5,215	16,032	33
<b>1971</b>			
Total built-up <sup>3</sup>	103	158	65
Settled	45	50	90
Roads	57	108	53
Arable <sup>4</sup>	..	11,392	..
Natural and semi-natural <sup>5</sup>	..	4,482	..
<b>1991</b>			
Total built-up <sup>6</sup>	291	551	53
Settled	129	175	73
Roads	162	376	43
Arable <sup>4</sup>	..	12,207	..
Natural and semi-natural <sup>5</sup>	..	3,274	..
<b>2001</b>			
Total built-up <sup>6</sup>	304	568	53
Settled	142	192	74
Roads	162	377	43
Arable <sup>4</sup>	..	12,021	..
Natural and semi-natural <sup>5</sup>	..	3,442	..
<b>2011</b>			
Total built-up <sup>6</sup>	319	587	54
Settled	155	207	75
Roads	165	380	43
Arable <sup>4</sup>	..	10,483	..
Natural and semi-natural <sup>7</sup>	..	4,962	..
Forest	..	250	..
Water	..	795	..
Other	..	3,918	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>3,6</sup>	211	270	...
Arable <sup>4</sup>	...	-8	...
Natural and semi-natural <sup>5</sup>	...	11	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. Built-up area for 1971 is based on *Canada Land Inventory Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), code B – Urban Built-up. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

4. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

5. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

6. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

7. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](http://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](http://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <http://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.72**

**Ecosystem asset account, Saskatoon census metropolitan area-ecosystem (CMA-E), 1971 to 2011**

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	50	108	11,392	4,482
Land lost to settled area	...	...	-108	-48
Balance of change <sup>4</sup>	156	272	-800	528
Closing stock 2011	207	380	10,483	4,962

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use (CLI: LU)* and *Canada Land Use Monitoring Program (CLUMP)*. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).
  2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.
  3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.
  4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.
- Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

### Links to more information

Tables by metropolitan area, Saskatoon

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met123-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met123-eng.htm)

Saskatoon CMA, population change, 2006 to 2011, by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-725-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-725-013-01-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Saskatoon CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=725&Geo2=PR&Code2=47&Data=Count&SearchText=saskatoon&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=725&Geo2=PR&Code2=47&Data=Count&SearchText=saskatoon&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Saskatoon CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=725&Data=Count&SearchText=saskatoon&SearchType=Begins&SearchPR=01&BI=All&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=725&Data=Count&SearchText=saskatoon&SearchType=Begins&SearchPR=01&BI=All&BI=All&Custom=&TABID=1)

### Sherbrooke, Quebec

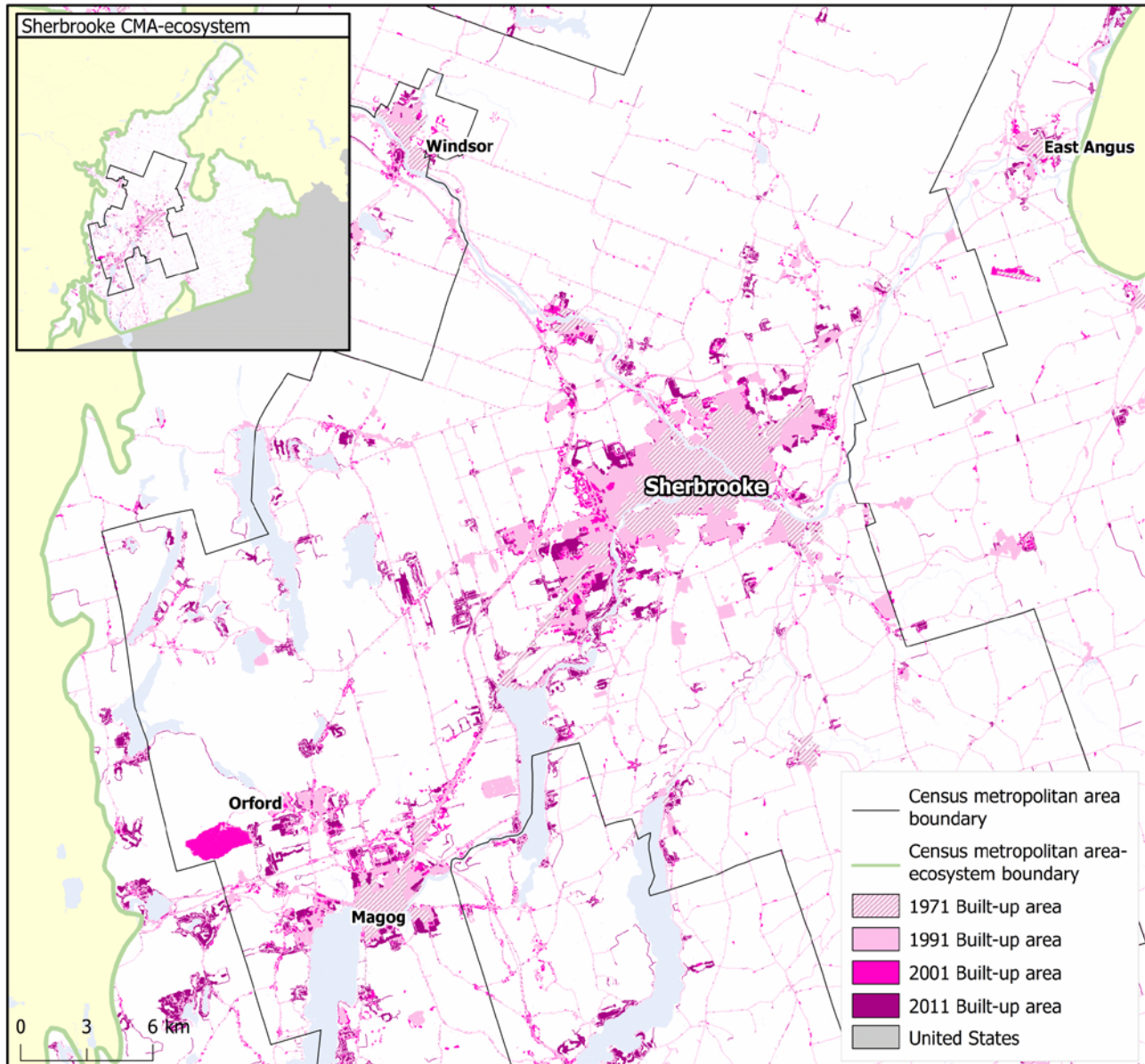
#### Highlights

- At the CMA level, built-up area increased from 44 km<sup>2</sup> in 1971 to 203 km<sup>2</sup> in 2011, an increase of 364%.
- At the CMA-E level, built-up area increased from 73 km<sup>2</sup> in 1971 to 424 km<sup>2</sup> in 2011, an increase of 483%.
- In 2011, the natural and semi-natural land class was divided into forest (77%), water (5%) and other (18%).
- From 1971 to 2011, 85 km<sup>2</sup> of arable land and 130 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 63.2% was forest, 24.6% was natural land for pasture and 12.2% was classed as other.
- Population in the CMA increased by 56% from 129,382 to 201,890 between 1971 and 2011.
- The number of dwellings in the CMA increased by 186% from 34,980 to 99,913 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.25

Built-up area, Sherbrooke census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Notes:** Canada Land Use Monitoring Program (CLUMP) data were not available—the 1971 built-up area may be underestimated. Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

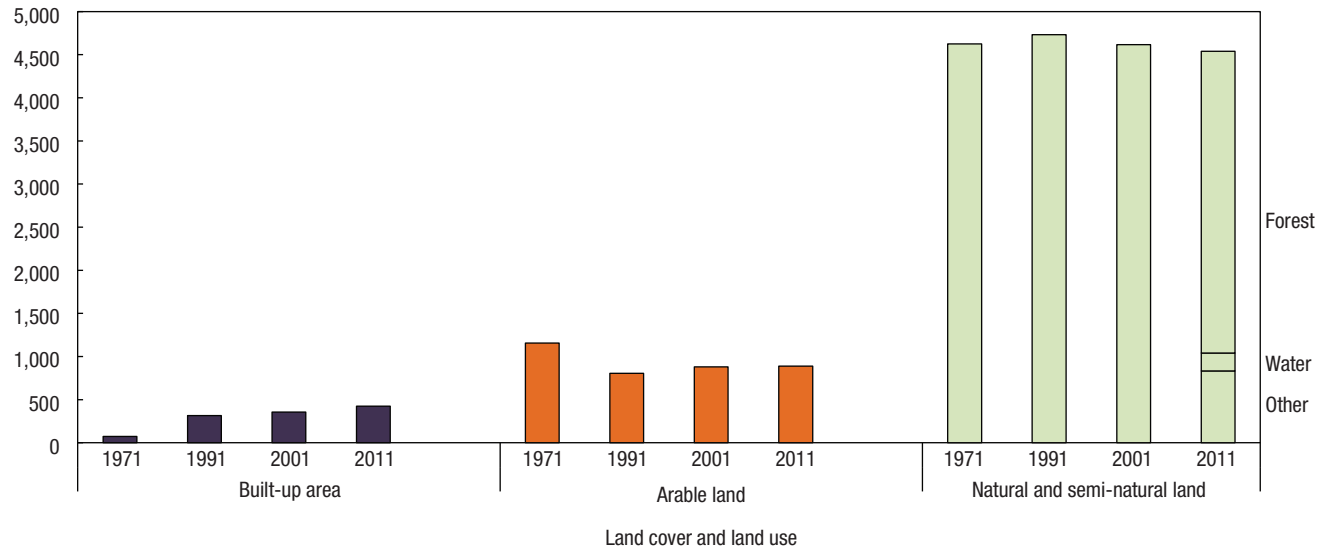
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCAN, Canada Centre for Mapping and Earth Observation 2014, *CanVec+*, <ftp://ftp2.cits.nrcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015); United States Census Bureau, 2014, *Digital cartographic file in shapefile format – States*, file: cb\_2014\_us\_state\_500k.zip, [http://www.census.gov/geo/maps-data/data/cbf/cbf\\_state.html](http://www.census.gov/geo/maps-data/data/cbf/cbf_state.html) (accessed October 29, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.49

### Land cover and land use, Sherbrooke census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres



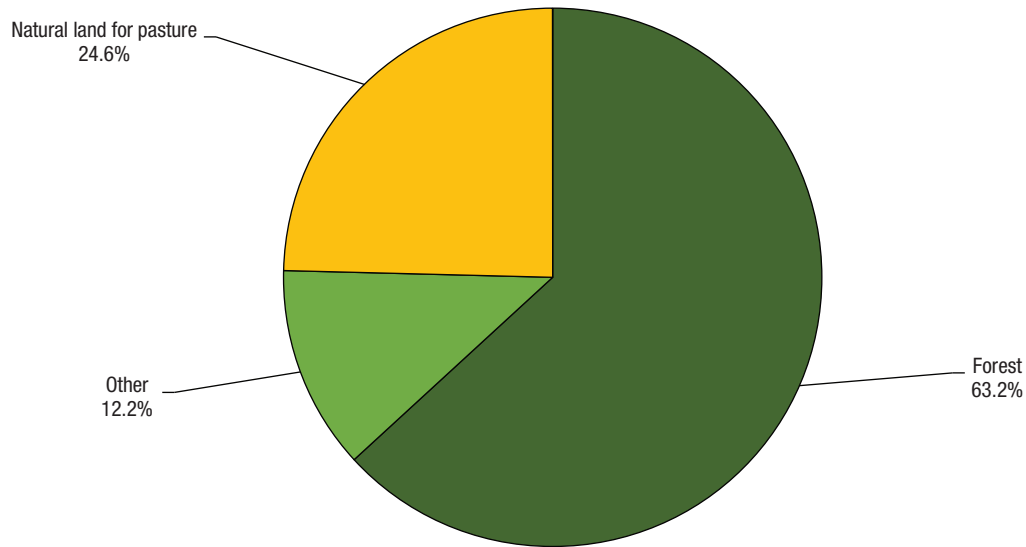
**Notes:** Built-up area for 1971 is based on *Canada Land Inventory: Land Use* (CLI: LU), with modeling of roads. *Canada Land Use Monitoring Program* (CLUMP) data exclude the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up areas may be underestimated for these CMAs. CLI: LU built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.50

Natural and semi-natural land lost to settled area, by selected land class, Sherbrooke census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.73**

**Population and dwellings, total and settled area, Sherbrooke census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2</sup>	
	Total area	Settled area <sup>3</sup>	Total area	Settled area <sup>3</sup>
	number			
<b>1971</b>				
Population	129,382	110,106	199,472	154,315
Dwellings	34,980	30,655	52,612	42,459
<b>1991</b>				
Population	165,542	155,493	225,620	208,303
Dwellings	65,367	62,070	87,567	81,820
<b>2001</b>				
Population	179,865	167,718	242,747	213,656
Dwellings	85,782	80,510	116,951	103,434
<b>2011</b>				
Population	201,890	190,470	266,931	240,047
Dwellings	99,913	95,240	134,150	121,649
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	56	73	34	56
Dwellings	186	211	155	187

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population and Natural Resources Canada, Canada Centre for Remote Sensing, 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.74**

**Land cover and land use, Sherbrooke census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	1,460	5,852	25
<b>1971</b>			
Total built-up <sup>3</sup>	44	73	60
Settled	26	39	67
Roads	18	34	52
Arable <sup>4</sup>	..	1,155	..
Natural and semi-natural <sup>5</sup>	..	4,624	..
<b>1991</b>			
Total built-up <sup>6</sup>	152	316	48
Settled	91	170	54
Roads	61	146	42
Arable <sup>4</sup>	..	806	..
Natural and semi-natural <sup>5</sup>	..	4,731	..
<b>2001</b>			
Total built-up <sup>6</sup>	170	356	48
Settled	109	209	52
Roads	62	148	42
Arable <sup>4</sup>	..	879	..
Natural and semi-natural <sup>5</sup>	..	4,617	..
<b>2011</b>			
Total built-up <sup>6</sup>	203	424	48
Settled	135	255	53
Roads	69	169	41
Arable <sup>4</sup>	..	889	..
Natural and semi-natural <sup>7</sup>	..	4,540	..
Forest	..	3,498	..
Water	..	207	..
Other	..	834	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>3,6</sup>	364	483	...
Arable <sup>4</sup>	...	-23	...
Natural and semi-natural <sup>5</sup>	...	-2	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. Built-up area for 1971 is based on *Canada Land Inventory: Land Use (CLI: LU)*, code B – Urban Built-up. *Canada Land Use Monitoring Program (CLUMP)* data exclude the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up areas may be underestimated for these CMAs. CLI: LU built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

4. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

5. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

6. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

7. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing, 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](http://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <http://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.75**

**Ecosystem asset account, Sherbrooke census metropolitan area-ecosystem (CMA-E), 1971 to 2011**

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	39	34	1,155	4,624
Land lost to settled area	...	...	-85	-130
Balance of change <sup>4</sup>	215	136	-181	45
Closing stock 2011	255	169	889	4,540

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use* (CLI: LU). *Canada Land Use Monitoring Program* (CLUMP) data exclude the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up may be underestimated for these CMAs. CLI: LU built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.

3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.

4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing, 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.rncan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

### Links to more information

Tables by metropolitan area, Sherbrooke

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met124-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met124-eng.htm)

Sherbrooke CMA, population change, 2006 to 2011, by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-433-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-433-013-01-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Sherbrooke CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=433&Geo2=PR&Code2=24&Data=Count&SearchText=sherbrooke&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=433&Geo2=PR&Code2=24&Data=Count&SearchText=sherbrooke&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Sherbrooke CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=433&Data=Count&SearchText=sherbrooke&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=433&Data=Count&SearchText=sherbrooke&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

### St. Catharines–Niagara, Ontario

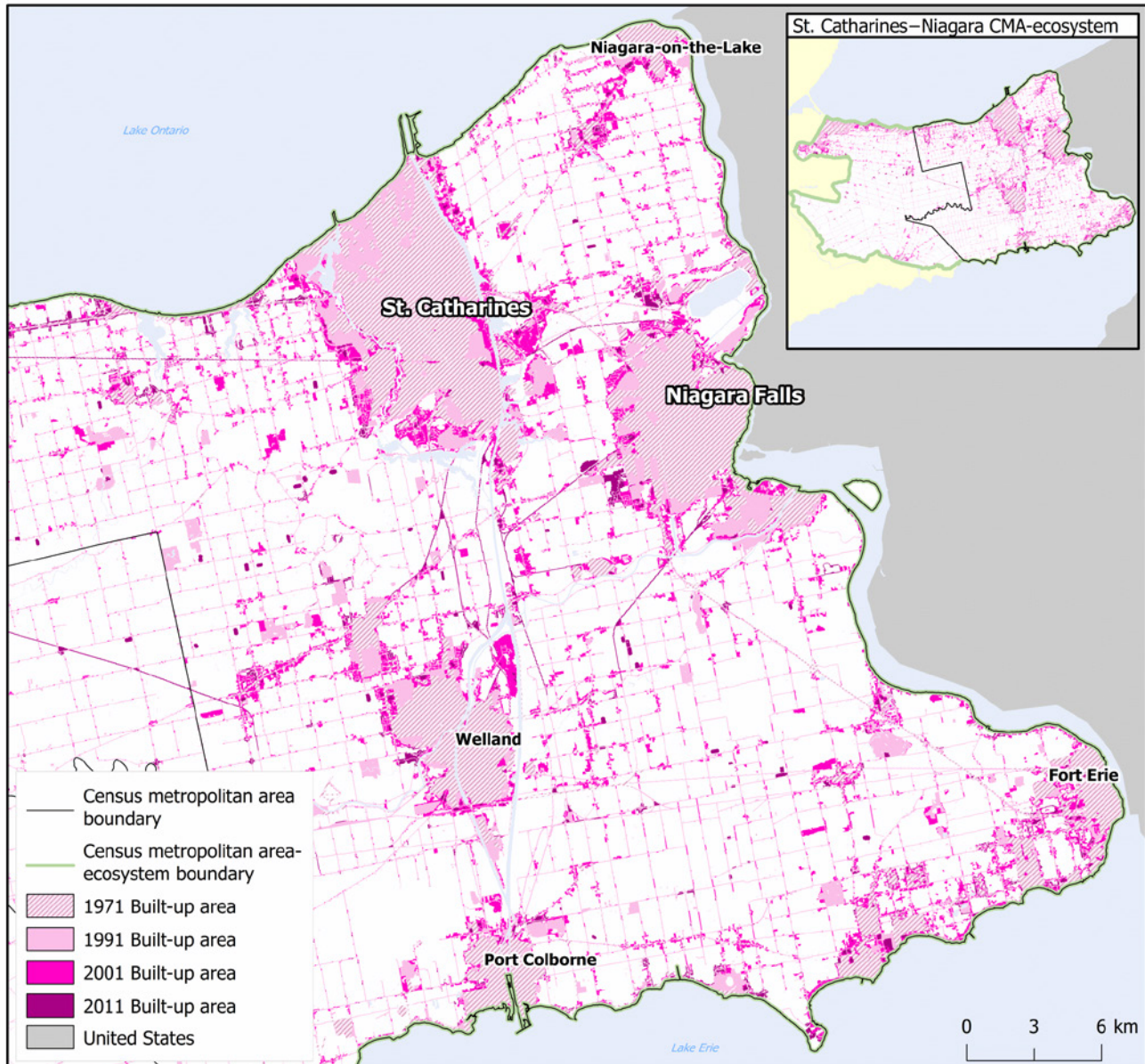
#### Highlights

- At the CMA level, built-up area increased from 187 km<sup>2</sup> in 1971 to 412 km<sup>2</sup> in 2011, an increase of 121%.
- At the CMA-E level, built-up area increased from 232 km<sup>2</sup> in 1971 to 553 km<sup>2</sup> in 2011, an increase of 139%.
- In 2011, the natural and semi-natural land class was divided into forest (49%), water (5%) and other (46%).
- From 1971 to 2011, 158 km<sup>2</sup> of arable land and 83 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 30.7% was forest, 63.1% was natural land for pasture and 6.1% was classed as other.
- Population in the CMA increased by 21% from 323,162 to 392,184 between 1971 and 2011.
- The number of dwellings in the CMA increased by 85% from 94,305 to 174,338 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.26

Built-up area, St. Catharines–Niagara census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Note:** Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

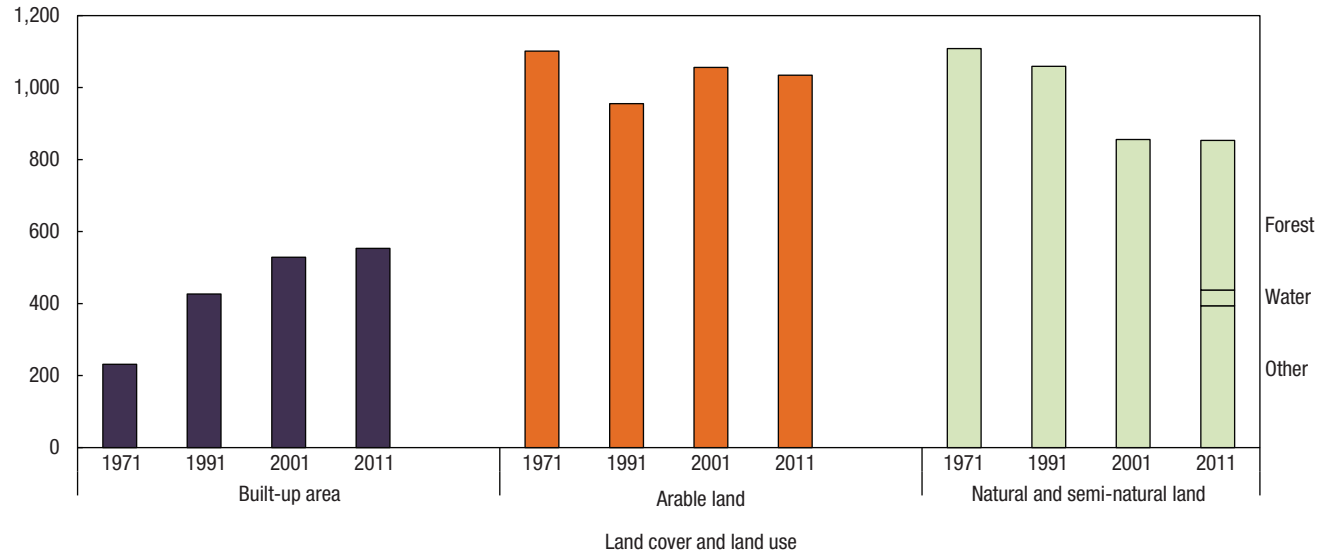
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): Land Use (1971)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.rncan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015); United States Census Bureau, 2014, *Digital cartographic file in shapefile format – States*, file: cb\_2014\_us\_state\_500k.zip, [http://www.census.gov/geo/maps-data/data/cbf/cbf\\_state.html](http://www.census.gov/geo/maps-data/data/cbf/cbf_state.html) (accessed October 29, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.51

### Land cover and land use, St. Catharines–Niagara census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres



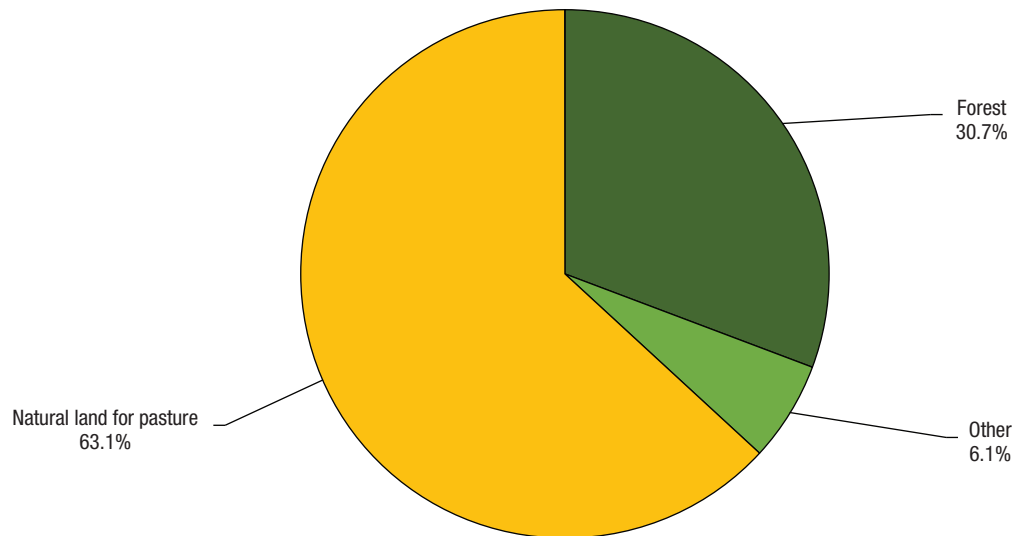
**Notes:** Built-up area for 1971 is based on *Canada Land Inventory: Land Use (CLI: LU)* and *Canada Land Use Monitoring Program (CLUMP)*, with modeling of roads. CLI: LU and CLUMP built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the *Interpolated Census of Agriculture*. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCAN, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCAN, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.nrcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.52

Natural and semi-natural land lost to settled area, by selected land class, St. Catharines–Niagara census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geotit/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geotit/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geotit/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geotit/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.76**

**Population and dwellings, total and settled area, St. Catharines-Niagara census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2</sup>	
	Total area	Settled area <sup>3</sup>	Total area	Settled area <sup>3</sup>
	number			
<b>1971</b>				
Population	323,162	302,962	404,113	368,000
Dwellings	94,305	89,034	117,014	107,728
<b>1991</b>				
Population	360,603	355,168	497,987	490,119
Dwellings	135,365	133,541	181,617	179,068
<b>2001</b>				
Population	372,656	369,692	528,772	517,017
Dwellings	156,856	155,768	212,545	208,530
<b>2011</b>				
Population	392,184	388,086	563,475	549,886
Dwellings	174,338	172,866	238,257	233,459
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	21	28	39	49
Dwellings	85	94	104	117

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population; Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.77**

**Land cover and land use, St. Catharines–Niagara census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	1,398	2,441	57
<b>1971</b>			
Total built-up <sup>3</sup>	187	232	81
Settled	117	141	82
Roads	70	90	78
Arable <sup>4</sup>	..	1,101	..
Natural and semi-natural <sup>5</sup>	..	1,108	..
<b>1991</b>			
Total built-up <sup>6</sup>	314	426	74
Settled	196	260	75
Roads	118	166	71
Arable <sup>4</sup>	..	955	..
Natural and semi-natural <sup>5</sup>	..	1,059	..
<b>2001</b>			
Total built-up <sup>6</sup>	395	529	75
Settled	276	362	76
Roads	119	167	71
Arable <sup>4</sup>	..	1,056	..
Natural and semi-natural <sup>5</sup>	..	856	..
<b>2011</b>			
Total built-up <sup>6</sup>	412	553	74
Settled	292	383	76
Roads	120	171	71
Arable <sup>4</sup>	..	1,034	..
Natural and semi-natural <sup>7</sup>	..	853	..
Forest	..	416	..
Water	..	44	..
Other	..	394	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>3,6</sup>	121	139	...
Arable <sup>4</sup>	...	-6	...
Natural and semi-natural <sup>5</sup>	...	-23	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. Built-up area for 1971 is based on *Canada Land Inventory Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), code B – Urban Built-up. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

4. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

5. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

6. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

7. For 2011, forest and water are broken out separately based on data from AAFC *Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](http://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](http://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <http://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.78**

**Ecosystem asset account, St. Catharines–Niagara census metropolitan area-ecosystem (CMA-E), 1971 to 2011**

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	141	90	1,101	1,108
Land lost to settled area	...	...	-158	-83
Balance of change <sup>4</sup>	241	80	91	-171
Closing stock 2011	383	171	1,034	853

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use (CLI: LU)* and *Canada Land Use Monitoring Program (CLUMP)*. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).
  2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.
  3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.
  4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.
- Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

### Links to more information

Tables by metropolitan area, St. Catharines–Niagara

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met125-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met125-eng.htm)

St. Catharines–Niagara CMA, population change, 2006 to 2011, by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-539-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-539-013-01-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

St. Catharines–Niagara CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=539&Geo2=PR&Code2=35&Data=Count&SearchText=st.%20catharines&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=539&Geo2=PR&Code2=35&Data=Count&SearchText=st.%20catharines&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

St. Catharines–Niagara CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=539&Data=Count&SearchText=st.%20catharines&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=539&Data=Count&SearchText=st.%20catharines&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

### St. John's, Newfoundland and Labrador

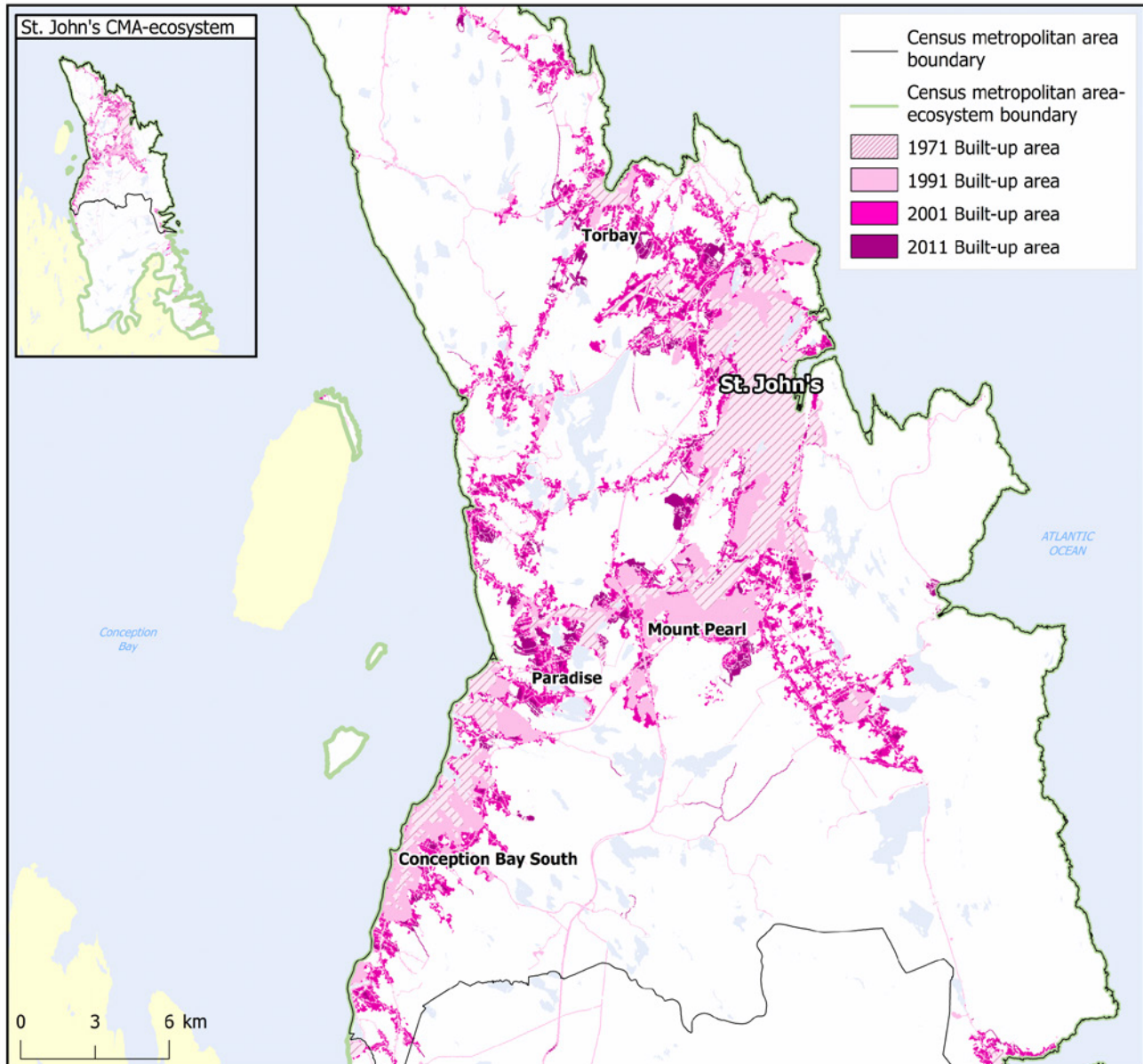
#### Highlights

- At the CMA level, built-up area increased from 60 km<sup>2</sup> in 1971 to 181 km<sup>2</sup> in 2011, an increase of 201%.
- At the CMA-E level, built-up area increased from 65 km<sup>2</sup> in 1971 to 204 km<sup>2</sup> in 2011, an increase of 215%.
- In 2011, the natural and semi-natural land class was divided into forest (56%), water (11%) and other (33%).
- From 1971 to 2011, 19 km<sup>2</sup> of arable land and 91 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 91.8% was forest, 2.6% was natural land for pasture and 5.6% was classed as other.
- Population in the CMA increased by 48% from 132,937 to 196,966 between 1971 and 2011.
- The number of dwellings in the CMA increased by 182% from 29,951 to 84,542 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.27

Built-up area, St. John's census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Note:** Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

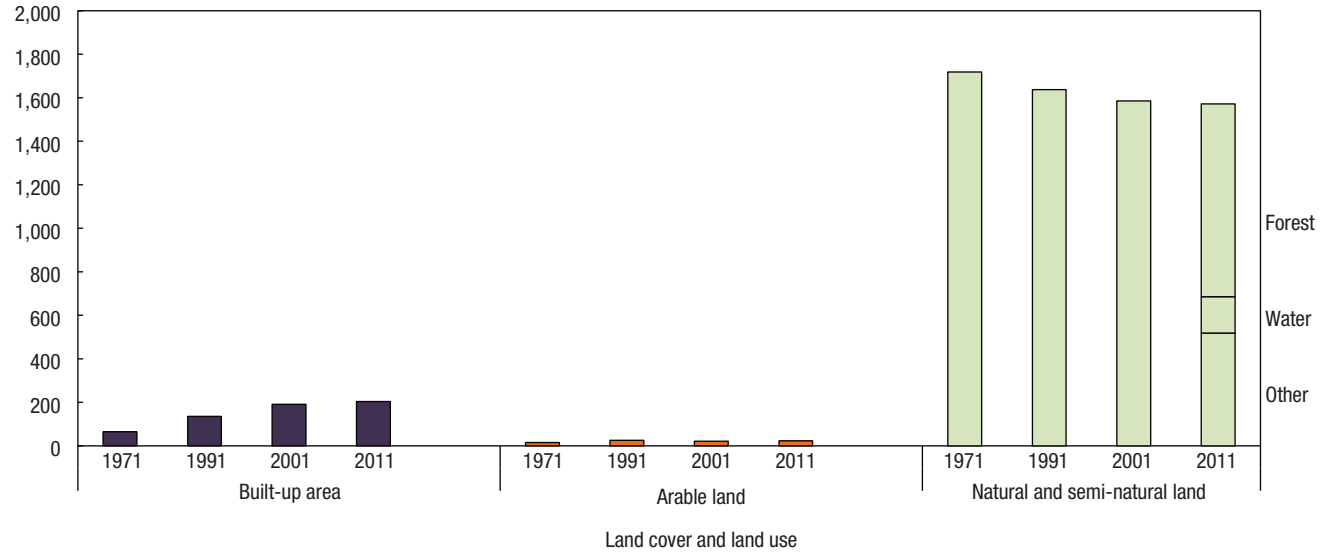
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.nrcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.53

### Land cover and land use, St. John's census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres



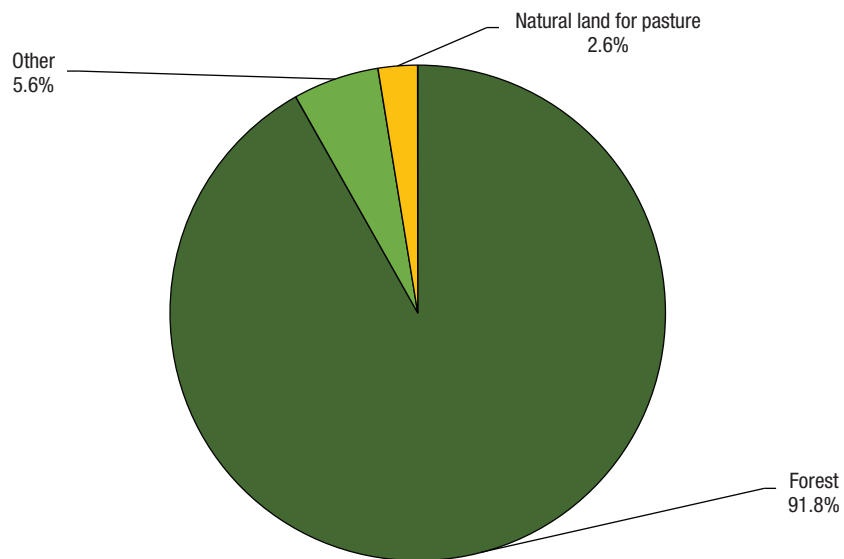
**Notes:** Built-up area for 1971 is based on *Canada Land Inventory: Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), with modeling of roads. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC Land Use, 1990 dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCAN, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCAN, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.54

Natural and semi-natural land lost to settled area, by selected land class, St. John's census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.79**

**Population and dwellings, total and settled area, St. John's census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2</sup>	
	Total area	Settled area <sup>3</sup>	Total area	Settled area <sup>3</sup>
	number			
<b>1971</b>				
Population	132,937	125,613	137,342	126,464
Dwellings	29,951	28,482	30,889	28,665
<b>1991</b>				
Population	170,441	169,934	175,122	173,827
Dwellings	54,817	54,665	56,192	55,823
<b>2001</b>				
Population	172,470	164,887	175,864	167,151
Dwellings	68,955	66,238	70,890	67,472
<b>2011</b>				
Population	196,966	190,481	200,604	193,120
Dwellings	84,542	82,104	86,709	83,593
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	48	52	46	53
Dwellings	182	188	181	192

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population; Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.80**

**Land cover and land use, St. John's census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	805	1,798	45
<b>1971</b>			
Total built-up <sup>3</sup>	60	65	93
Settled	39	41	95
Roads	21	23	89
Arable <sup>4</sup>	..	15	..
Natural and semi-natural <sup>5</sup>	..	1,718	..
<b>1991</b>			
Total built-up <sup>6</sup>	120	135	89
Settled	78	87	90
Roads	42	49	85
Arable <sup>4</sup>	..	25	..
Natural and semi-natural <sup>5</sup>	..	1,638	..
<b>2001</b>			
Total built-up <sup>6</sup>	169	191	88
Settled	127	142	89
Roads	42	49	85
Arable <sup>4</sup>	..	22	..
Natural and semi-natural <sup>5</sup>	..	1,586	..
<b>2011</b>			
Total built-up <sup>6</sup>	181	204	89
Settled	136	152	90
Roads	44	52	85
Arable <sup>4</sup>	..	23	..
Natural and semi-natural <sup>7</sup>	..	1,572	..
Forest	..	886	..
Water	..	168	..
Other	..	518	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>3,6</sup>	201	215	...
Arable <sup>4</sup>	...	51	...
Natural and semi-natural <sup>5</sup>	...	-9	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. Built-up area for 1971 is based on *Canada Land Inventory Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), code B – Urban Built-up. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

4. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

5. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

6. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

7. For 2011, forest and water are broken out separately based on data from AAFC *Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](http://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](http://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <http://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.81**  
**Ecosystem asset account, St. John's census metropolitan area-ecosystem (CMA-E), 1971 to 2011**

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	41	23	15	1,718
Land lost to settled area	...	...	-19	-91
Balance of change <sup>4</sup>	110	29	26	-55
Closing stock 2011	152	52	23	1,572

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use (CLI: LU)* and *Canada Land Use Monitoring Program (CLUMP)*. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).
  2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture. Because of the differences in the datasets for arable land, arable land lost to settled area from 1971 to 2011 in St. John's is greater than the opening stock of arable land in 1971.
  3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.
  4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.
- Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

### Links to more information

Tables by metropolitan area, St. John's

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met126-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met126-eng.htm)

St. John's CMA, population change, 2006 to 2011, by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-001-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-001-013-01-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

St. John's CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=001&Geo2=PR&Code2=10&Data=Count&SearchText=st.%20john&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=001&Geo2=PR&Code2=10&Data=Count&SearchText=st.%20john&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

St. John's CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=001&Data=Count&SearchText=st.%20john&SearchType=Begins&SearchPR=01&BI=All&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=001&Data=Count&SearchText=st.%20john&SearchType=Begins&SearchPR=01&BI=All&BI=All&Custom=&TABID=1)

### Thunder Bay, Ontario

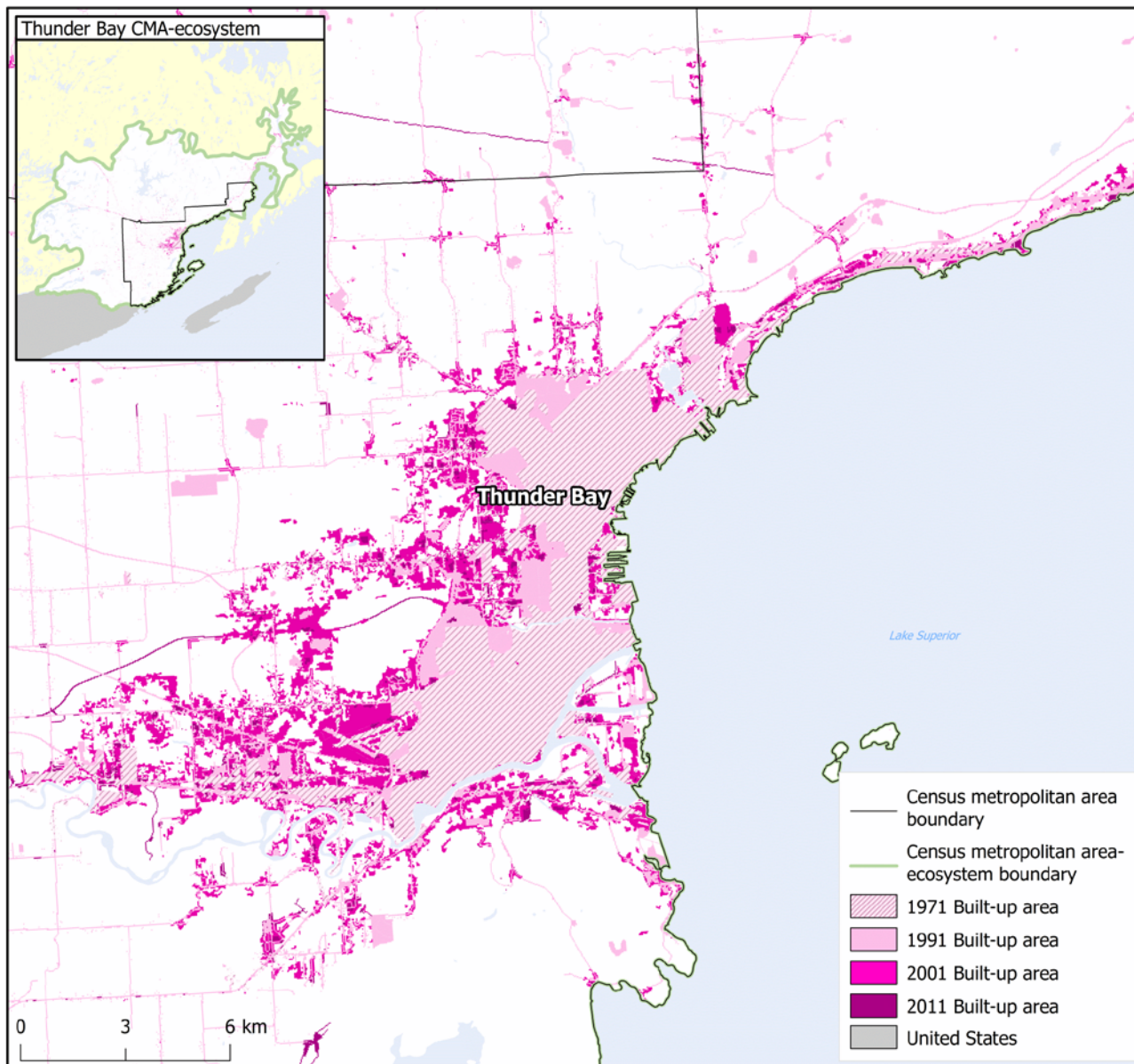
#### Highlights

- At the CMA level, built-up area increased from 71 km<sup>2</sup> in 1971 to 193 km<sup>2</sup> in 2011, an increase of 170%.
- At the CMA-E level, built-up area increased from 79 km<sup>2</sup> in 1971 to 307 km<sup>2</sup> in 2011, an increase of 289%.
- In 2011, the natural and semi-natural land class was divided into forest (59%), water (8%) and other (33%).
- From 1971 to 2011, 20 km<sup>2</sup> of arable land and 130 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 62.2% was forest, 5.3% was natural land for pasture and 32.4% was classed as other.
- Population in the CMA increased by 5% from 115,564 to 121,596 between 1971 and 2011.
- The number of dwellings in the CMA increased by 69% from 33,190 to 56,071 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.28

Built-up area, Thunder Bay census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Note:** Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

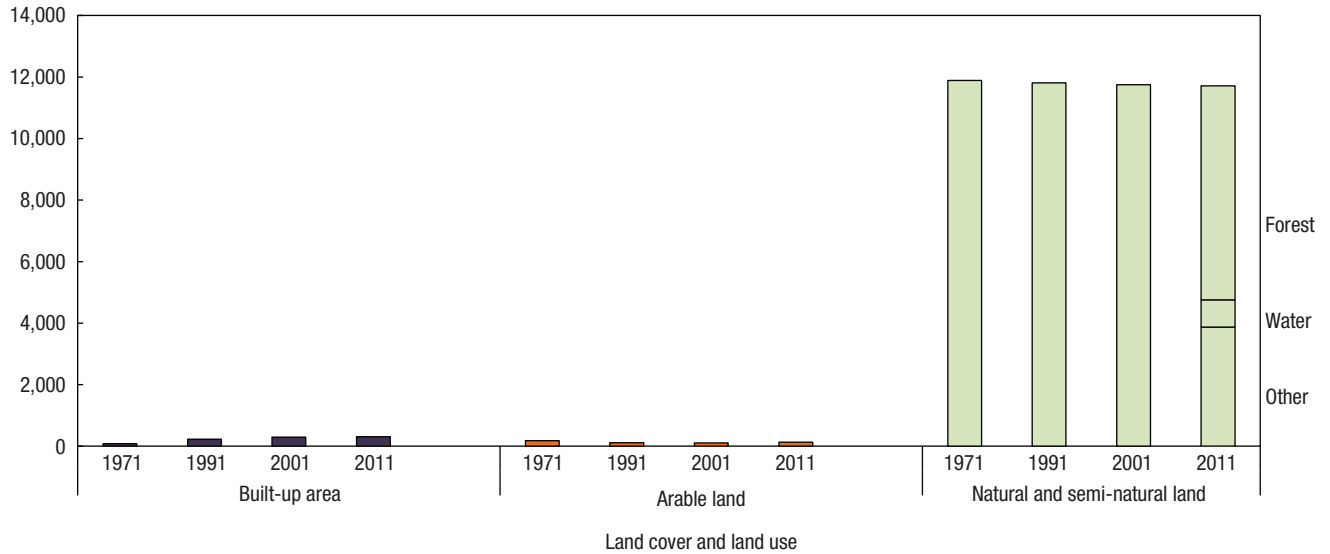
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): Land Use (1971)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.rncan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015); United States Census Bureau, 2014, *Digital cartographic file in shapefile format – States*, file: cb\_2014\_us\_state\_500k.zip, [http://www.census.gov/geo/maps-data/data/cbf/cbf\\_state.html](http://www.census.gov/geo/maps-data/data/cbf/cbf_state.html) (accessed October 29, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.55

### Land cover and land use, Thunder Bay census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres



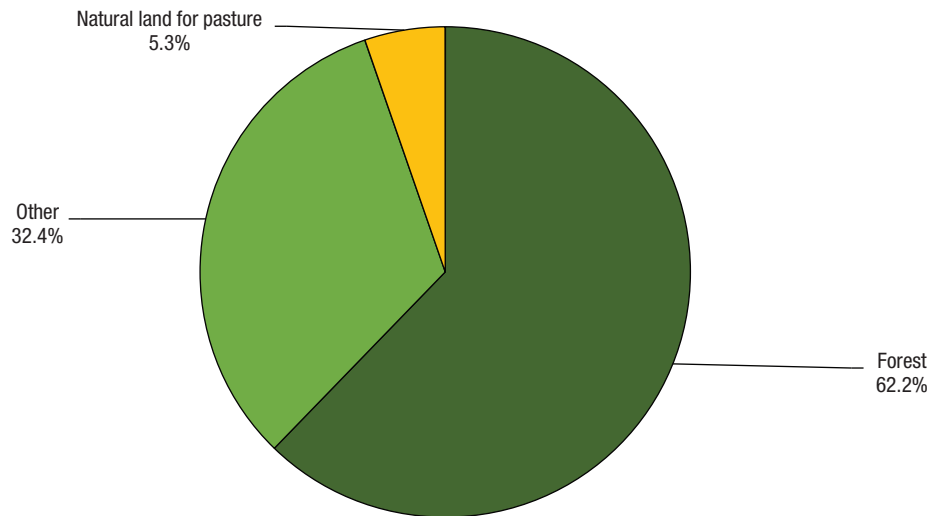
**Notes:** Built-up area for 1971 is based on *Canada Land Inventory: Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), with modeling of roads. CLI: LU and CLUMP built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.56

Natural and semi-natural land lost to settled area, by selected land class, Thunder Bay census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.82**

**Population and dwellings, total and settled area, Thunder Bay census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2</sup>	
	Total area	Settled area <sup>3</sup>	Total area	Settled area <sup>3</sup>
	number			
<b>1971</b>				
Population	115,564	107,043	123,361	107,043
Dwellings	33,190	30,876	35,362	30,876
<b>1991</b>				
Population	123,838	120,818	132,951	127,293
Dwellings	46,372	45,466	49,541	47,741
<b>2001</b>				
Population	120,773	112,062	129,550	117,010
Dwellings	53,331	49,755	58,936	52,601
<b>2011</b>				
Population	121,596	110,457	129,800	115,002
Dwellings	56,071	51,483	62,185	54,849
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	5	3	5	7
Dwellings	69	67	76	78

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population; Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, Land Use 1990, 2000 and 2010, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.83**

**Land cover and land use, Thunder Bay census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	2,556	12,148	21
<b>1971</b>			
Total built-up <sup>3</sup>	71	79	90
Settled	42	42	100
Roads	29	36	79
Arable <sup>4</sup>	..	179	..
Natural and semi-natural <sup>5</sup>	..	11,891	..
<b>1991</b>			
Total built-up <sup>6</sup>	144	228	63
Settled	85	123	70
Roads	58	106	55
Arable <sup>4</sup>	..	112	..
Natural and semi-natural <sup>5</sup>	..	11,808	..
<b>2001</b>			
Total built-up <sup>6</sup>	186	292	64
Settled	128	186	69
Roads	58	106	55
Arable <sup>4</sup>	..	108	..
Natural and semi-natural <sup>5</sup>	..	11,748	..
<b>2011</b>			
Total built-up <sup>6</sup>	193	307	63
Settled	132	193	68
Roads	61	114	53
Arable <sup>4</sup>	..	131	..
Natural and semi-natural <sup>7</sup>	..	11,710	..
Forest	..	6,951	..
Water	..	891	..
Other	..	3,869	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>3,6</sup>	170	289	...
Arable <sup>4</sup>	...	-27	...
Natural and semi-natural <sup>5</sup>	...	-2	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. Built-up area for 1971 is based on *Canada Land Inventory Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), code B – Urban Built-up. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

4. Arable land area is the area of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

5. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

6. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

7. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geoft/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geoft/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geoft/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geoft/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



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**Table 3.84**

**Ecosystem asset account, Thunder Bay census metropolitan area-ecosystem (CMA-E), 1971 to 2011**

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	42	36	179	11,891
Land lost to settled area	...	...	-20	-130
Balance of change <sup>4</sup>	151	77	-27	-50
Closing stock 2011	193	114	131	11,710

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use (CLI: LU)* and *Canada Land Use Monitoring Program (CLUMP)*. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).
  2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.
  3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.
  4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.
- Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

### Links to more information

Tables by metropolitan area, Thunder Bay

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met127-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met127-eng.htm)

Thunder Bay CMA, population change, 2006 to 2011, by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-595-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-595-013-01-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Thunder Bay CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=595&Geo2=PR&Code2=35&Data=Count&SearchText=thunder&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=595&Geo2=PR&Code2=35&Data=Count&SearchText=thunder&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Thunder Bay CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=595&Data=Count&SearchText=thunder&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=595&Data=Count&SearchText=thunder&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1)

### Toronto, Ontario

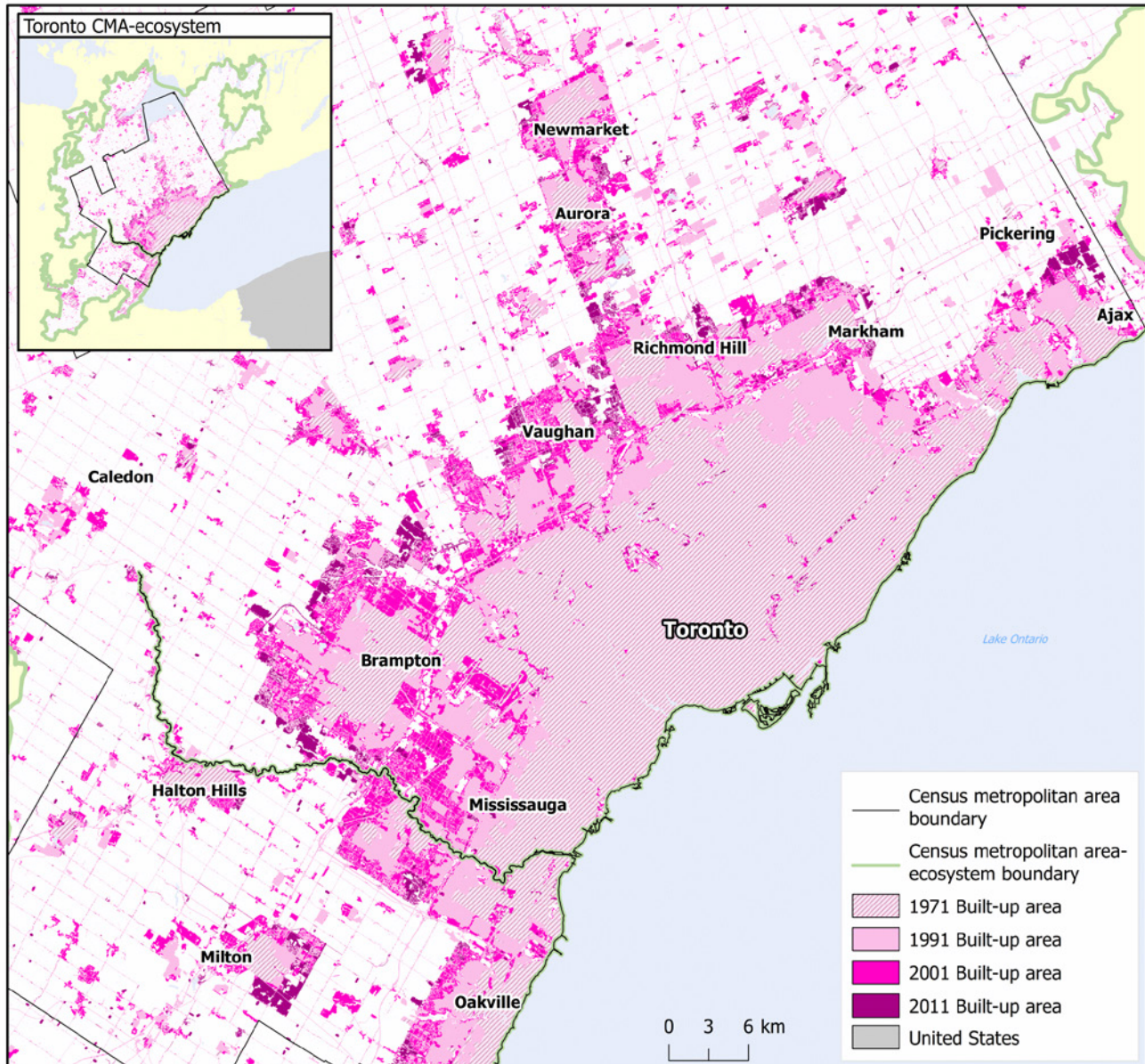
#### Highlights

- At the CMA level, built-up area increased from 995 km<sup>2</sup> in 1971 to 2,184 km<sup>2</sup> in 2011, an increase of 120%.
- At the CMA-E level, built-up area increased from 1,269 km<sup>2</sup> in 1971 to 3,080 km<sup>2</sup> in 2011, an increase of 143%.
- In 2011, the natural and semi-natural land class was divided into forest (38%), water (15%) and other (47%).
- From 1971 to 2011, 961 km<sup>2</sup> of arable land and 448 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 49.2% was forest, 37.5% was natural land for pasture and 13.3% was classed as other.
- Population in the CMA increased by 107% from 2,699,927 to 5,583,064 between 1971 and 2011.
- The number of dwellings in the CMA increased by 162% from 794,253 to 2,079,459 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.29

Built-up area, Toronto census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Note:** Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

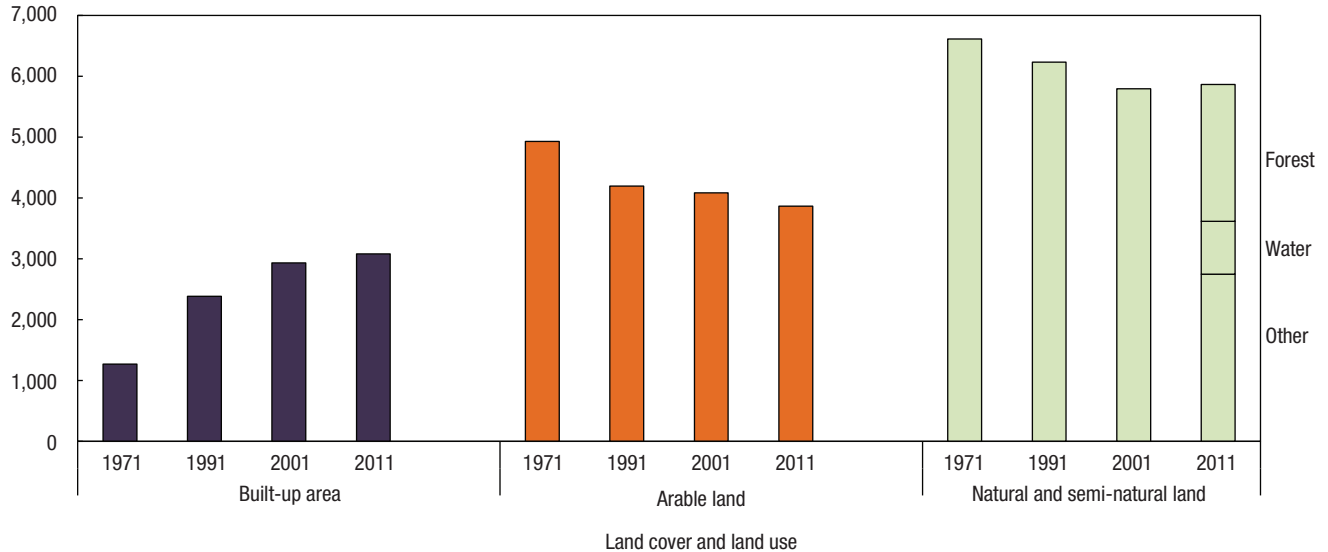
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): Land Use (1971)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.rncan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015); United States Census Bureau, 2014, *Digital cartographic file in shapefile format – States*, file: cb\_2014\_us\_state\_500k.zip, [http://www.census.gov/geo/maps-data/data/cbf/cbf\\_state.html](http://www.census.gov/geo/maps-data/data/cbf/cbf_state.html) (accessed October 29, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.57

### Land cover and land use, Toronto census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres



**Notes:** CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries. Built-up area for 1971 is based on *Canada Land Inventory: Land Use (CLI: LU)* and *Canada Land Use Monitoring Program (CLUMP)*, with modeling of roads. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

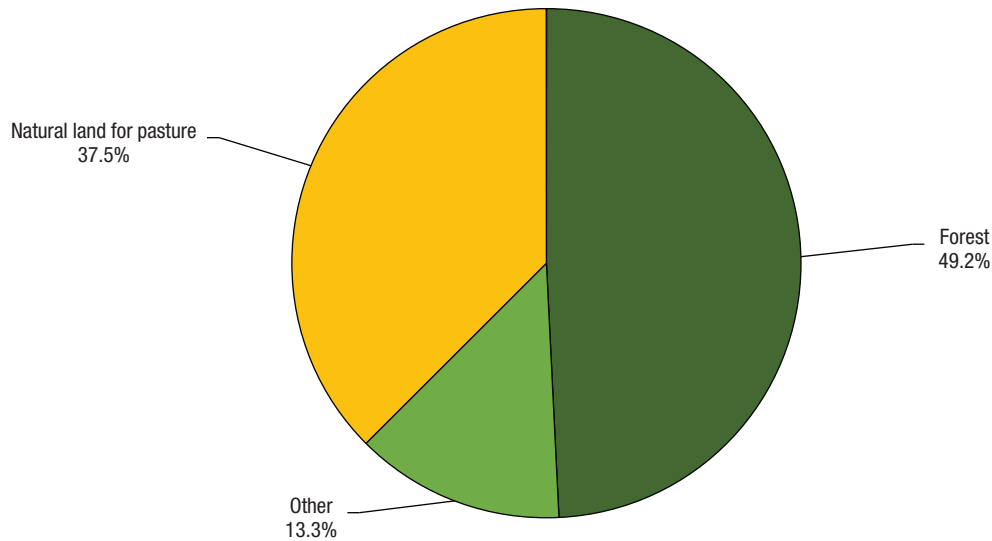
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCAN, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCAN, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



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Chart 3.58

Natural and semi-natural land lost to settled area, by selected land class, Toronto census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geotit/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geotit/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geotit/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geotit/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.85**

**Population and dwellings, total and settled area, Toronto census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2,3</sup>	
	Total area	Settled area <sup>4</sup>	Total area	Settled area <sup>4</sup>
	number			
<b>1971</b>				
Population	2,699,927	2,611,961	3,134,604	2,971,200
Dwellings	794,253	771,152	917,213	874,029
<b>1991</b>				
Population	3,897,034	3,859,696	4,550,876	4,491,637
Dwellings	1,367,718	1,355,772	1,598,515	1,579,500
<b>2001</b>				
Population	4,671,682	4,631,315	5,472,222	5,381,521
Dwellings	1,666,012	1,651,340	1,974,044	1,938,830
<b>2011</b>				
Population	5,583,064	5,550,113	6,505,806	6,426,003
Dwellings	2,079,459	2,067,395	2,449,081	2,419,006
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	107	112	108	116
Dwellings	162	168	167	177

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener-Cambridge-Waterloo, Guelph, Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.

4. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population; Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

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**Table 3.86**

**Land cover and land use, Toronto census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2,3</sup>	CMA as a proportion of CMA-ecosystem
		square kilometres	percent
<b>Total land area</b>	5,906	12,814	46
<b>1971</b>			
Total built-up <sup>4</sup>	995	1,269	78
Settled	699	850	82
Roads	296	418	71
Arable <sup>5</sup>	..	4,930	..
Natural and semi-natural <sup>6</sup>	..	6,615	..
<b>1991</b>			
Total built-up <sup>7</sup>	1,714	2,384	72
Settled	1,203	1,598	75
Roads	510	786	65
Arable <sup>5</sup>	..	4,194	..
Natural and semi-natural <sup>6</sup>	..	6,235	..
<b>2001</b>			
Total built-up <sup>7</sup>	2,082	2,933	71
Settled	1,566	2,139	73
Roads	516	794	65
Arable <sup>5</sup>	..	4,085	..
Natural and semi-natural <sup>6</sup>	..	5,795	..
<b>2011</b>			
Total built-up <sup>7</sup>	2,184	3,080	71
Settled	1,648	2,260	73
Roads	536	821	65
Arable <sup>5</sup>	..	3,867	..
Natural and semi-natural <sup>6</sup>	..	5,866	..
Forest	..	2,250	..
Water	..	868	..
Other	..	2,748	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>4,7</sup>	120	143	...
Arable <sup>5</sup>	..	-22	...
Natural and semi-natural <sup>6</sup>	..	-11	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.

4. Built-up area for 1971 is based on *Canada Land Inventory Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), code B – Urban Built-up. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

5. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

6. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

7. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

8. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](http://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](http://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <http://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.87**

**Ecosystem asset account, Toronto census metropolitan area-ecosystem (CMA-E), 1971 to 2011**

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	850	418	4,930	6,615
Land lost to settled area	...	...	-961	-448
Balance of change <sup>4</sup>	1,409	403	-102	-300
Closing stock 2011	2,260	821	3,867	5,866

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use (CLI: LU)* and *Canada Land Use Monitoring Program (CLUMP)*. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).
  2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.
  3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.
  4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.
- Note:** CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.
- Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

### Links to more information

Tables by metropolitan area, Toronto

[www.StatCan.gc.ca/tables-tableaux/sum-som/101/met01/met128-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/101/met01/met128-eng.htm)

Toronto CMA, percentage of private dwellings owned by a member of the household, 2011 (Map 1 of 2)

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-535-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-535-013-01-00-eng.pdf)

Toronto CMA, percentage of private dwellings owned by a member of the household, 2011 (Map 2 of 2)

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-535-013-01-01-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-535-013-01-01-eng.pdf)

Toronto CMA, percentage of owner households spending 30% or more in shelter costs, 2011 (Map 1 of 2)

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-535-013-02-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-535-013-02-00-eng.pdf)

Toronto CMA, percentage of owner households spending 30% or more in shelter costs, 2011 (Map 2 of 2)

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-535-013-02-01-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-535-013-02-01-eng.pdf)

Toronto CMA, percentage of renter households spending 30% or more in shelter costs, 2011 (Map 1 of 2)

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-535-013-03-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-535-013-03-00-eng.pdf)

Toronto CMA, percentage of renter households spending 30% or more in shelter costs, 2011 (Map 2 of 2)

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-535-013-03-01-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-535-013-03-01-eng.pdf)

Toronto CMA average value of owned private dwellings, 2011 (Map 1 of 2)

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-535-013-04-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-535-013-04-00-eng.pdf)

Toronto CMA average value of owned private dwellings, 2011 (Map 2 of 2)

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-535-013-04-01-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-535-013-04-01-eng.pdf)

Toronto CMA, population change, 2006 to 2011, by 2011 census tract (Map 1 of 2)

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-535-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-535-013-01-00-eng.pdf)

Toronto CMA, population change, 2006 to 2011, by 2011 census tract (Map 2 of 2)

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-535-013-01-01-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-535-013-01-01-eng.pdf)

Toronto CMA, percentage of the employed labour force using a car, truck or van to get to work in 2011, by 2011 census tract (Map 1 of 2)

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99012-005-535-013-07-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99012-005-535-013-07-00-eng.pdf)

Toronto CMA, percentage of the employed labour force using a car, truck or van to get to work in 2011, by 2011 census tract (Map 2 of 2)

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99012-005-535-013-07-01-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99012-005-535-013-07-01-eng.pdf)

<http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99012-005-535-013-07-01-eng.pdf>

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Toronto CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=535&Geo2=PR&Code2=35&Data=Count&SearchText=toronto&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=535&Geo2=PR&Code2=35&Data=Count&SearchText=toronto&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Toronto CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=535&Data=Count&SearchText=toronto&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=535&Data=Count&SearchText=toronto&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1)

### Trois-Rivières, Quebec

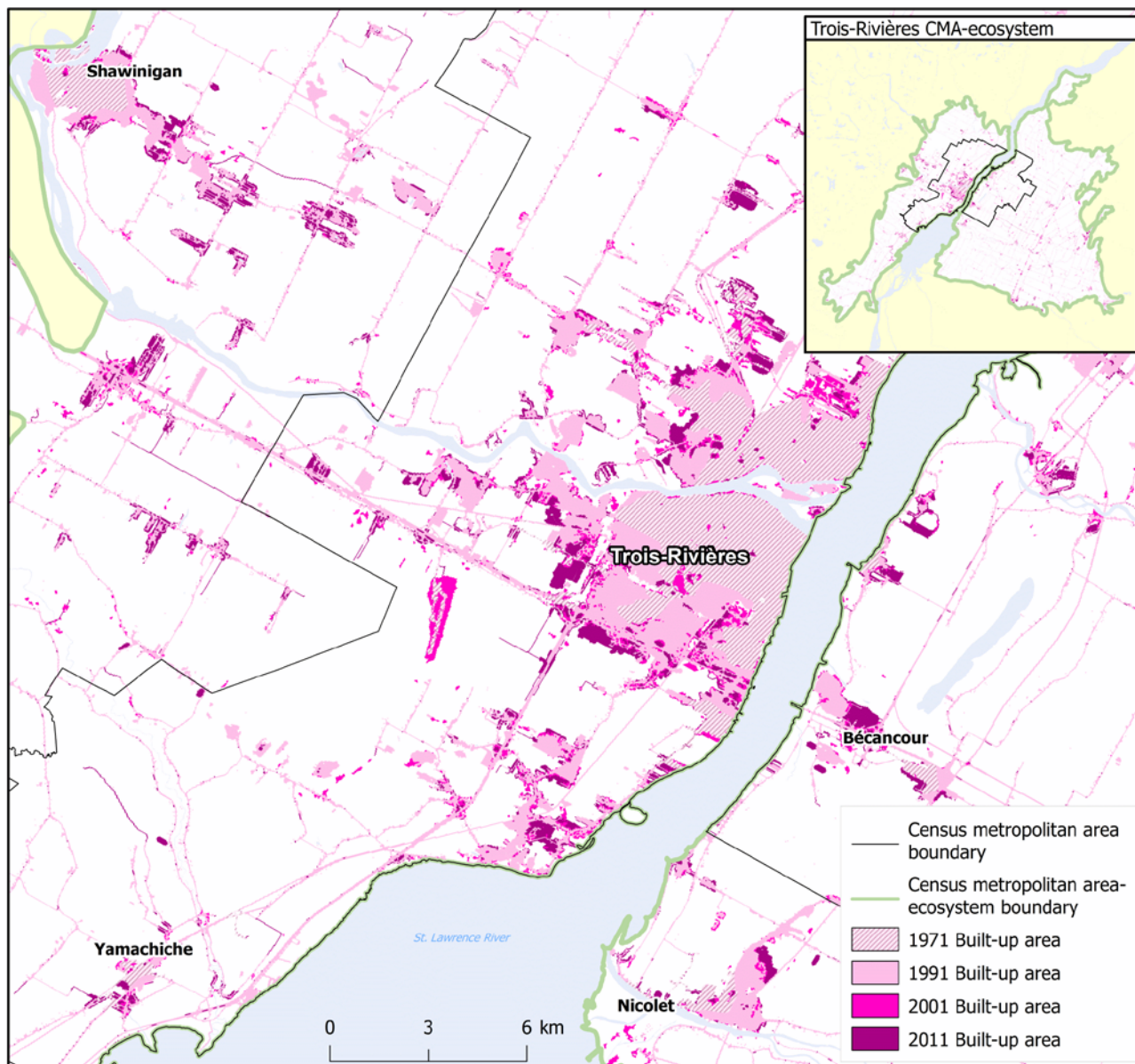
#### Highlights

- At the CMA level, built-up area increased from 36 km<sup>2</sup> in 1971 to 147 km<sup>2</sup> in 2011, an increase of 310%.
- At the CMA-E level, built-up area increased from 68 km<sup>2</sup> in 1971 to 446 km<sup>2</sup> in 2011, an increase of 558%.
- In 2011, the natural and semi-natural land class was divided into forest (62%), water (3%) and other (35%).
- From 1971 to 2011, 131 km<sup>2</sup> of arable land and 110 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 73.4% was forest, 13.6% was natural land for pasture and 13.0% was classed as other.
- Population in the CMA increased by 28% from 118,248 to 151,773 between 1971 and 2011.
- The number of dwellings in the CMA increased by 142% from 30,942 to 74,837 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.30

Built-up area, Trois-Rivières census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Notes:** Canada Land Use Monitoring Program (CLUMP) data were not available—the 1971 built-up area may be underestimated. Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

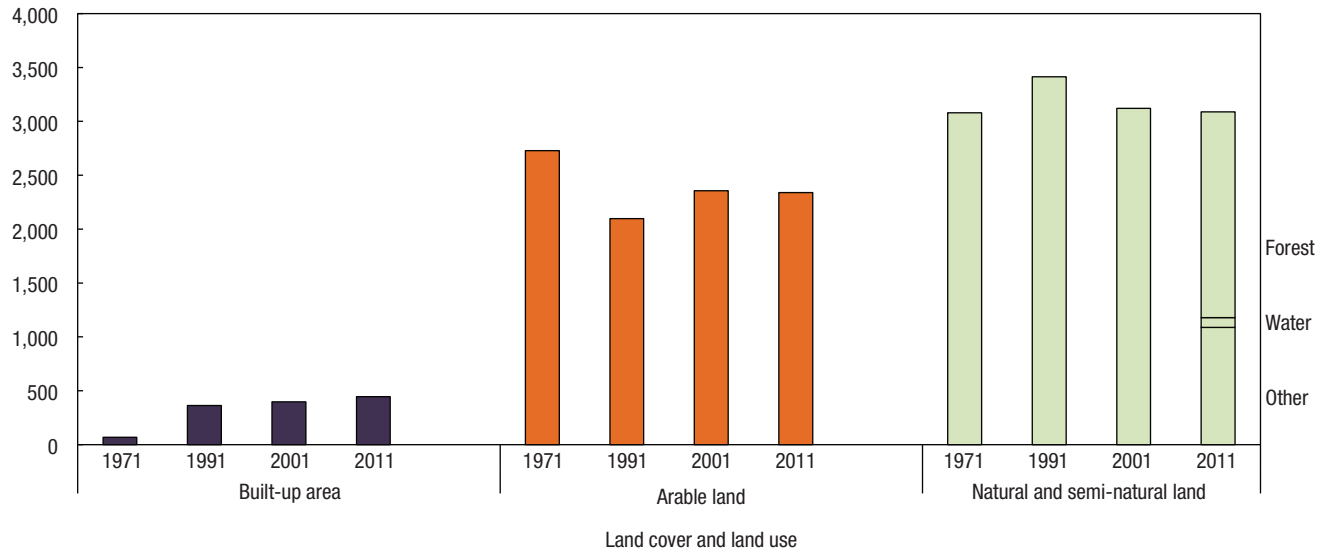
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCAN, Canada Centre for Mapping and Earth Observation 2014, *CanVec+*, <ftp://ftp2.cits.nrcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.59

### Land cover and land use, Trois-Rivières census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres



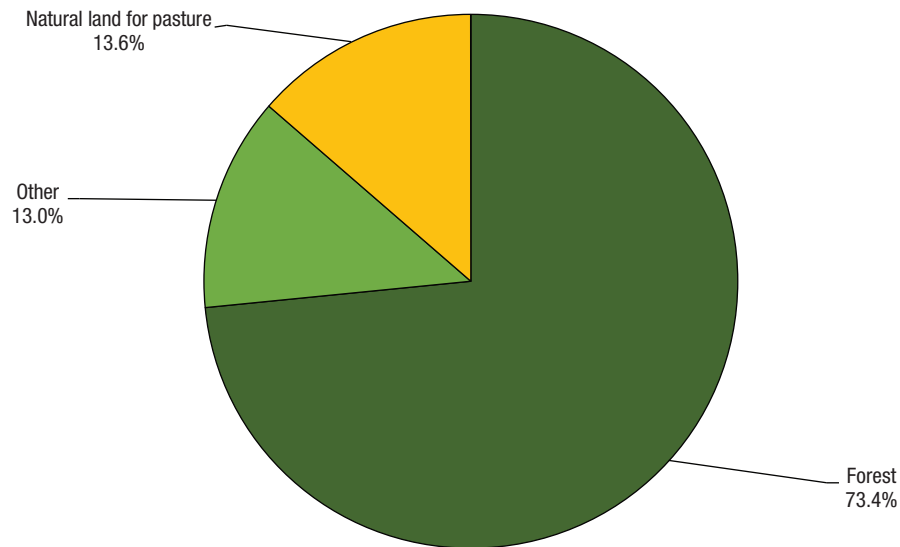
**Notes:** Built-up area for 1971 is based on *Canada Land Inventory: Land Use* (CLI: LU), with modeling of roads. *Canada Land Use Monitoring Program* (CLUMP) data exclude the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up areas may be underestimated for these CMAs. CLI: LU built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.60

Natural and semi-natural land lost to settled area, by selected land class, Trois-Rivières census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.88**

**Population and dwellings, total and settled area, Trois-Rivières census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2</sup>	
	Total area	Settled area <sup>3</sup>	Total area	Settled area <sup>3</sup>
	number			
<b>1971</b>				
Population	118,248	96,713	241,279	149,671
Dwellings	30,942	25,841	60,129	39,059
<b>1991</b>				
Population	137,164	129,802	266,662	247,483
Dwellings	54,254	51,676	100,794	94,307
<b>2001</b>				
Population	136,357	125,052	271,828	225,394
Dwellings	63,635	59,167	120,804	101,832
<b>2011</b>				
Population	151,773	142,724	295,963	252,174
Dwellings	74,837	71,032	139,926	120,867
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	28	48	23	68
Dwellings	142	175	133	209

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population and Natural Resources Canada, Canada Centre for Remote Sensing, 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.89**

**Land cover and land use, Trois-Rivières census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	1,041	5,874	18
<b>1971</b>			
Total built-up <sup>3</sup>	36	68	53
Settled	23	40	58
Roads	13	28	46
Arable <sup>4</sup>	..	2,727	..
Natural and semi-natural <sup>5</sup>	..	3,079	..
<b>1991</b>			
Total built-up <sup>6</sup>	118	363	33
Settled	76	211	36
Roads	42	151	28
Arable <sup>4</sup>	..	2,097	..
Natural and semi-natural <sup>5</sup>	..	3,414	..
<b>2001</b>			
Total built-up <sup>6</sup>	131	397	33
Settled	88	245	36
Roads	43	152	28
Arable <sup>4</sup>	..	2,357	..
Natural and semi-natural <sup>5</sup>	..	3,120	..
<b>2011</b>			
Total built-up <sup>6</sup>	147	446	33
Settled	102	281	36
Roads	46	165	28
Arable <sup>4</sup>	..	2,340	..
Natural and semi-natural <sup>7</sup>	..	3,088	..
Forest	..	1,910	..
Water	..	90	..
Other	..	1,088	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>3,6</sup>	310	558	...
Arable <sup>4</sup>	...	-14	...
Natural and semi-natural <sup>5</sup>	...	0	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. Built-up area for 1971 is based on *Canada Land Inventory: Land Use* (CLI: LU), code B – Urban Built-up. *Canada Land Use Monitoring Program* (CLUMP) data exclude the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up areas may be underestimated for these CMAs. CLI: LU built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

4. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the *Interpolated Census of Agriculture*.

5. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

6. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

7. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing, 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.90**

**Ecosystem asset account, Trois-Rivières census metropolitan area-ecosystem (CMA-E), 1971 to 2011**

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	40	28	2,727	3,079
Land lost to settled area	...	...	-131	-110
Balance of change <sup>4</sup>	241	137	-256	120
Closing stock 2011	281	165	2,340	3,088

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use* (CLI: LU). *Canada Land Use Monitoring Program* (CLUMP) data exclude the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up may be underestimated for these CMAs. CLI: LU built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.

3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.

4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing, 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.rncan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

### Links to more information

Tables by metropolitan area, Trois-Rivières

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met129-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met129-eng.htm)

Trois-Rivières CMA, population change, 2006 to 2011, by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-442-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-442-013-01-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Trois-Rivières CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=442&Geo2=PR&Code2=24&Data=Count&SearchText=trois&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=442&Geo2=PR&Code2=24&Data=Count&SearchText=trois&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Trois-Rivières CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=442&Data=Count&SearchText=trois&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=442&Data=Count&SearchText=trois&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1)

### Vancouver, British Columbia

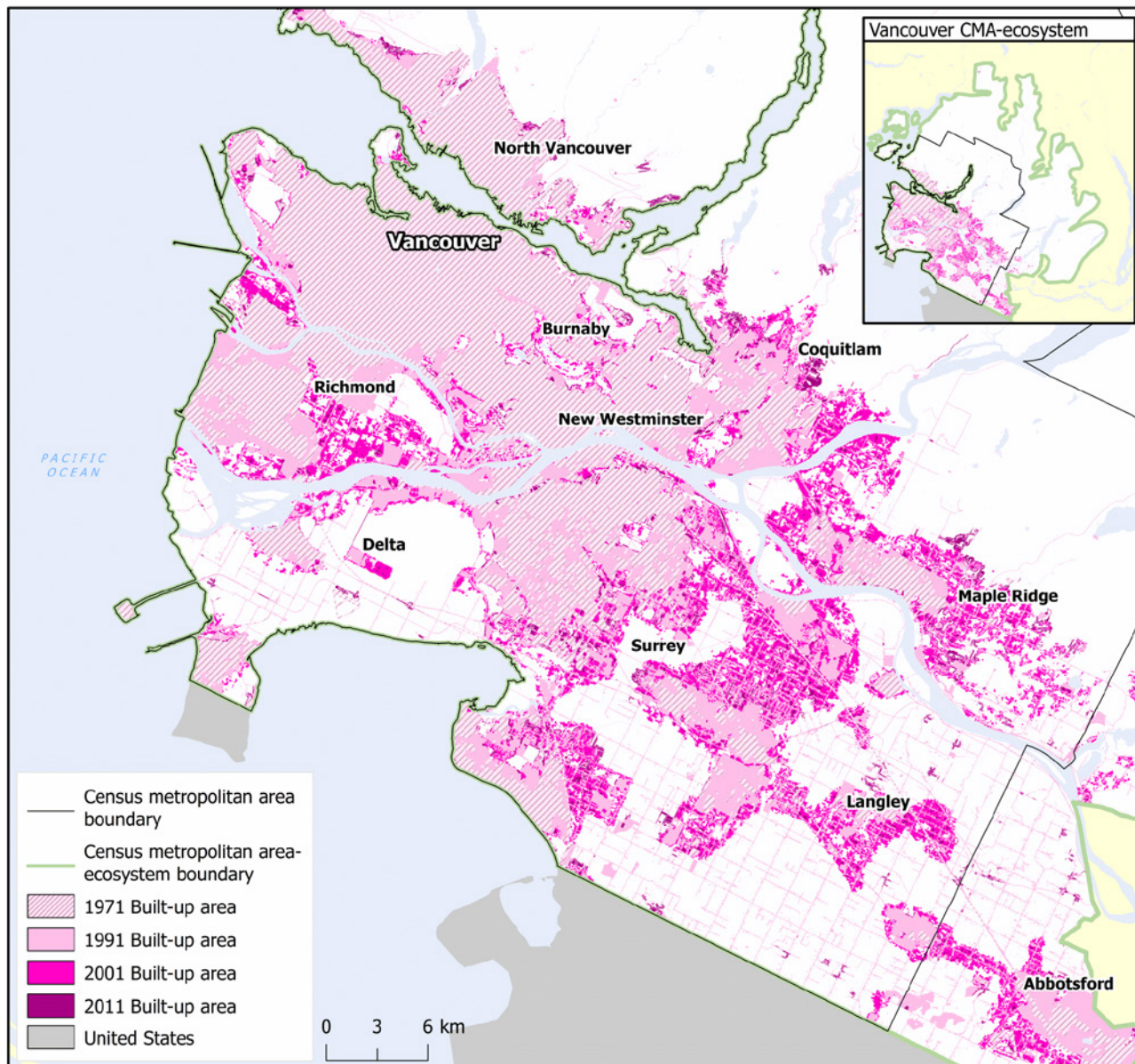
#### Highlights

- At the CMA level, built-up area increased from 492 km<sup>2</sup> in 1971 to 995 km<sup>2</sup> in 2011, an increase of 102%.
- At the CMA-E level, built-up area increased from 506 km<sup>2</sup> in 1971 to 1,085 km<sup>2</sup> in 2011, an increase of 114%.
- In 2011, the natural and semi-natural land class was divided into forest (81%), water (7%) and other (12%).
- From 1971 to 2011, 166 km<sup>2</sup> of arable land and 296 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 64.3% was forest, 27.7% was natural land for pasture and 8.0% was classed as other.
- Population in the CMA increased by 114% from 1,082,441 to 2,313,328 between 1971 and 2011.
- The number of dwellings in the CMA increased by 175% from 345,897 to 949,565 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.31

Built-up area, Vancouver census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Note:** Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

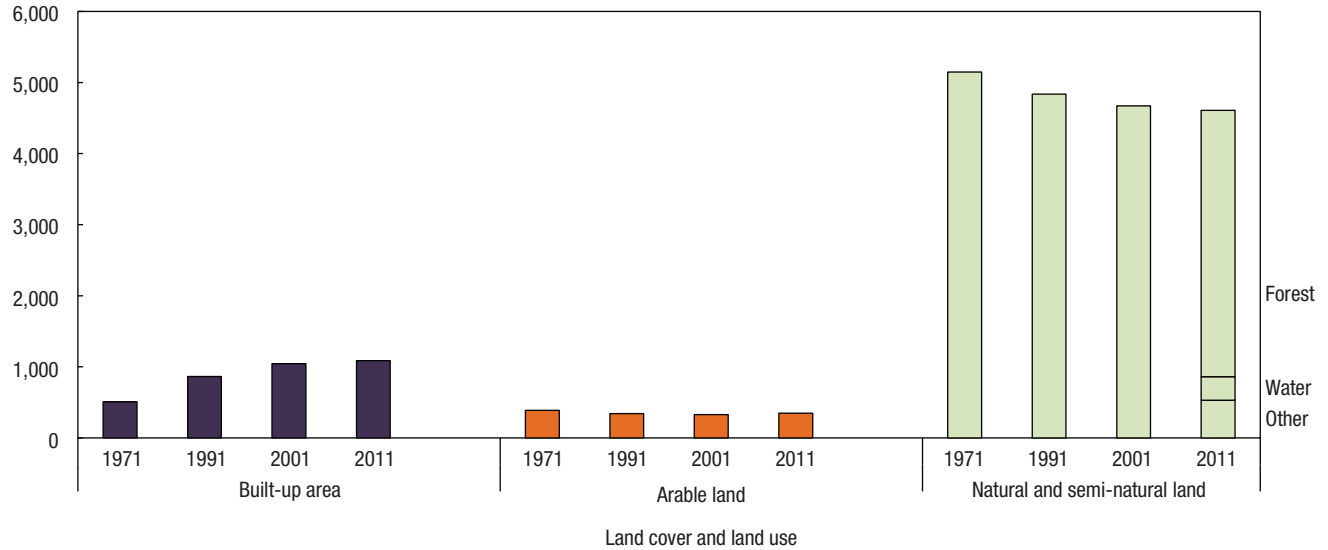
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/di\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/di_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): Land Use (1971)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.rncan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015); United States Census Bureau, 2014, *Digital cartographic file in shapefile format – States*, file: cb\_2014\_us\_state\_500k.zip, [http://www.census.gov/geo/maps-data/data/cbf/cbf\\_state.html](http://www.census.gov/geo/maps-data/data/cbf/cbf_state.html) (accessed October 29, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.61

### Land cover and land use, Vancouver census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres



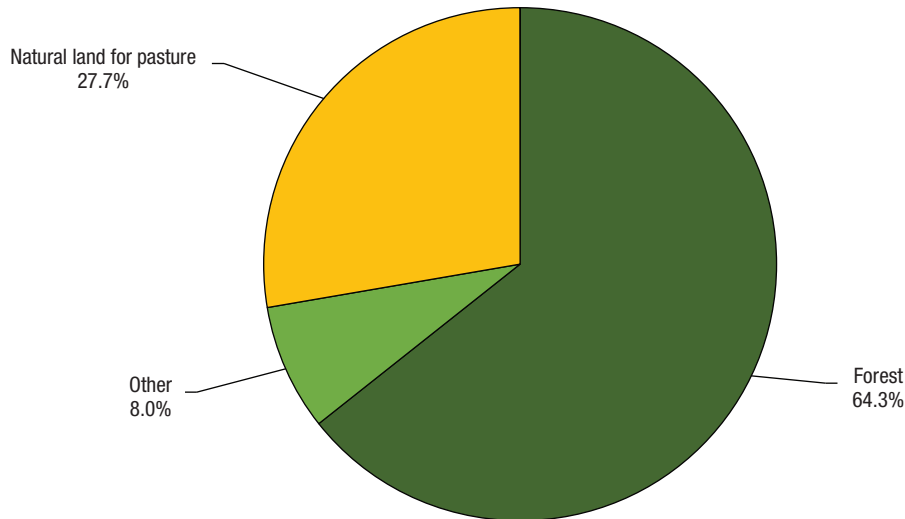
**Notes:** CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Vancouver and Abbotsford–Mission. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries. Built-up area for 1971 is based on *Canada Land Inventory: Land Use (CLI: LU)* and *Canada Land Use Monitoring Program (CLUMP)*, with modeling of roads. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCAN, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCAN, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.62

Natural and semi-natural land lost to settled area, by selected land class, Vancouver census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geotit/cli\\_250k/landuse/](http://ftp2.cits.mcan.gc.ca/pub/geotit/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geotit/clump/clump\\_1971/](http://ftp2.cits.mcan.gc.ca/pub/geotit/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.91**

**Population and dwellings, Vancouver census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2,3</sup>	
	Total area	Settled area <sup>4</sup>	Total area	Settled area <sup>4</sup>
	number			
<b>1971</b>				
Population	1,082,441	1,050,926	1,113,390	1,068,122
Dwellings	345,897	337,105	354,698	342,201
<b>1991</b>				
Population	1,587,663	1,573,722	1,657,729	1,643,140
Dwellings	602,268	597,714	627,099	622,310
<b>2001</b>				
Population	1,979,344	1,969,500	2,067,551	2,056,009
Dwellings	782,495	778,821	815,926	811,044
<b>2011</b>				
Population	2,313,328	2,305,024	2,414,733	2,404,177
Dwellings	949,565	946,227	989,634	985,003
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	114	119	117	125
Dwellings	175	181	179	188

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Vancouver and Abbotsford–Mission. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.

4. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population; Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.92**

**Land cover and land use, Vancouver census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2,3</sup>	CMA as a proportion of CMA-ecosystem
		square kilometres	percent
<b>Total land area</b>	2,883	6,041	48
<b>1971</b>			
Total built-up <sup>4</sup>	492	506	97
Settled	339	348	98
Roads	153	159	96
Arable <sup>5</sup>	..	387	..
Natural and semi-natural <sup>6</sup>	..	5,148	..
<b>1991</b>			
Total built-up <sup>7</sup>	801	864	93
Settled	552	594	93
Roads	248	271	92
Arable <sup>5</sup>	..	341	..
Natural and semi-natural <sup>6</sup>	..	4,836	..
<b>2001</b>			
Total built-up <sup>7</sup>	960	1,042	92
Settled	710	770	92
Roads	250	272	92
Arable <sup>5</sup>	..	328	..
Natural and semi-natural <sup>6</sup>	..	4,672	..
<b>2011</b>			
Total built-up <sup>7</sup>	995	1,085	92
Settled	743	810	92
Roads	252	275	92
Arable <sup>5</sup>	..	348	..
Natural and semi-natural <sup>6</sup>	..	4,609	..
Forest	..	3,748	..
Water	..	330	..
Other	..	531	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>4,7</sup>	102	114	...
Arable <sup>5</sup>	...	-10	...
Natural and semi-natural <sup>6</sup>	...	-10	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Vancouver and Abbotsford–Mission. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.

4. Built-up area for 1971 is based on *Canada Land Inventory Land Use (CLI: LU)* and *Canada Land Use Monitoring Program (CLUMP)*, code B – Urban Built-up. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

5. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

6. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

7. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

8. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](http://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](http://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <http://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.93**

**Ecosystem asset account, Vancouver census metropolitan area-ecosystem (CMA-E), 1971 to 2011**

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	348	159	387	5,148
Land lost to settled area	...	...	-166	-296
Balance of change <sup>4</sup>	462	116	127	-244
Closing stock 2011	810	275	348	4,609

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use (CLI: LU)* and *Canada Land Use Monitoring Program (CLUMP)*. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).
  2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.
  3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.
  4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.
- Note:** CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Vancouver and Abbotsford–Mission. Caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.
- Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

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### Links to more information

Tables by metropolitan area, Vancouver

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met130-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met130-eng.htm)

Vancouver CMA, percentage of private dwellings owned by a member of the household, 2011 (Map 1 of 2)

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-933-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-933-013-01-00-eng.pdf)

Vancouver CMA, percentage of private dwellings owned by a member of the household, 2011 (Map 2 of 2)

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-933-013-01-01-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-933-013-01-01-eng.pdf)

Vancouver CMA, percentage of owner households spending 30% or more in shelter costs, 2011 (Map 1 of 2)

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-933-013-02-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-933-013-02-00-eng.pdf)

Vancouver CMA, percentage of owner households spending 30% or more in shelter costs, 2011 (Map 2 of 2)

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-933-013-02-01-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-933-013-02-01-eng.pdf)

Vancouver CMA, percentage of renter households spending 30% or more in shelter costs, 2011 (Map 1 of 2)

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-933-013-03-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-933-013-03-00-eng.pdf)

Vancouver CMA, percentage of renter households spending 30% or more in shelter costs, 2011 (Map 2 of 2)

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-933-013-03-01-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-933-013-03-01-eng.pdf)

Vancouver CMA average value of owned private dwellings, 2011 (Map 1 of 2)

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-933-013-04-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-933-013-04-00-eng.pdf)

Vancouver CMA average value of owned private dwellings, 2011 (Map 2 of 2)

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-933-013-04-01-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99014-006-933-013-04-01-eng.pdf)

Vancouver CMA, population change, 2006 to 2011, by 2011 census tract (Map 1 of 2)

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-933-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-933-013-01-00-eng.pdf)

Vancouver CMA, population change, 2006 to 2011, by 2011 census tract (Map 2 of 2)

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-933-013-01-01-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-933-013-01-01-eng.pdf)

Vancouver CMA, percentage of the employed labour force using a car, truck or van to get to work in 2011, by 2011 census tract (Map 1 of 2)

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99012-005-933-013-07-00-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99012-005-933-013-07-00-eng.pdf)

Vancouver CMA, percentage of the employed labour force using a car, truck or van to get to work in 2011, by 2011 census tract (Map 2 of 2)

[www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99012-005-933-013-07-01-eng.pdf](http://www12.StatCan.gc.ca/nhs-enm/2011/as-sa/map-carte/pdf/2011-99012-005-933-013-07-01-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Vancouver CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=933&Geo2=PR&Code2=59&Data=Count&SearchText=vancouver&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=933&Geo2=PR&Code2=59&Data=Count&SearchText=vancouver&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Vancouver CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=933&Data=Count&SearchText=vancouver&SearchType=Begins&SearchPR=01&BI=All&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=933&Data=Count&SearchText=vancouver&SearchType=Begins&SearchPR=01&BI=All&BI=All&Custom=&TABID=1)

### Victoria, British Columbia

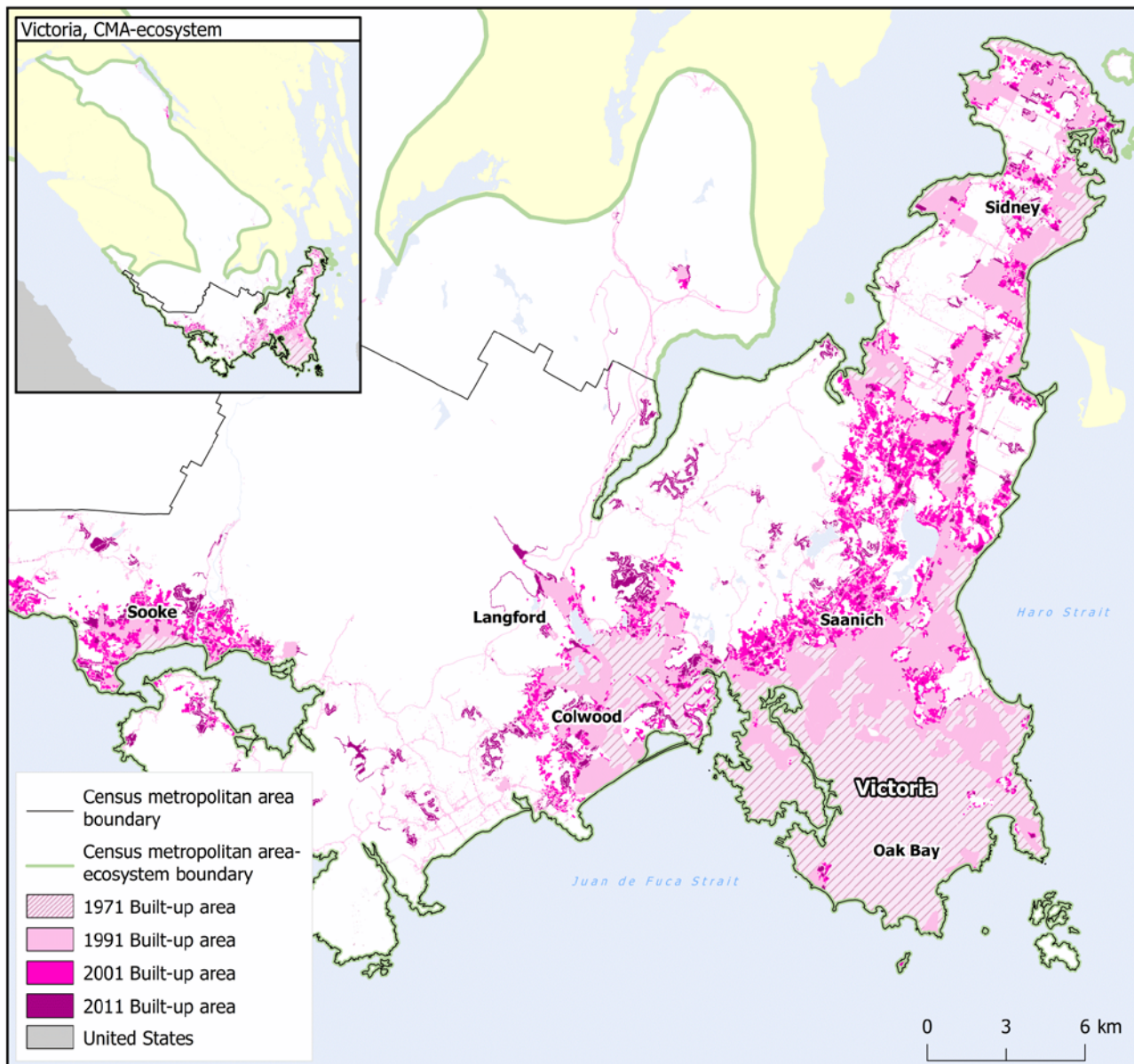
#### Highlights

- At the CMA level, built-up area increased from 120 km<sup>2</sup> in 1971 to 233 km<sup>2</sup> in 2011, an increase of 95%.
- At the CMA-E level, built-up area increased from 121 km<sup>2</sup> in 1971 to 240 km<sup>2</sup> in 2011, an increase of 98%.
- In 2011, the natural and semi-natural land class was divided into forest (94%), water (3%) and other (4%).
- From 1971 to 2011, 31 km<sup>2</sup> of arable land and 87 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 74.2% was forest, 15.8% was natural land for pasture and 9.9% was other.
- Population in the CMA increased by 73% from 199,487 to 344,615 between 1971 and 2011.
- The number of dwellings in the CMA increased by 148% from 67,505 to 167,229 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.32

Built-up area, Victoria census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Note:** Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

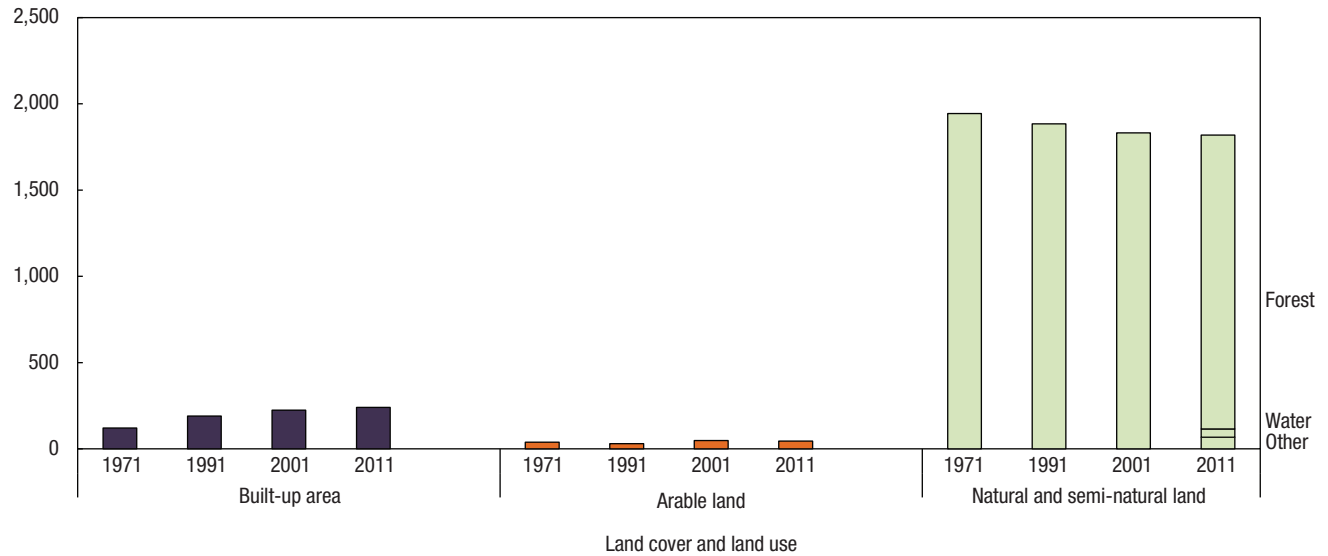
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.nrcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015); United States Census Bureau, 2014, *Digital cartographic file in shapefile format – States*, file: cb\_2014\_us\_state\_500k.zip, [http://www.census.gov/geo/maps-data/data/cbf/cbf\\_state.html](http://www.census.gov/geo/maps-data/data/cbf/cbf_state.html) (accessed October 29, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.63

### Land cover and land use, Victoria census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres

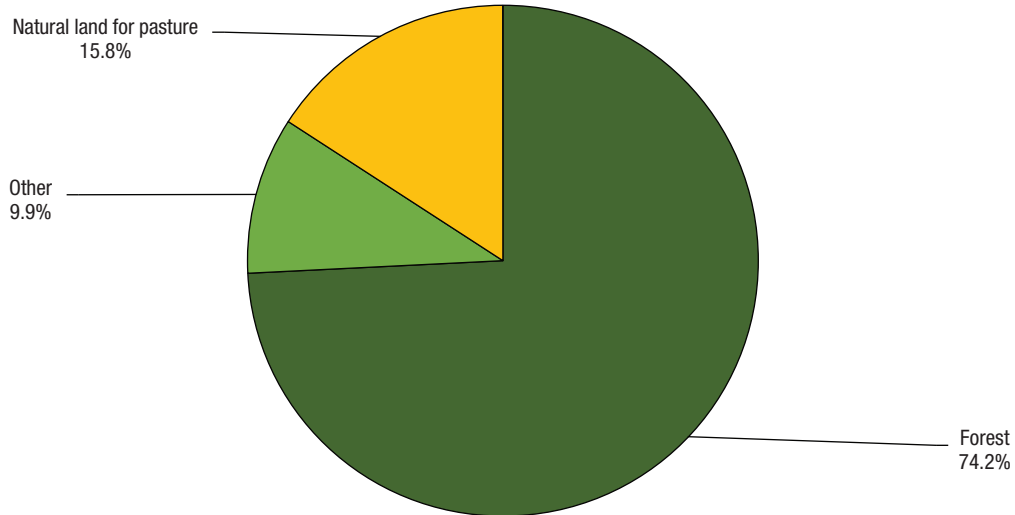


**Notes:** Built-up area for 1971 is based on *Canada Land Inventory: Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), with modeling of roads. CLI: LU and CLUMP built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCAN, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCAN, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

Chart 3.64

Natural and semi-natural land lost to settled area, by selected land class, Victoria census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.94**

**Population and dwellings, total and settled area, Victoria census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2</sup>	
	Total area	Settled area <sup>3</sup>	Total area	Settled area <sup>3</sup>
	number			
<b>1971</b>				
Population	199,487	190,106	201,334	190,106
Dwellings	67,505	64,681	68,046	64,681
<b>1991</b>				
Population	281,318	276,338	281,827	276,847
Dwellings	116,644	114,807	116,830	114,993
<b>2001</b>				
Population	296,162	293,481	298,078	294,412
Dwellings	133,587	132,419	134,515	132,917
<b>2011</b>				
Population	344,615	341,000	346,916	341,841
Dwellings	167,229	165,541	168,360	166,056
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	73	79	72	80
Dwellings	148	156	147	157

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population; Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.95**

**Land cover and land use, Victoria census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	696	2,103	33
<b>1971</b>			
Total built-up <sup>3</sup>	120	121	99
Settled	82	82	100
Roads	38	39	97
Arable <sup>4</sup>	..	39	..
Natural and semi-natural <sup>5</sup>	..	1,943	..
<b>1991</b>			
Total built-up <sup>6</sup>	184	190	97
Settled	126	129	98
Roads	58	61	95
Arable <sup>4</sup>	..	30	..
Natural and semi-natural <sup>5</sup>	..	1,884	..
<b>2001</b>			
Total built-up <sup>6</sup>	217	224	97
Settled	159	163	98
Roads	58	61	95
Arable <sup>4</sup>	..	48	..
Natural and semi-natural <sup>5</sup>	..	1,832	..
<b>2011</b>			
Total built-up <sup>6</sup>	233	240	97
Settled	174	178	98
Roads	59	62	95
Arable <sup>4</sup>	..	45	..
Natural and semi-natural <sup>7</sup>	..	1,818	..
Forest	..	1,703	..
Water	..	48	..
Other	..	67	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>3,6</sup>	95	98	...
Arable <sup>4</sup>	...	15	...
Natural and semi-natural <sup>5</sup>	...	-6	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. Built-up area for 1971 is based on *Canada Land Inventory Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), code B – Urban Built-up. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

4. Arable land area is the area of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

5. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

6. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

7. For 2011, forest and water are broken out separately based on data from AAFC *Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [http://ftp2.cits.mcan.gc.ca/pub/geoft/cli\\_250k/landuse/](http://ftp2.cits.mcan.gc.ca/pub/geoft/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [http://ftp2.cits.mcan.gc.ca/pub/geoft/clump/clump\\_1971/](http://ftp2.cits.mcan.gc.ca/pub/geoft/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <http://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.96**

**Ecosystem asset account, Victoria census metropolitan area-ecosystem (CMA-E), 1971 to 2011**

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	82	39	39	1,943
Land lost to settled area	...	...	-23	-73
Balance of change <sup>4</sup>	96	23	29	-52
Closing stock 2011	178	62	45	1,818

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use (CLI: LU)* and *Canada Land Use Monitoring Program (CLUMP)*. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).
  2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.
  3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.
  4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.
- Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

### Links to more information

Tables by metropolitan area, Victoria

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met131-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met131-eng.htm)

Victoria CMA, population change, 2006 to 2011, by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-935-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-935-013-01-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Victoria CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=935&Geo2=PR&Code2=59&Data=Count&SearchText=victoria&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=935&Geo2=PR&Code2=59&Data=Count&SearchText=victoria&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Victoria CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=935&Data=Count&SearchText=victoria&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=935&Data=Count&SearchText=victoria&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1)

### Windsor, Ontario

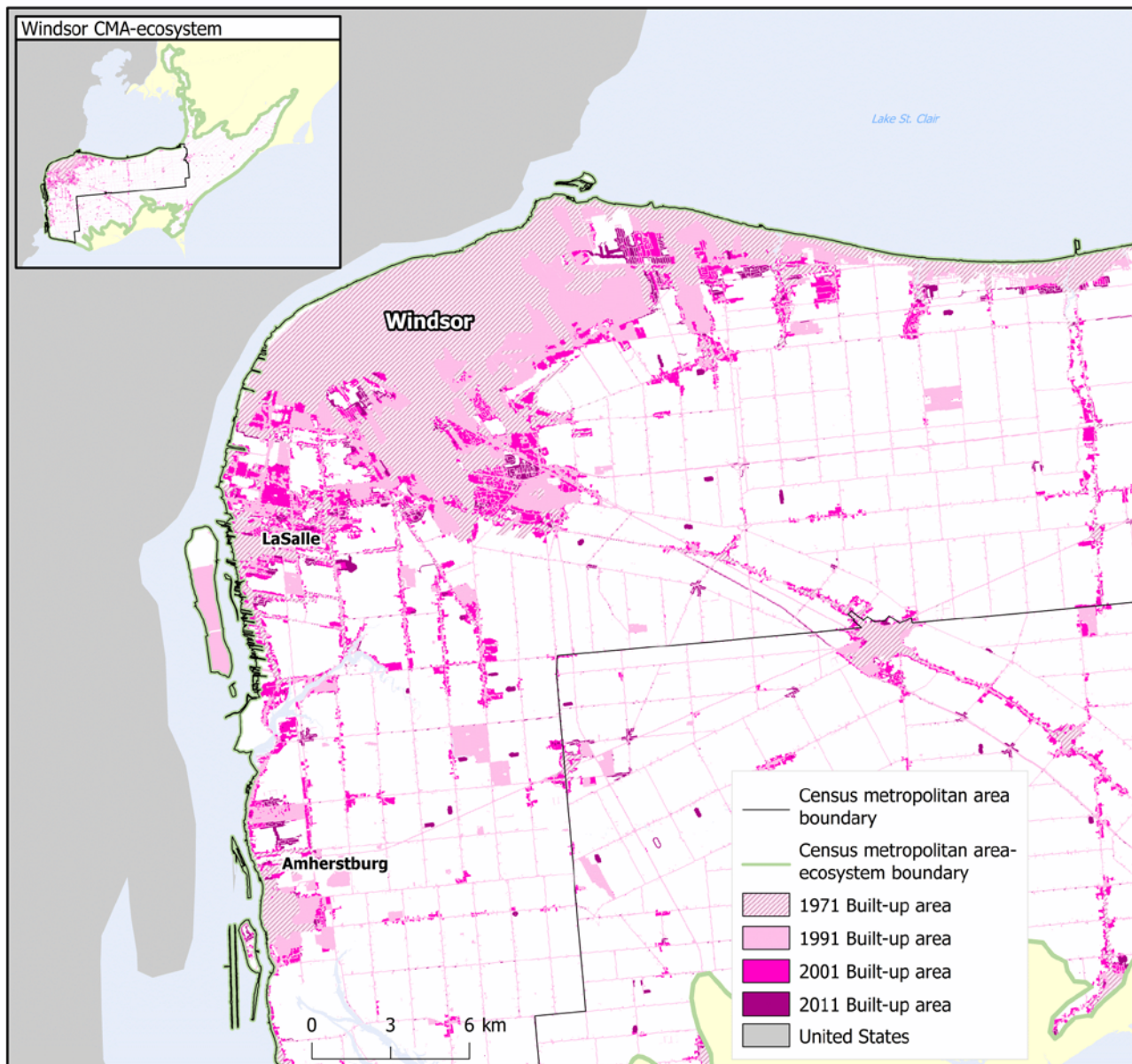
#### Highlights

- At the CMA level, built-up area increased from 113 km<sup>2</sup> in 1971 to 258 km<sup>2</sup> in 2011, an increase of 128%.
- At the CMA-E level, built-up area increased from 138 km<sup>2</sup> in 1971 to 364 km<sup>2</sup> in 2011, an increase of 163%.
- In 2011, the natural and semi-natural land class was divided into forest (19%), water (10%) and other (71%).
- From 1971 to 2011, 134 km<sup>2</sup> of arable land and 24 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 24.8% was forest, 34.8% was natural land for pasture and 40.4% was classed as other.
- Population in the CMA increased by 23% from 259,546 to 319,246 between 1971 and 2011.
- The number of dwellings in the CMA increased by 85% from 74,307 to 137,098 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.33

Built-up area, Windsor census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Note:** Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

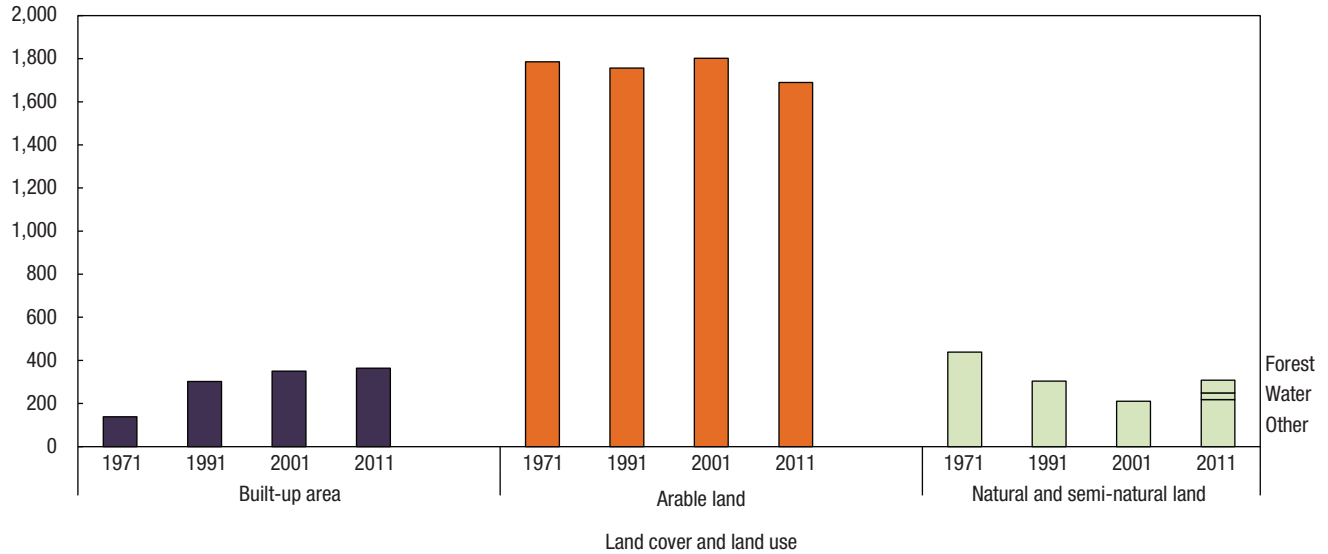
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.nrcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015); United States Census Bureau, 2014, *Digital cartographic file in shapefile format – States*, file: cb\_2014\_us\_state\_500k.zip, [http://www.census.gov/geo/maps-data/data/cbf/cbf\\_state.html](http://www.census.gov/geo/maps-data/data/cbf/cbf_state.html) (accessed October 29, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.65

### Land cover and land use, Windsor census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres



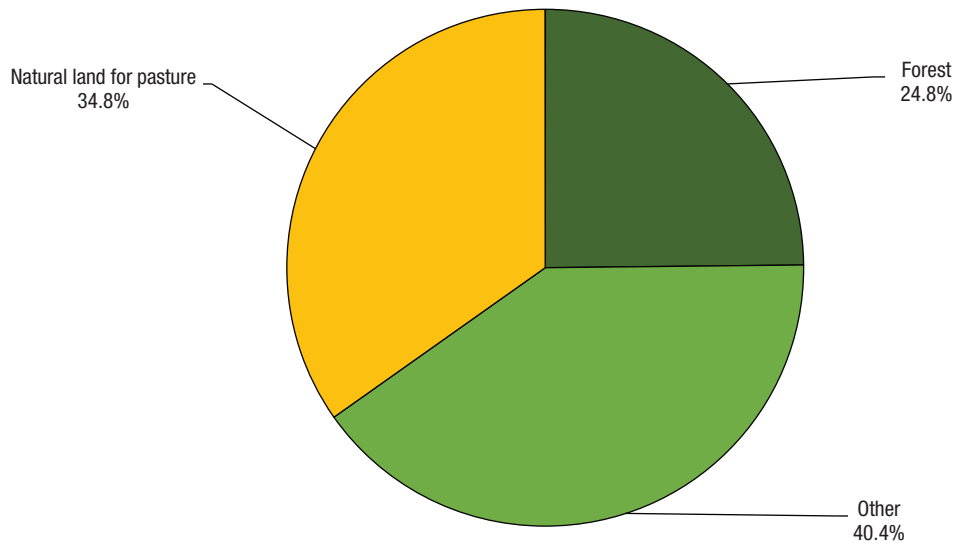
**Notes:** Built-up area for 1971 is based on *Canada Land Inventory: Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), with modeling of roads. CLI: LU and CLUMP built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the *Interpolated Census of Agriculture*. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCAN, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCAN, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.66

Natural and semi-natural land lost to settled area, by selected land class, Windsor census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.97**

**Population and dwellings, total and settled area, Windsor census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2</sup>	
	Total area	Settled area <sup>3</sup>	Total area	Settled area <sup>3</sup>
	number			
<b>1971</b>				
Population	259,546	233,637	296,704	246,110
Dwellings	74,307	67,718	84,885	71,472
<b>1991</b>				
Population	266,408	263,468	311,057	300,718
Dwellings	98,391	97,399	113,626	110,228
<b>2001</b>				
Population	302,045	289,459	344,855	318,918
Dwellings	121,168	116,767	137,698	128,538
<b>2011</b>				
Population	319,246	308,493	364,156	340,601
Dwellings	137,098	133,050	155,474	146,535
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	23	32	23	38
Dwellings	85	96	83	105

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population; Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).



## The changing landscape of Canadian metropolitan areas

**Table 3.98**

**Land cover and land use, Windsor census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	1,022	2,362	43
<b>1971</b>			
Total built-up <sup>3</sup>	113	138	82
Settled	75	84	89
Roads	38	54	71
Arable <sup>4</sup>	..	1,786	..
Natural and semi-natural <sup>5</sup>	..	438	..
<b>1991</b>			
Total built-up <sup>6</sup>	214	302	71
Settled	142	184	77
Roads	73	118	61
Arable <sup>4</sup>	..	1,756	..
Natural and semi-natural <sup>5</sup>	..	304	..
<b>2001</b>			
Total built-up <sup>6</sup>	250	350	71
Settled	177	231	77
Roads	73	119	61
Arable <sup>4</sup>	..	1,802	..
Natural and semi-natural <sup>5</sup>	..	210	..
<b>2011</b>			
Total built-up <sup>6</sup>	258	364	71
Settled	184	243	76
Roads	74	121	61
Arable <sup>4</sup>	..	1,690	..
Natural and semi-natural <sup>7</sup>	..	308	..
Forest	..	59	..
Water	..	31	..
Other	..	218	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>3,6</sup>	128	163	...
Arable <sup>4</sup>	...	-5	...
Natural and semi-natural <sup>5</sup>	...	-30	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. Built-up area for 1971 is based on *Canada Land Inventory Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), code B – Urban Built-up. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

4. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

5. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

6. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

7. For 2011, forest and water are broken out separately based on data from AAFC *Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [http://ftp2.cits.mcan.gc.ca/pub/geotit/cli\\_250k/landuse/](http://ftp2.cits.mcan.gc.ca/pub/geotit/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [http://ftp2.cits.mcan.gc.ca/pub/geotit/clump/clump\\_1971/](http://ftp2.cits.mcan.gc.ca/pub/geotit/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <http://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

Table 3.99

Ecosystem asset account, Windsor census metropolitan area-ecosystem (CMA-E), 1971 to 2011

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	84	54	1,786	438
Land lost to settled area	...	...	-134	-24
Balance of change <sup>4</sup>	159	67	39	-105
Closing stock 2011	243	121	1,690	308

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP).

CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover.

To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.

3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.

4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

### Links to more information

Tables by metropolitan area, Windsor

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met132-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met132-eng.htm)

Windsor CMA, population change, 2006 to 2011, by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-559-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-559-013-01-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Windsor CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=559&Geo2=PR&Code2=35&Data=Count&SearchText=windsor&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=559&Geo2=PR&Code2=35&Data=Count&SearchText=windsor&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Windsor CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=559&Data=Count&SearchText=windsor&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=559&Data=Count&SearchText=windsor&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

### Winnipeg, Manitoba

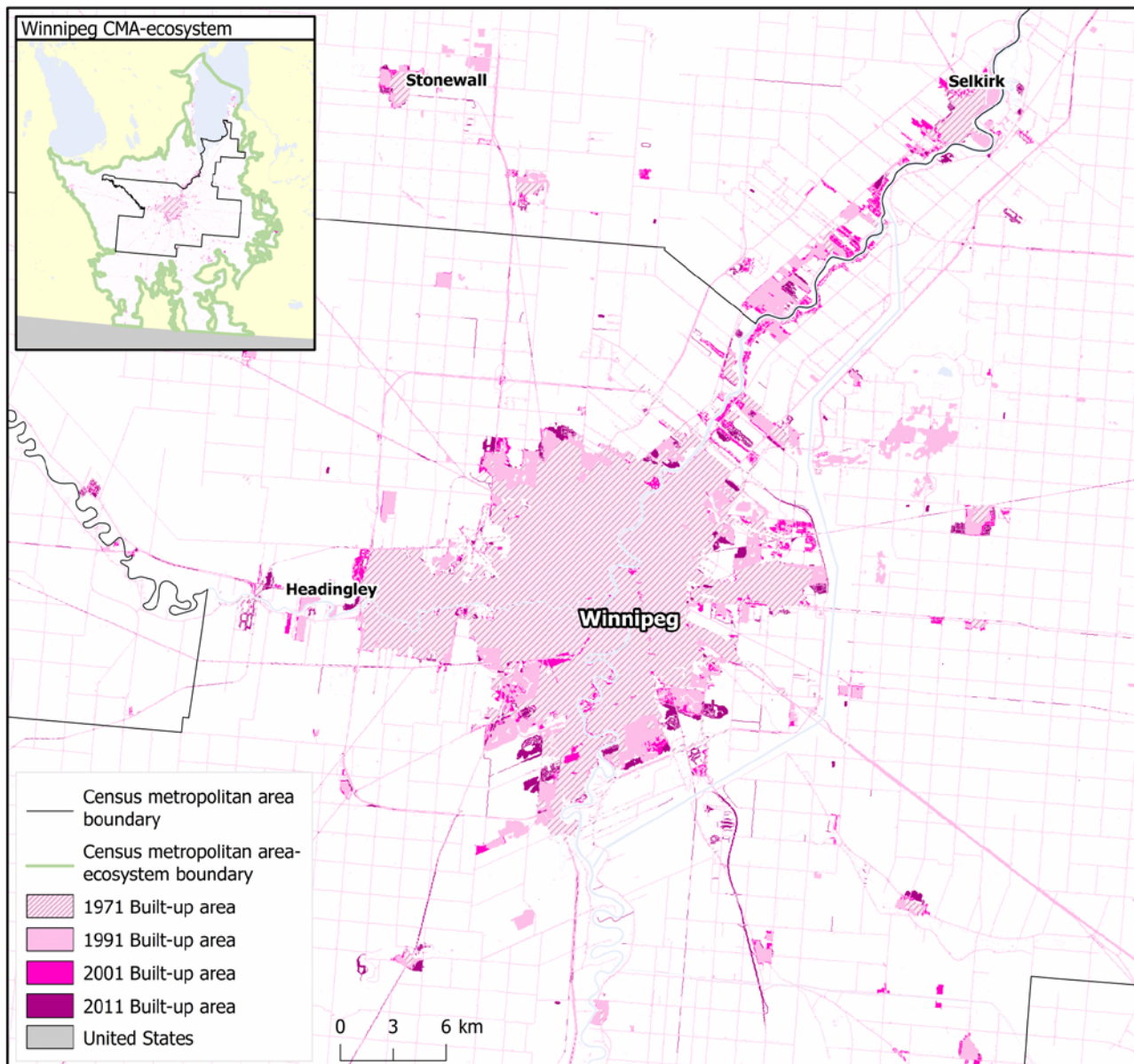
#### Highlights

- At the CMA level, built-up area increased from 326 km<sup>2</sup> in 1971 to 559 km<sup>2</sup> in 2011, an increase of 71%
- At the CMA-E level, built-up area increased from 497 km<sup>2</sup> in 1971 to 1,112 km<sup>2</sup> in 2011, an increase of 124%.
- In 2011, the natural and semi-natural land class was divided into forest (28%), water (23%) and other (50%).
- From 1971 to 2011, 194 km<sup>2</sup> of arable land and 103 km<sup>2</sup> of natural and semi-natural land were lost to settled area.
- Of the natural and semi-natural land converted to settled area from 1971 to 2011, 62.0% was forest, 11.8% was natural land for pasture and 26.2% was classed as other.
- Population in the CMA increased by 30% from 563,195 to 730,018 between 1971 and 2011.
- The number of dwellings in the CMA increased by 77% from 172,371 to 304,779 between 1971 and 2011.

## The changing landscape of Canadian metropolitan areas

Map 3.34

Built-up area, Winnipeg census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011



**Note:** Sources for 1971 built-up area do not contain the same level of detail as the more recent years.

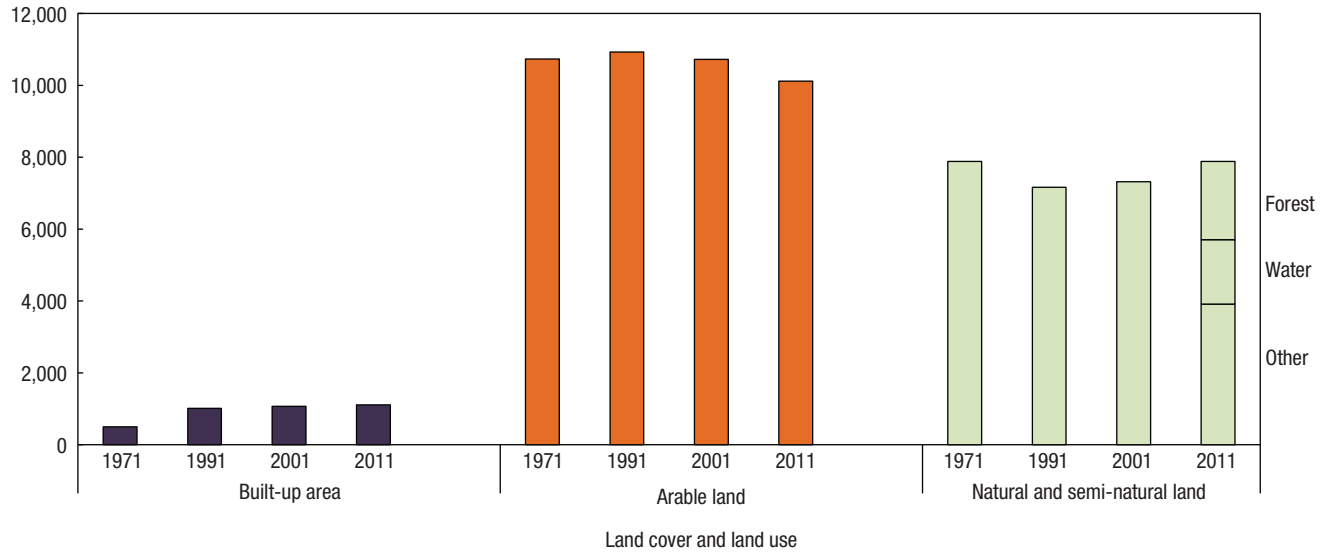
**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): Land Use (1971)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.nrcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015); United States Census Bureau, 2014, *Digital cartographic file in shapefile format – States*, file: cb\_2014\_us\_state\_500k.zip, [http://www.census.gov/geo/maps-data/data/cbf/cbf\\_state.html](http://www.census.gov/geo/maps-data/data/cbf/cbf_state.html) (accessed October 29, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.67

### Land cover and land use, Winnipeg census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

square kilometres



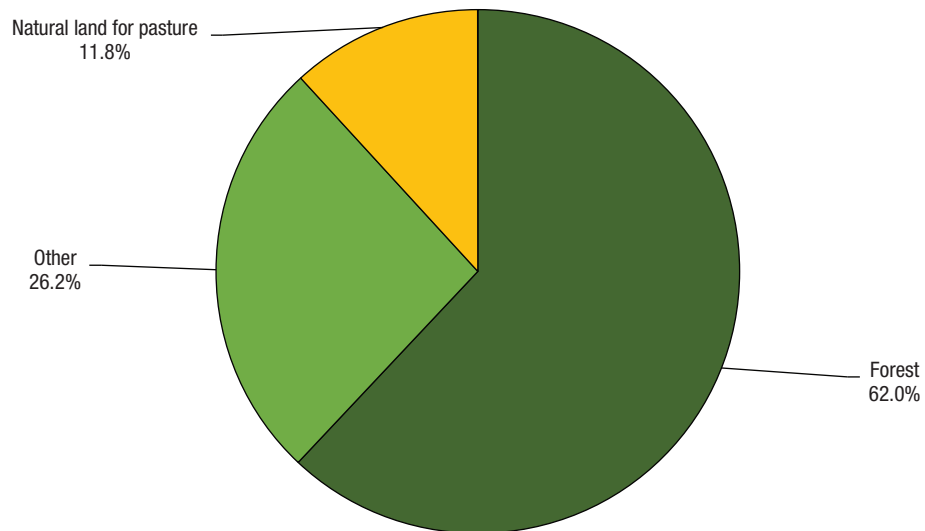
**Notes:** Built-up area for 1971 is based on *Canada Land Inventory: Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), with modeling of roads. CLI: LU and CLUMP built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. Built-up areas for other years are taken from *Land Use, 1990, 2000 and 2010*. Arable land is composed of the cropland, tame or seeded pasture and summerfallow land from the *Interpolated Census of Agriculture*. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCAN, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and Census of Agriculture Regular Base 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCAN, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Chart 3.68

Natural and semi-natural land lost to settled area, by selected land class, Winnipeg census metropolitan area-ecosystem (CMA-E), 1971 to 2011



**Notes:** Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Natural and semi-natural land lost to roads is not included. Other could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation; other natural and semi-natural land and unmapped areas.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.100**

**Population and dwellings, total and settled area, Winnipeg census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>		CMA-ecosystem <sup>2</sup>	
	Total area	Settled area <sup>3</sup>	Total area	Settled area <sup>3</sup>
	number			
<b>1971</b>				
Population	563,195	541,792	649,905	585,168
Dwellings	172,371	166,911	195,230	178,971
<b>1991</b>				
Population	664,449	648,438	767,265	741,724
Dwellings	256,181	251,280	291,438	283,723
<b>2001</b>				
Population	676,594	656,777	791,415	744,293
Dwellings	281,982	274,748	333,073	315,743
<b>2011</b>				
Population	730,018	710,612	861,176	815,062
Dwellings	304,779	297,870	361,956	344,951
	percent			
<b>Population and dwelling change, 1971 to 2011</b>				
Population	30	31	33	39
Dwellings	77	78	85	93

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400 m of the settled area. Population and dwelling data for 2001 and 2011 is finer in scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population; Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.rncan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table 3.101**

**Land cover and land use, Winnipeg census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	CMA <sup>1</sup>	CMA-ecosystem <sup>2</sup>	CMA as a proportion of CMA-ecosystem
	square kilometres		percent
<b>Total land area</b>	5,303	19,111	28
<b>1971</b>			
Total built-up <sup>3</sup>	326	497	66
Settled	168	197	85
Roads	158	299	53
Arable <sup>4</sup>	..	10,732	..
Natural and semi-natural <sup>5</sup>	..	7,883	..
<b>1991</b>			
Total built-up <sup>6</sup>	517	1,015	51
Settled	266	403	66
Roads	251	611	41
Arable <sup>4</sup>	..	10,931	..
Natural and semi-natural <sup>5</sup>	..	7,166	..
<b>2001</b>			
Total built-up <sup>6</sup>	535	1,070	50
Settled	285	458	62
Roads	251	612	41
Arable <sup>4</sup>	..	10,723	..
Natural and semi-natural <sup>5</sup>	..	7,318	..
<b>2011</b>			
Total built-up <sup>6</sup>	559	1,112	50
Settled	303	494	61
Roads	256	618	41
Arable <sup>4</sup>	..	10,118	..
Natural and semi-natural <sup>7</sup>	..	7,882	..
Forest	..	2,175	..
Water	..	1,793	..
Other	..	3,913	..
		percent	
<b>Land cover and land use change, 1971 to 2011</b>			
Total built-up area <sup>3,6</sup>	71	124	...
Arable <sup>4</sup>	...	-6	...
Natural and semi-natural <sup>5</sup>	...	-0	...

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.

2. The CMA-Ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects with the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.

3. Built-up area for 1971 is based on *Canada Land Inventory Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), code B – Urban Built-up. CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.

4. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.

5. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data and overlying tree canopy.

6. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

7. For 2011, forest and water are broken out separately based on data from AAFC *Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](http://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [http://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](http://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1991 and 1971; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <http://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).



## The changing landscape of Canadian metropolitan areas

Table 3.102

### Ecosystem asset account, Winnipeg census metropolitan area-ecosystem (CMA-E), 1971 to 2011

	Total built-up area <sup>1</sup>			Natural and semi-natural <sup>3</sup>
	Settled	Roads	Arable <sup>2</sup>	
	square kilometres			
Opening stock 1971	197	299	10,732	7,883
Land lost to settled area	...	...	-194	-103
Balance of change <sup>4</sup>	297	319	-421	102
Closing stock 2011	494	618	10,118	7,882

1. Built-up area data are taken from multiple sources. The 1971 built-up area is based on *Canada Land Inventory: Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP).

CLI: LU and CLUMP built-up areas that were not built-up in the AAFC *Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover.

To improve comparability with the other years, roads included in the 1971 core built-up area were identified and removed to produce the 1971 settled area. As the 1971 dataset did not include roads outside the core built-up area, roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area. Built-up area estimates for 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).

2. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture.

3. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled area from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC *Land Use, 1990*. The following CLI: LU classes were included: forest, natural pasture and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas.

4. The balance of change row reports the change, other than arable and natural and semi-natural land lost to settled area, that occurred from 1971 to 2011. These values are determined using an accounting procedure and represent the remaining difference between the opening and closing stock. Some rounding may occur.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP): CLUMP Land Use (1971)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and *Census of Agriculture*, Regular Base 1971 and 1991; NRCan, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

### Links to more information

Tables by metropolitan area, Winnipeg

[www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met133-eng.htm](http://www.StatCan.gc.ca/tables-tableaux/sum-som/l01/met01/met133-eng.htm)

Winnipeg CMA, population change, 2006 to 2011, by 2011 census tract

[www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-602-013-01-00-eng.pdf](http://www12.StatCan.gc.ca/census-recensement/2011/geo/map-carte/pdf/thematic/2011-98310-001-602-013-01-00-eng.pdf)

Metropolitan gross domestic product, experimental estimates, CANSIM TABLE 381-5000

[www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid](http://www5.StatCan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3815000&paSer=&pattern=&stByVal=1&p1=1&p2=31&tabMode=dataTable&csid)

Winnipeg CMA, Census Profile, 2011

[www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=602&Geo2=PR&Code2=46&Data=Count&SearchText=winnipeg&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=602&Geo2=PR&Code2=46&Data=Count&SearchText=winnipeg&SearchType=Begins&SearchPR=01&BI=All&Custom=&TABID=1)

Winnipeg CMA, National Household Survey (NHS) Profile, 2011

[www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=602&Data=Count&SearchText=winnipeg&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1](http://www12.StatCan.gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CMA&Code1=602&Data=Count&SearchText=winnipeg&SearchType=Begins&SearchPR=01&AI=All&BI=All&Custom=&TABID=1)

## Appendices

### A. Comprehensive data tables

Table A.1

Land cover and land use by census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

	CMA <sup>1</sup>	CMA-E <sup>2,3</sup>	1971					
			CMA		CMA-E <sup>3</sup>			
			Total built-up area <sup>4</sup>		Total built-up area <sup>4</sup>		Natural and	
			Total land area	Settled	Roads	Settled	Roads	Arable <sup>5</sup>
square kilometres								
Abbotsford–Mission	605	5,313	11	7	37	23	470	4,783
Barrie	898	3,766	14	10	54	40	1,310	2,363
Brantford	1,073	4,196	24	20	137	96	2,363	1,600
Calgary	5,108	12,444	158	116	162	170	6,172	5,940
Edmonton	9,427	19,900	185	157	189	225	10,501	8,984
Greater Sudbury	3,411	35,921	60	26	86	65	353	35,416
Guelph	594	2,599	22	13	68	44	1,289	1,198
Halifax	5,496	16,127	96	52	100	68	166	15,793
Hamilton	1,372	4,944	125	62	332	179	2,201	2,232
Kelowna	2,905	8,145	8	4	8	5	180	7,951
Kingston	1,939	5,409	25	18	30	27	1,154	4,198
Kitchener–Cambridge–Waterloo	827	3,240	80	38	181	101	1,722	1,237
London	2,666	8,361	104	63	135	118	5,771	2,337
Moncton	2,406	5,941	17	13	21	21	214	5,685
Montréal	4,258	10,186	520	235	581	294	4,201	5,110
Oshawa	904	4,496	51	26	126	76	1,782	2,512
Ottawa–Gatineau (Ont.) <sup>9</sup>	3,287	8,411	153	65	185	95	3,614	4,517
Ottawa–Gatineau (Que.) <sup>9</sup>	3,000	7,817	41	25	45	32	1,014	6,726
Peterborough	1,507	4,167	21	17	23	23	925	3,196
Québec	3,349	8,532	120	62	134	76	1,281	7,041
Regina	3,408	15,899	46	56	61	149	12,609	3,080
Saguenay	2,564	12,331	40	22	47	22	586	11,676
Saint John	3,363	7,005	46	29	52	43	88	6,821
Saskatoon	5,215	16,032	45	57	50	108	11,392	4,482
Sherbrooke	1,460	5,852	26	18	39	34	1,155	4,624
St. Catharines–Niagara	1,398	2,441	117	70	141	90	1,101	1,108
St. John's	805	1,798	39	21	41	23	15	1,718
Thunder Bay	2,556	12,148	42	29	42	36	179	11,891
Toronto	5,906	12,814	699	296	850	418	4,930	6,615
Trois-Rivières	1,041	5,874	23	13	40	28	2,727	3,079
Vancouver	2,883	6,041	339	153	348	159	387	5,148
Victoria	696	2,103	82	38	82	39	39	1,943
Windsor	1,022	2,362	75	38	84	54	1,786	438
Winnipeg	5,303	19,111	168	158	197	299	10,732	7,883

## The changing landscape of Canadian metropolitan areas

**Table A.1 (continued)**

**Land cover and land use by census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	1991					
	CMA		CMA-E <sup>3</sup>			
	Total built-up area <sup>7</sup>		Total built-up area <sup>7</sup>		Arable <sup>5</sup>	Natural and semi-natural <sup>6</sup>
	Settled	Roads	Settled	Roads		
square kilometres						
Abbotsford–Mission	64	38	161	104	412	4,636
Barrie	65	44	203	149	1,199	2,215
Brantford	60	49	294	204	2,143	1,555
Calgary	330	242	390	407	6,233	5,414
Edmonton	482	409	547	652	10,852	7,848
Greater Sudbury	144	62	275	208	271	35,168
Guelph	54	30	180	115	1,288	1,016
Halifax	204	110	271	184	149	15,522
Hamilton	216	107	667	359	1,897	2,021
Kelowna	91	49	99	61	126	7,858
Kingston	104	72	162	145	914	4,187
Kitchener–Cambridge–Waterloo	147	70	343	191	1,659	1,046
London	205	126	347	305	5,892	1,817
Moncton	73	55	96	99	114	5,632
Montréal	893	404	1,153	584	3,894	4,555
Oshawa	114	59	377	227	1,592	2,300
Ottawa–Gatineau (Ont.) <sup>9</sup>	401	171	596	305	2,873	4,636
Ottawa–Gatineau (Que.) <sup>9</sup>	146	90	197	140	703	6,777
Peterborough	69	58	115	117	873	3,062
Québec	239	124	323	184	1,038	6,987
Regina	95	115	168	409	13,472	1,850
Saguenay	99	55	181	84	443	11,623
Saint John	109	69	130	108	56	6,711
Saskatoon	129	162	175	376	12,207	3,274
Sherbrooke	91	61	170	146	806	4,731
St. Catharines–Niagara	196	118	260	166	955	1,059
St. John's	78	42	87	49	25	1,638
Thunder Bay	85	58	123	106	112	11,808
Toronto	1,203	510	1,598	786	4,194	6,235
Trois-Rivières	76	42	211	151	2,097	3,414
Vancouver	552	248	594	271	341	4,836
Victoria	126	58	129	61	30	1,884
Windsor	142	73	184	118	1,756	304
Winnipeg	266	251	403	611	10,931	7,166

## The changing landscape of Canadian metropolitan areas

Table A.1 (continued)

Land cover and land use by census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

	2001					
	CMA		CMA-E <sup>3</sup>			
	Total built-up area <sup>7</sup>		Total built-up area <sup>7</sup>		Arable <sup>5</sup>	Natural and semi-natural <sup>6</sup>
	Settled	Roads	Settled	Roads		
	square kilometres					
Abbotsford–Mission	93	38	253	104	420	4,536
Barrie	101	45	305	151	1,234	2,076
Brantford	100	50	426	206	2,153	1,410
Calgary	392	242	464	408	6,520	5,053
Edmonton	627	411	704	654	11,248	7,295
Greater Sudbury	186	63	350	209	234	35,129
Guelph	77	30	263	115	1,159	1,062
Halifax	318	110	397	185	170	15,375
Hamilton	288	109	947	363	1,909	1,725
Kelowna	116	49	126	62	127	7,830
Kingston	122	72	188	146	899	4,176
Kitchener–Cambridge–Waterloo	194	71	469	193	1,531	1,047
London	270	127	460	307	6,124	1,470
Moncton	112	56	144	100	131	5,566
Montréal	999	410	1,291	591	4,070	4,234
Oshawa	159	62	530	232	1,584	2,149
Ottawa–Gatineau (Ont.) <sup>9</sup>	419	171	641	306	3,010	4,454
Ottawa–Gatineau (Que.) <sup>9</sup>	161	91	214	141	679	6,783
Peterborough	99	58	163	117	847	3,039
Québec	283	125	382	186	1,137	6,827
Regina	104	115	195	409	13,189	2,106
Saguenay	113	55	199	85	441	11,606
Saint John	170	69	196	108	71	6,630
Saskatoon	142	162	192	377	12,021	3,442
Sherbrooke	109	62	209	148	879	4,617
St. Catharines–Niagara	276	119	362	167	1,056	856
St. John's	127	42	142	49	22	1,586
Thunder Bay	128	58	186	106	108	11,748
Toronto	1,566	516	2,139	794	4,085	5,795
Trois-Rivières	88	43	245	152	2,357	3,120
Vancouver	710	250	770	272	328	4,672
Victoria	159	58	163	61	48	1,832
Windsor	177	73	231	119	1,802	210
Winnipeg	285	251	458	612	10,723	7,318

## The changing landscape of Canadian metropolitan areas

**Table A.1 (concluded)**

**Land cover and land use by census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	2011							
	CMA		CMA-E <sup>3</sup>					
	Total built-up area <sup>7</sup>		Total built-up area <sup>7</sup>		Arable <sup>5</sup>	Natural and semi-natural <sup>8</sup>		
	Settled	Roads	Settled	Roads		Forest	Water	Other
	square kilometres							
Abbotsford–Mission	101	38	276	106	438	3,624	333	536
Barrie	109	46	331	156	1,165	873	368	873
Brantford	105	50	450	211	2,133	789	71	542
Calgary	448	252	531	420	6,257	2,004	284	2,949
Edmonton	677	417	760	662	9,937	3,290	1,185	4,066
Greater Sudbury	197	72	386	238	246	24,301	4,640	6,110
Guelph	82	31	281	117	1,226	641	39	295
Halifax	354	113	446	189	168	11,952	1,096	2,275
Hamilton	305	115	1,010	379	1,791	866	91	808
Kelowna	133	52	145	65	86	6,119	377	1,353
Kingston	134	74	211	150	850	2,134	503	1,560
Kitchener–Cambridge–Waterloo	209	73	497	197	1,594	580	58	314
London	285	130	485	313	5,963	833	62	705
Moncton	123	59	158	103	151	4,372	97	1,060
Montréal	1,128	443	1,491	643	4,081	2,629	216	1,125
Oshawa	170	66	571	244	1,421	941	171	1,146
Ottawa–Gatineau (Ont.) <sup>9</sup>	455	180	697	320	3,030	2,349	382	1,634
Ottawa–Gatineau (Que.) <sup>9</sup>	216	112	284	179	740	5,651	775	188
Peterborough	107	59	184	119	810	1,736	416	903
Québec	337	138	453	205	1,150	5,535	211	978
Regina	113	117	209	411	11,633	364	510	2,771
Saguenay	126	62	217	97	535	8,785	1,365	1,332
Saint John	179	71	207	111	80	5,159	398	1,051
Saskatoon	155	165	207	380	10,483	250	795	3,918
Sherbrooke	135	69	255	169	889	3,498	207	834
St. Catharines–Niagara	292	120	383	171	1,034	416	44	394
St. John's	136	44	152	52	23	886	168	518
Thunder Bay	132	61	193	114	131	6,951	891	3,869
Toronto	1,648	536	2,260	821	3,867	2,250	868	2,748
Trois-Rivières	102	46	281	165	2,340	1,910	90	1,088
Vancouver	743	252	810	275	348	3,748	330	531
Victoria	174	59	178	62	45	1,703	48	67
Windsor	184	74	243	121	1,690	59	31	218
Winnipeg	303	256	494	618	10,118	2,175	1,793	3,913

1. 2011 census metropolitan area (CMA) boundaries are used for all years. Total area excludes water.
  2. The CMA-ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Includes all terrestrial and water surfaces.
  3. CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Vancouver and Abbotsford–Mission or Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. For this reason, CMA-E data should not be summed to generate a total and caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.
  4. Built-up area for 1971 is based on *Canada Land Inventory Land Use* (CLI: LU) and *Canada Land Use Monitoring Program* (CLUMP), code B – Urban Built-up. CLUMP data exclude the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up areas may be underestimated for these CMAs. CLI: LU and CLUMP built-up areas that were not built-up in the *AAFC Land Use, 1990* dataset were removed from the 1971 built-up data and reclassified according to their 1990 cover. To improve comparability with the other years, roads included in the core built-up area were identified and removed to produce the 1971 settled area. The 1971 dataset did not include roads outside the core built-up area. Roads were modeled by applying the ratio of roads to settled area from 1990 to the 1971 settled area.
  5. Arable land area is composed of the cropland, tame or seeded pasture and summerfallow land from the Interpolated Census of Agriculture.
  6. Natural and semi-natural land is the residual area remaining after subtracting built-up and arable land from the total area. Because it was calculated residually, the class also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as 'built-up,' due in part to the resolution of the data, but also overlying tree canopy.
  7. Built-up area estimates for 1991, 2001 and 2011 are based on *Land Use, 1990, 2000 and 2010*, codes 21 (Settlement–Built-up and urban) and 25 (Roads–primary, secondary and tertiary).
  8. For 2011, forest and water are broken out separately based on data from *AAFC Crop Inventory, 2011* and *CanVec+* respectively. Other natural and semi-natural land is a residual class calculated by subtracting all other classes from the total area. The change over time for these categories requires further validation.
  9. Data for Ottawa–Gatineau were tabulated separately for the Ontario and Quebec parts.
- Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory Level-1 Lat/Long Digital Data: CLI Land Use (circa 1966) (1:250,000)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCAN, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP) UTM Digital Data: CLUMP Land Use (1971) (1:50,000)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); AAFC and Statistics Canada, special tabulation, *Census of Agriculture, Census Geographic Component Base 2011 and 2001 and Census of Agriculture, Regular Base 1991 and 1971*; AAFC, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015); NRCAN, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <http://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

## The changing landscape of Canadian metropolitan areas

Table A.2

### Arable land and natural and semi-natural land lost to settled area by census metropolitan area-ecosystem (CMA-E), 1971 to 2011

CMA-ecosystem	Arable land <sup>1</sup>	Natural and semi-natural land <sup>2</sup>
	square kilometres	
Abbotsford–Mission	109	130
Barrie	124	154
Brantford	216	96
Calgary	214	154
Edmonton	402	169
Greater Sudbury	40	259
Guelph	132	80
Halifax	50	297
Hamilton	487	191
Kelowna	43	93
Kingston	83	98
Kitchener–Cambridge–Waterloo	214	102
London	256	94
Moncton	52	85
Montréal	448	462
Oshawa	290	155
Ottawa–Gatineau (Ont.)	295	217
Ottawa–Gatineau (Que.)	72	168
Peterborough	70	91
Québec	135	184
Regina	99	48
Saguenay	48	122
Saint John	31	124
Saskatoon	108	48
Sherbrooke	85	130
St. Catharines–Niagara	158	83
St. John's	19	91
Thunder Bay	20	130
Toronto	961	448
Trois-Rivières	131	110
Vancouver	166	296
Victoria	23	73
Windsor	134	24
Winnipeg	194	103

1. Arable land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using *AAFC Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture. Does not include arable land lost to roads.

2. Natural and semi-natural land lost to settled area is calculated by overlaying the growth in settled areas from 1971 to 2011 on the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using *AAFC Land Use, 1990*. The following CLI: LU classes were included: woodlands, rough grazing and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland, water and unmapped areas. Does not include natural and semi-natural land lost to roads.

**Notes:** CMA-E are not spatially mutually exclusive—they overlap where a SLC polygon crosses more than one CMA boundary, as is the case in Vancouver and Abbotsford–Mission or Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. For this reason, CMA-E data cannot be summed to generate a total and caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory Level-1 Lat/Long Digital Data: CLI Land Use (circa 1966) (1:250,000)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCAN, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP) UTM Digital Data: CLUMP Land Use (1971) (1:50,000)*, [ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.nrcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

**Table A.3**

**Agricultural land lost to settled area by soil capability class, by census metropolitan area-ecosystem (CMA-E), 1971 to 2011**

	Agricultural land, <i>Canada Land Inventory - Soil capability for agriculture</i>		Agricultural land lost to settled area, 1971 to 2011 <sup>1</sup>	
	Class 1 to 3 – Dependable agricultural land <sup>2</sup>	Class 4 to 6 – Agricultural land with important limitations <sup>3</sup>	Class 1 to 3 – Dependable agricultural land	Class 4 to 6 – Agricultural land with important limitations
	square kilometres			
<b>CMA-ecosystem</b>				
Abbotsford–Mission	491	732	74	140
Barrie	2,057	755	156	76
Brantford	3,379	547	270	33
Calgary	6,460	5,350	214	119
Edmonton	11,206	7,241	397	144
Greater Sudbury	961	4,246	41	81
Guelph	2,079	303	184	19
Halifax	1,587	460	80	26
Hamilton	4,236	343	602	42
Kelowna <sup>4</sup>	0	94	0	22
Kingston	1,254	1,011	71	59
Kitchener–Cambridge–Waterloo	2,776	199	289	17
London	7,925	289	331	13
Moncton	1,731	3,140	97	37
Montréal	5,580	2,064	533	228
Oshawa	3,013	1,014	344	84
Ottawa–Gatineau (Ont.)	3,793	3,273	234	230
Ottawa–Gatineau (Que.)	1,122	992	83	62
Peterborough	1,401	1,104	76	52
Québec	1,401	1,875	102	126
Regina	13,681	2,171	102	38
Saguenay	819	511	49	29
Saint John	278	2,691	9	86
Saskatoon	9,375	6,595	87	68
Sherbrooke	702	2,880	32	136
St. Catharines–Niagara	2,089	234	204	23
St. John's	4	489	1	74
Thunder Bay	924	2,532	22	71
Toronto	8,505	2,060	1,159	163
Trois-Rivières	1,934	3,510	77	154
Vancouver	321	830	86	226
Victoria	182	170	47	22
Windsor	2,283	37	145	9
Winnipeg	12,850	3,332	223	56

1. Agricultural land lost to settled area is calculated by overlaying the growth in settled area between 1971 and 2011 on the *Canada Land Inventory (CLI): Soil Capability for Agriculture*, 1969 base. Does not include agricultural land lost to roads.

2. Dependable agricultural land includes *CLI: Soil Capability for Agriculture* Class 1 to 3. Class 1 has no significant limitations in use for crops, Class 2 has moderate limitations that require moderate conservation practices and Class 3 has moderately severe limitations that restrict the range of crops or that require special conservation practices.

3. Agricultural land with important limitations includes *CLI: Soil Capability for Agriculture* Class 4 to 6. Class 4 land is marginal for crop production and requires the use of additional management or conservation practices, Class 5 is capable of permanent pasture and hay and Class 6 is suitable for natural pasture.

4. Data on agricultural land capability were not included in the *CLI: Soil Capability for Agriculture*. Supplemental data for Kelowna were taken from the British Columbia Land Inventory.

**Notes:** CMA-E are not spatially mutually exclusive—they overlap where a SLC polygon crosses more than one CMA boundary, as is the case in Vancouver and Abbotsford–Mission or Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph and Brantford and Barrie. For this reason, CMA-E data cannot be summed to generate a total and caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries. This classification of soil capability for agriculture only covered mineral (not organic) soils. Class 7 land has no capability for arable culture or permanent pasture, but may or may not have a high capability for trees, native fruit, wildlife or recreation.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory (CLI) Level I Lat/Long Digital Data: Soil Capability for Agriculture (1969) (1:250,000 and 1:50,000)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/agriculture/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/agriculture/) and [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_50k/agriculture/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_50k/agriculture/) (accessed October 16, 2015); NRCAN, CCRS, 1999, *CLI Level II UTM Digital Data: Soil Capability for Agriculture (circa 1969) (Cities - 1:50,000)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_50k/city\\_agriculture/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_50k/city_agriculture/); NRCAN, CCRS, 1999, *CLI Level-I Lat/Long Digital Data: CLI Land Use (circa 1966)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCAN, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP) UTM Digital Data: CLUMP Land Use (1971) (1:50,000)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015); Provincial Agricultural Land Commission, 2015, *Maps and GIS*, [www.alc.gov.bc.ca/alc/content/alr-maps/maps-and-gis](http://www.alc.gov.bc.ca/alc/content/alr-maps/maps-and-gis) (accessed October 16, 2015).



## The changing landscape of Canadian metropolitan areas

**Table A.4**  
**Population and dwellings, total and settled area, by census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	1971							
	CMA <sup>1</sup>				CMA-ecosystem <sup>2,3</sup>			
	Total area		Settled area <sup>4</sup>		Total area		Settled area <sup>4</sup>	
	Population	Dwellings	Population	Dwellings	Population	Dwellings	Population	Dwellings
number								
Abbotsford–Mission	41,602	11,799	23,642	7,082	124,228	35,563	76,482	22,832
Barrie	46,983	13,748	32,008	9,616	154,937	43,852	102,588	29,986
Brantford	96,534	28,181	77,205	23,248	589,200	173,647	518,481	155,188
Calgary	418,510	125,071	407,409	122,250	439,891	131,290	415,649	124,949
Edmonton	530,888	154,343	496,313	145,504	556,734	161,464	501,037	146,980
Greater Sudbury	170,271	42,864	148,167	37,778	271,483	68,700	219,479	56,390
Guelph	69,329	20,055	61,588	17,943	217,540	61,978	186,180	53,827
Halifax	260,672	69,192	225,552	60,605	281,850	74,856	229,782	61,668
Hamilton	503,189	147,550	474,600	140,156	1,041,889	299,404	958,892	277,914
Kelowna	50,177	15,283	27,511	8,734	53,816	16,305	28,211	8,965
Kingston	105,669	30,056	78,517	23,119	134,692	38,411	87,631	25,887
Kitchener–Cambridge–Waterloo	238,628	69,707	229,348	67,399	699,307	207,135	650,181	194,540
London	307,743	93,018	272,709	83,689	440,607	131,207	338,024	104,180
Moncton	87,046	22,906	66,466	17,843	103,533	26,984	72,757	19,420
Montréal	2,823,639	826,231	2,758,768	810,470	3,124,315	903,950	2,973,546	867,375
Oshawa	147,516	41,350	131,523	37,266	351,653	97,204	286,139	80,006
Ottawa–Gatineau (Ont.) <sup>5</sup>	484,326	140,225	449,959	131,410	603,460	173,692	522,805	153,145
Ottawa–Gatineau (Que.) <sup>5</sup>	162,709	41,176	147,493	37,471	181,157	45,856	154,631	39,371
Peterborough	83,774	24,276	62,372	18,588	99,148	28,972	65,453	19,620
Québec	512,233	134,673	484,871	128,331	587,020	152,286	524,798	138,249
Regina	146,481	44,192	141,031	42,697	201,851	60,970	179,116	55,085
Saguenay	151,464	32,906	132,852	29,531	188,079	40,170	154,702	34,172
Saint John	111,439	29,996	96,610	26,074	130,488	34,561	109,580	29,011
Saskatoon	140,628	42,238	130,947	39,794	156,447	46,518	136,122	41,446
Sherbrooke	129,382	34,980	110,106	30,655	199,472	52,612	154,315	42,459
St. Catharines–Niagara	323,162	94,305	302,962	89,034	404,113	117,014	368,000	107,728
St. John's	132,937	29,951	125,613	28,482	137,342	30,889	126,464	28,665
Thunder Bay	115,564	33,190	107,043	30,876	123,361	35,362	107,043	30,876
Toronto	2,699,927	794,253	2,611,961	771,152	3,134,604	917,213	2,971,200	874,029
Trois-Rivières	118,248	30,942	96,713	25,841	241,279	60,129	149,671	39,059
Vancouver	1,082,441	345,897	1,050,926	337,105	1,113,390	354,698	1,068,122	342,201
Victoria	199,487	67,505	190,106	64,681	201,334	68,046	190,106	64,681
Windsor	259,546	74,307	233,637	67,718	296,704	84,885	246,110	71,472
Winnipeg	563,195	172,371	541,792	166,911	649,905	195,230	585,168	178,971

## The changing landscape of Canadian metropolitan areas

**Table A.4 (continued)**

**Population and dwellings, total and settled area, by census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	1991							
	CMA <sup>1</sup>				CMA-ecosystem <sup>2,3</sup>			
	Total area		Settled area <sup>4</sup>		Total area		Settled area <sup>4</sup>	
	Population	Dwellings	Population	Dwellings	Population	Dwellings	Population	Dwellings
number								
Abbotsford–Mission	113,562	38,410	112,708	38,153	280,133	96,169	270,222	92,936
Barrie	97,397	34,563	96,163	34,187	260,449	91,610	250,609	88,307
Brantford	110,380	39,965	109,293	39,588	642,636	238,588	634,063	235,759
Calgary	754,543	276,153	752,919	275,641	797,148	290,275	794,301	289,352
Edmonton	841,132	306,572	834,384	304,400	878,922	319,570	868,747	316,269
Greater Sudbury	162,539	59,318	156,494	57,276	270,609	99,136	248,982	90,938
Guelph	102,857	37,111	98,949	35,917	315,103	109,895	301,357	105,598
Halifax	323,542	118,732	296,797	109,585	358,033	130,661	318,848	117,195
Hamilton	598,345	220,851	586,141	216,963	1,633,967	564,251	1,608,728	556,158
Kelowna	111,846	43,440	99,991	39,300	117,321	45,451	104,234	40,840
Kingston	135,204	50,881	132,715	49,892	168,766	62,908	165,257	61,575
Kitchener–Cambridge–Waterloo	356,421	128,111	351,815	126,668	853,073	315,878	837,455	310,946
London	401,191	153,586	390,842	150,107	551,729	205,288	532,505	199,101
Moncton	108,449	39,410	98,250	36,159	129,606	46,688	111,685	40,832
Montréal	3,222,845	1,271,255	3,180,063	1,256,706	3,598,555	1,412,311	3,529,718	1,388,874
Oshawa	240,104	82,909	234,530	81,140	756,935	244,856	729,969	236,289
Ottawa–Gatineau (Ont.) <sup>5</sup>	704,559	268,313	675,322	258,717	852,377	322,661	815,688	310,600
Ottawa–Gatineau (Que.) <sup>5</sup>	232,314	86,197	220,788	82,189	251,565	93,411	239,554	89,216
Peterborough	106,211	39,389	99,370	37,181	134,961	49,726	126,056	46,806
Québec	652,412	255,695	639,238	251,404	731,425	283,692	717,425	279,151
Regina	191,692	71,666	190,373	71,225	244,114	91,737	238,855	90,087
Saguenay	164,704	58,207	151,242	53,741	204,219	71,208	186,821	65,531
Saint John	125,838	45,461	107,935	39,644	143,759	51,155	121,564	43,884
Saskatoon	210,949	79,577	210,359	79,391	225,547	84,544	222,745	83,671
Sherbrooke	165,542	65,367	155,493	62,070	225,620	87,567	208,303	81,820
St. Catharines–Niagara	360,603	135,365	355,168	133,541	497,987	181,617	490,119	179,068
St. John's	170,441	54,817	169,934	54,665	175,122	56,192	173,827	55,823
Thunder Bay	123,838	46,372	120,818	45,466	132,951	49,541	127,293	47,741
Toronto	3,897,034	1,367,718	3,859,696	1,355,772	4,550,876	1,598,515	4,491,637	1,579,500
Trois-Rivières	137,164	54,254	129,802	51,676	266,662	100,794	247,483	94,307
Vancouver	1,587,663	602,268	1,573,722	597,714	1,657,729	627,099	1,643,140	622,310
Victoria	281,318	116,644	276,338	114,807	281,827	116,830	276,847	114,993
Windsor	266,408	98,391	263,468	97,399	311,057	113,626	300,718	110,228
Winnipeg	664,449	256,181	648,438	251,280	767,265	291,438	741,724	283,723

## The changing landscape of Canadian metropolitan areas

Table A.4 (continued)

Population and dwellings, total and settled area, by census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011

	2001							
	CMA <sup>1</sup>				CMA-ecosystem <sup>2,3</sup>			
	Total area		Settled area <sup>4</sup>		Total area		Settled area <sup>4</sup>	
	Population	Dwellings	Population	Dwellings	Population	Dwellings	Population	Dwellings
	number							
Abbotsford–Mission	147,147	52,486	144,157	51,504	357,609	131,372	345,307	126,862
Barrie	148,480	56,390	140,373	52,702	344,733	141,136	311,011	126,487
Brantford	118,086	46,208	112,322	44,217	709,215	280,292	677,896	269,553
Calgary	951,560	368,593	937,773	363,793	1,013,182	391,432	985,165	381,455
Edmonton	937,845	371,908	902,136	359,045	979,242	391,804	923,063	370,593
Greater Sudbury	155,601	68,823	142,381	62,903	260,934	123,382	224,262	101,793
Guelph	123,229	48,282	119,581	47,063	372,137	139,611	352,735	132,660
Halifax	347,902	147,779	323,744	137,950	383,893	164,867	342,956	146,513
Hamilton	659,005	259,206	646,300	254,813	1,976,870	712,851	1,942,949	701,349
Kelowna	147,739	62,675	138,301	58,573	153,349	65,933	140,586	60,081
Kingston	144,106	64,530	130,812	58,091	181,838	83,111	155,001	70,669
Kitchener–Cambridge–Waterloo	414,284	158,735	409,449	157,158	951,374	376,340	928,897	368,786
London	435,007	184,310	417,436	178,105	589,585	241,778	535,075	223,458
Moncton	118,678	49,332	104,278	43,592	139,572	58,158	116,431	48,689
Montréal	3,398,965	1,458,594	3,361,378	1,444,556	3,793,042	1,630,258	3,701,182	1,594,313
Oshawa	294,878	106,004	291,542	104,867	941,207	316,265	913,072	306,313
Ottawa–Gatineau (Ont.) <sup>5</sup>	806,096	321,083	777,929	311,425	967,863	388,156	900,059	363,931
Ottawa–Gatineau (Que.) <sup>5</sup>	264,148	113,665	247,605	104,488	283,064	126,351	257,732	110,778
Peterborough	110,876	47,784	100,482	43,763	142,841	66,415	121,188	55,826
Québec	681,022	308,975	656,812	298,895	759,304	344,271	717,383	326,050
Regina	192,800	80,772	189,329	79,510	243,191	105,470	232,694	100,938
Saguenay	159,187	68,228	140,971	60,095	200,111	84,623	170,228	71,798
Saint John	121,816	51,278	107,321	45,366	139,933	58,954	118,227	49,798
Saskatoon	225,927	94,688	217,956	91,882	240,295	100,272	226,070	95,278
Sherbrooke	179,865	85,782	167,718	80,510	242,747	116,951	213,656	103,434
St. Catharines–Niagara	372,656	156,856	369,692	155,768	528,772	212,545	517,017	208,530
St. John's	172,470	68,955	164,887	66,238	175,864	70,890	167,151	67,472
Thunder Bay	120,773	53,331	112,062	49,755	129,550	58,936	117,010	52,601
Toronto	4,671,682	1,666,012	4,631,315	1,651,340	5,472,222	1,974,044	5,381,521	1,938,830
Trois-Rivières	136,357	63,635	125,052	59,167	271,828	120,804	225,394	101,832
Vancouver	1,979,344	782,495	1,969,500	778,821	2,067,551	815,926	2,056,009	811,044
Victoria	296,162	133,587	293,481	132,419	298,078	134,515	294,412	132,917
Windsor	302,045	121,168	289,459	116,767	344,855	137,698	318,918	128,538
Winnipeg	676,594	281,982	656,777	274,748	791,415	333,073	744,293	315,743

## The changing landscape of Canadian metropolitan areas

**Table A.4 (concluded)**

**Population and dwellings, total and settled area, by census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E), 1971, 1991, 2001 and 2011**

	2011							
	CMA <sup>1</sup>				CMA-ecosystem <sup>2,3</sup>			
	Total area		Settled area <sup>4</sup>		Total area		Settled area <sup>4</sup>	
	Population	Dwellings	Population	Dwellings	Population	Dwellings	Population	Dwellings
number								
Abbotsford–Mission	170,191	63,821	166,285	62,422	417,561	161,672	407,341	157,780
Barrie	187,013	72,817	179,854	70,183	413,061	175,245	381,276	162,442
Brantford	135,501	55,115	124,364	51,023	778,104	321,212	737,629	306,685
Calgary	1,214,839	488,451	1,202,912	484,133	1,305,343	523,751	1,275,860	512,800
Edmonton	1,159,869	482,249	1,126,596	469,294	1,205,484	504,340	1,151,795	482,858
Greater Sudbury	160,770	72,736	146,593	66,412	267,661	127,675	234,018	109,522
Guelph	141,097	59,362	137,738	58,209	422,245	166,366	405,273	160,516
Halifax	390,328	177,295	370,811	168,351	428,380	196,350	391,336	178,585
Hamilton	721,053	294,150	707,165	289,263	2,438,897	894,030	2,402,686	881,411
Kelowna	179,839	83,836	172,048	80,558	185,768	89,760	175,007	84,830
Kingston	159,561	73,889	143,949	67,373	198,914	94,173	169,134	80,672
Kitchener–Cambridge–Waterloo	477,160	191,739	474,062	190,725	1,047,637	435,211	1,026,623	427,944
London	474,786	211,260	456,004	204,263	637,821	274,943	578,946	254,035
Moncton	138,644	62,403	124,273	56,426	160,180	72,281	136,642	62,110
Montréal	3,824,221	1,696,210	3,786,936	1,681,399	4,282,453	1,905,583	4,187,393	1,866,568
Oshawa	356,177	134,034	351,762	132,431	1,217,480	422,493	1,189,779	411,841
Ottawa–Gatineau (Ont.) <sup>5</sup>	921,823	384,358	888,782	372,368	1,090,459	458,027	1,022,344	432,218
Ottawa–Gatineau (Que.) <sup>5</sup>	314,501	142,269	301,075	135,180	334,492	156,241	313,249	143,507
Peterborough	118,975	53,730	108,343	49,476	151,124	72,770	131,286	62,821
Québec	765,706	361,447	739,243	350,329	857,087	404,775	812,077	384,403
Regina	210,556	90,262	207,175	88,935	260,979	115,516	251,452	111,464
Saguenay	157,790	73,766	143,360	66,938	198,239	92,705	174,744	81,595
Saint John	127,761	56,775	115,484	51,451	147,574	65,693	128,613	57,235
Saskatoon	260,600	110,314	253,069	107,463	275,509	116,375	262,337	111,385
Sherbrooke	201,890	99,913	190,470	95,240	266,931	134,150	240,047	121,649
St. Catharines–Niagara	392,184	174,338	388,086	172,866	563,475	238,257	549,886	233,459
St. John's	196,966	84,542	190,481	82,104	200,604	86,709	193,120	83,593
Thunder Bay	121,596	56,071	110,457	51,483	129,800	62,185	115,002	54,849
Toronto	5,583,064	2,079,459	5,550,113	2,067,395	6,505,806	2,449,081	6,426,003	2,419,006
Trois-Rivières	151,773	74,837	142,724	71,032	295,963	139,926	252,174	120,867
Vancouver	2,313,328	949,565	2,305,024	946,227	2,414,733	989,634	2,404,177	985,003
Victoria	344,615	167,229	341,000	165,541	346,916	168,360	341,841	166,056
Windsor	319,246	137,098	308,493	133,050	364,156	155,474	340,601	146,535
Winnipeg	730,018	304,779	710,612	297,870	861,176	361,956	815,062	344,951

1. 2011 census metropolitan area (CMA) boundaries are used for all years.

2. The CMA-ecosystem (CMA-E) combines any Soil Landscapes of Canada (SLC) polygon that is contained within or that intersects the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

3. CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscape of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Vancouver and Abbotsford–Mission or Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. For this reason, CMA-E data should not be summed to generate a total and caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.

4. Settled area is defined as the built-up area excluding roads. Settled area population and dwelling counts include 1971 and 1991 enumeration area points and 2001 and 2011 dissemination block points located within 400m of the settled area. Population and dwelling data for 2001 and 2011 is of finer scale than data for 1971 and 1991 and can therefore be better attributed to the settled areas, which may limit comparability of the data over time.

5. Data for Ottawa–Gatineau were tabulated separately for the Ontario and Quebec parts.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from the 1971, 1991, 2001 and 2011 Censuses of Population; Natural Resources Canada (NRCan), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory Level-1 Lat/Long Digital Data: CLI Land Use (circa 1966) (1:250,000)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCan, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP) UTM Digital Data: CLUMP Land Use (1971) (1:50,000)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada, 2015, *Land Use 1991, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

### B. Data sources and methods

#### Data sources

This study combines data from the 1971, 1991, 2001 and 2011 Census of Population<sup>73</sup> and Interpolated Census of Agriculture<sup>74</sup> with spatial data sets in order to analyze the evolution of built-up areas in and around CMAs.

Historical land cover and land use data are taken from the *Canada Land Inventory (CLI)*, undertaken under the *Agricultural Rehabilitation and Development Act (ARDA)*, 1961 and supplemented with data from the 1971 *Canada Land Use Monitoring Program (CLUMP): Land Use*. The CLI was a comprehensive survey of land capability and use for various purposes including agriculture, forestry, recreation and wildlife and included information on the existing land use. Land was classified based on air photo interpretation, field surveys and census information. Soil characteristics were determined by soil surveys. The CLI mapping of southern Canada took close to two decades to complete, producing over 1,000 map sheets at the 1:250,000 scale.

Data from *Canada Land Inventory: Land Use (CLI: LU)*<sup>75</sup> formed the basis for the 1971 built-up area. Land use categories in this product are: built-up area; mines, quarries, sand and gravel pits; outdoor recreation areas; horticulture, poultry and fur operations; orchards and vineyards; cropland; improved pasture and forage crops; rough grazing and rangeland; productive woodland; non-productive woodland; swamp, marsh or bog; sand, sandbars, sand flats, dunes and beaches; and rock and other unvegetated surfaces.

The CLUMP<sup>76</sup> used CLI-compatible land use classes, but focused on land use change in the urban-rural fringe of Canada's 23 largest urbanized regions,<sup>77</sup> the boundaries of which do not represent administrative, census or other legal limits, but simply a spatial extent set by the program. Mapping was based on aerial photos interpretation, with supplementary information from field surveys, street maps, municipal planning maps and satellite images.<sup>78</sup>

*Canada Land Inventory: Soil Capability for Agriculture, 1969*<sup>79</sup> provided information on the potential of a specific area for agricultural production. Despite the vintage of this product and the availability of more recent soil data for some areas, the soil capability interpretations are considered to be largely valid and they continue to be used for land planning purposes.<sup>80</sup>

The CLI and CLUMP maps were digitized in Environment Canada's Canadian Geographic Information System in the 1960s. Significant research and development by Agriculture and Agri-Food Canada (AAFC), National Archives of Canada, Natural Resources Canada (NRCan) and Statistics Canada (StatCan) was involved in recovering these data and converting them to ArcInfo in mid-1990s.<sup>81</sup>

73 Statistics Canada, 2012, *GeoSuite, Census year 2011*, Catalogue no. 92-150-X; Statistics Canada, 2007, *GeoSuite, Census year 2006*, Catalogue no. 92-150-X; Statistics Canada, Census Program, Census of Population 1991 and 1971.

74 Statistics Canada, special tabulation, *Census of Agriculture*, Census Geographic Component Base 2011 and 2001 and Census of Agriculture, Regular Base 1991 and 1971.

75 Natural Resources Canada, Canada Centre for Remote Sensing, 1999, *Canada Land Inventory Level-I Lat/Long Digital Data: CLI Land Use (circa 1966) (1:250,000)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015).

76 Natural Resources Canada, Canada Centre for Remote Sensing, 1999, *Canada Land Use Monitoring Program (CLUMP) UTM Digital Data: CLUMP Land Use (1971) (1:50,000)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015).

77 These 23 urbanized regions correspond to the 23 CMAs that existed in 1971. However, Guelph was included in the map for Kitchener–Cambridge–Waterloo.

78 Natural Resources Canada, 1971, *Canada Land Use Monitoring Program (CLUMP) Urban Land Use—1971—Ottawa, Ontario*, <http://open.canada.ca/data/en/dataset/5f52e0c3-6f9d-5639-b314-b5006a64d716> (accessed October 13, 2015).

79 Natural Resources Canada, Canada Centre for Remote Sensing, 1999, *Canada Land Inventory Level I Lat/Long Digital Data: Soil Capability for Agriculture (1969) (1:250,000 and 1:50,000)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/agriculture/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/agriculture/) and [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_50k/agriculture](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_50k/agriculture) (accessed October 16, 2015).

80 Agriculture and Agri-Food Canada, 2013, *ISO 19131 - Canada Land Inventory (CLI): 1:250,000 – Land Capability for Agriculture Data Product Specification, Revision A*, [www.agr.gc.ca/atlas/supportdocument\\_documentdesupport/canadaLandInventory/en/ISO\\_19131\\_Canada\\_Land\\_Inventory\\_CLI\\_Data\\_Product\\_Specification.pdf](http://www.agr.gc.ca/atlas/supportdocument_documentdesupport/canadaLandInventory/en/ISO_19131_Canada_Land_Inventory_CLI_Data_Product_Specification.pdf) (accessed October 16, 2015).

81 Schut, P., 2009, "Back from the Brink," *Geospatial World*, May 2009, <http://geospatialworld.net/magazine/MArticleView.aspx?aid=19111&Itemid=262> (accessed September 16, 2015).

## The changing landscape of Canadian metropolitan areas

Remote sensing imagery data are taken from AAFC's *Land Use 1990, 2000 and 2010*.<sup>82</sup> These land use maps cover all of Canada south of 60°N at a spatial resolution of 30 m and were developed to meet international reporting requirements including those for the *National Inventory Report* to the United Nations Framework Convention on Climate Change, the Agri-Environmental program of the Organisation for Economic Co-operation and Development (OECD) and the FAOSTAT component of the Food and Agricultural Organization of the United Nations (FAO).

This land use product includes the following classes: settlement, roads, water, forest, forest wetland, trees, treed wetland, cropland, grassland managed, grassland unmanaged, wetland, wetland shrub, wetland herb and other land.

Data product specifications indicate that source data include land cover and crop maps, as well as various topographical layers from *CanVec*<sup>83</sup>—a digital cartographical reference product produced by NRCan. Imagery for 1990 was based on satellite data taken between 1988 and 1994; the 2000 image, from 1988 to 2002 and the 2010 image, from 2009 to 2012. The estimates of the overall accuracy of this product are 84.0%, 87.1% and 92.7% for 1990, 2000 and 2010 respectively. See Table B.1 for the accuracy assessment of the Settlements class.

**Table B.1**  
**Accuracy of settlements data in the Agriculture and Agri-Food Canada (AAFC) Land Use, 1990, 2000 and 2010 product**

	Total sample points identified as settlements in the land use product	Sample points correctly identified as settlements <sup>1</sup>	Total sample points that should be identified as settlements <sup>2</sup>	Sample points correctly identified as settlements/ Total sample points identified as settlements in the land use product	Sample points correctly identified as settlements/ Total sample points that should be identified as settlements
				percent	percent
1990	270	190	217	70.4	87.6
2000	269	217	240	80.7	90.4
2010	60	50	57	83.3	87.7

1. Represents the number of sample points identified as settlements in AAFC's *Land Use, 1990, 2000 and 2010*, that were groundtruthed and that were correctly identified in the land use product.

2. Represents the number of sample points, among all sample points, that are actually settled according to the groundtruthing.

**Note:** The AAFC *Land Use, 1990, 2000 and 2010* product was groundtruthed using a sample of randomly generated points and comparing them against information collected through field surveys, aerial photos or high-resolution satellite image.

**Source:** Agriculture and Agri-Food Canada, 2015, ISO 19131 – *Land Use 1990, 2000 and 2010 Data Product Specifications*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

The data product specifications report that most misclassification occurs between the following categories: other land and forest, grassland and forest, cropland and forest, and wetland and forest, and that most errors occur with boundary pixels. Boundary pixels are located on the fringe of a given land use area.

As well, AAFC *Crop Inventory, 2011* provided detail for forest data<sup>84</sup> and NRCan's *CanVec+* provided the water data.<sup>85</sup>

Each data set is subject to limitations. In particular, the accuracy of land cover classification using spatial data sets depends on the resolution of the data and imagery dates and is also limited by the similarity of certain land covers when viewed from above and by cloud and tree canopy cover, which can obscure underlying land features. Metadata for these data sources are available through the provided references.

82 Agriculture and Agri-Food Canada, 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

83 Agriculture and Agri-Food Canada, 2015, *ISO 19131 – Land Use 1990, 2000 and 2010 Data Product Specifications*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed October 5, 2015).

84 Agriculture and Agri-Food Canada, 2013, *AAFC Crop Inventory, 2011*, <http://open.canada.ca/data/en/dataset/58ca7629-4f6d-465a-88eb-ad7fd3a847e3> (accessed August 10, 2015).

85 Natural Resources Canada, Canada Centre for Mapping and Earth Observation, 2014, *CanVec+*, <ftp://ftp2.cits.mcan.gc.ca/pub/canvec+/shp/> (accessed August 10, 2015).

### Methods

The report uses a consistent methodology to compare urban development trends across the country, allowing inter-city comparison. However, it is recognized that this broad scale analysis does not capture the finer details that are required to assess all the environmental impacts of development in and around cities.

### Spatial units

Data for this report are tabulated according to two main geographies—the census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E).

The CMA is a Census of Population geography.<sup>86</sup> The 2011 CMA boundaries were used for all years to produce data that are comparable over time.<sup>87</sup> For this reason, population data by CMA for 1971, 1991 and 2001 may not match previously published census data.

The CMA-E was created for this analysis and combines all Soil Landscapes of Canada (SLC)<sup>88</sup> polygons that are contained within or that intersect the boundary of the CMA, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. See Map B.1 for a visual depiction.

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<sup>86</sup> Statistics Canada, 2012, *Census Dictionary*, Catalogue no. 98-301-X.

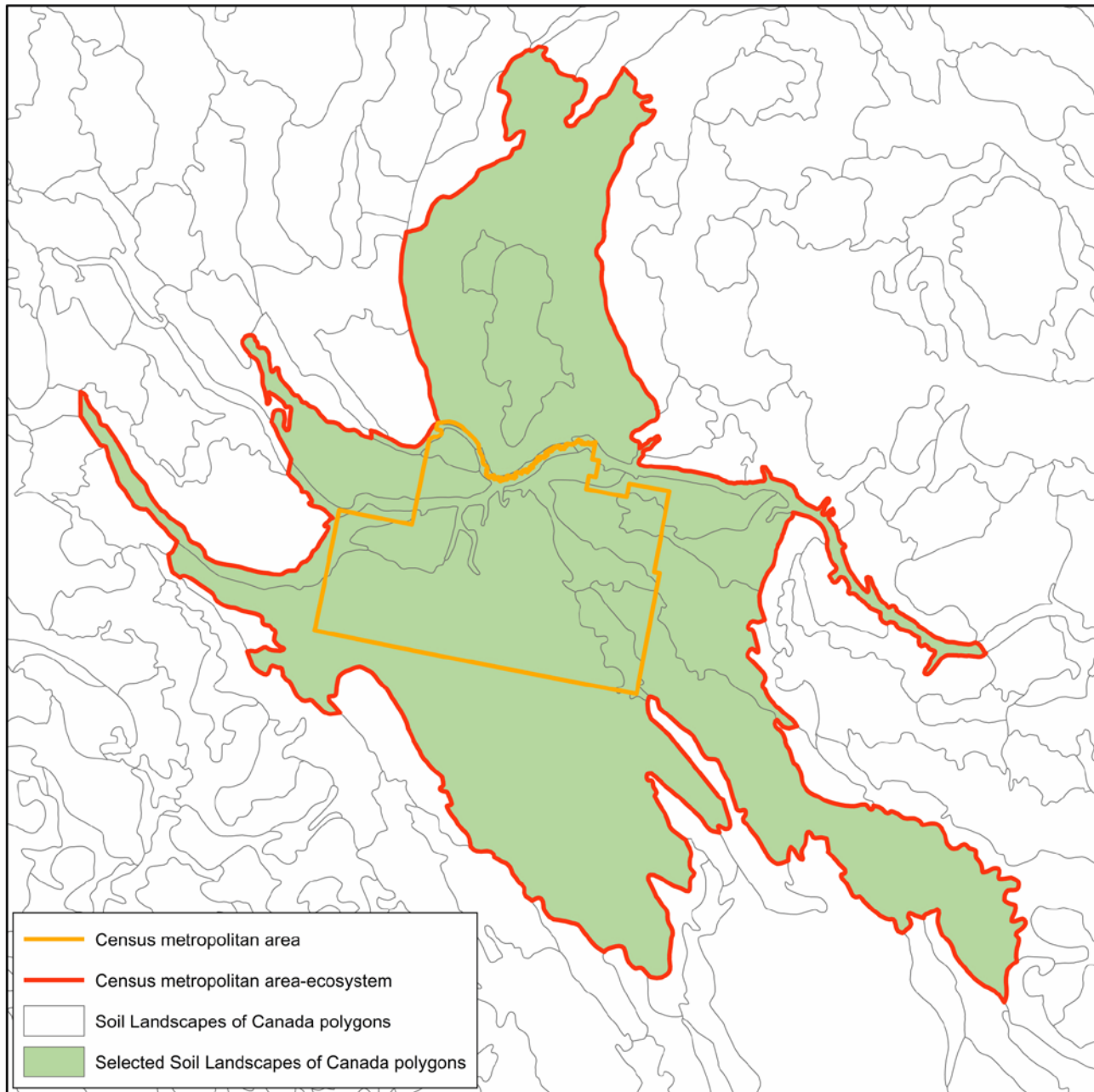
<sup>87</sup> Statistics Canada, 2011, *Boundary Files, Census year 2011*, Catalogue no. 92-160-X.

<sup>88</sup> Agriculture and Agri-Food Canada, 2013, *Soil Landscapes of Canada (SLC) (version 3.2)*, <http://sis.agr.gc.ca/cansis/nsdb/slc/index.html> (site consulted July 28, 2015).



## The changing landscape of Canadian metropolitan areas

Map B.1  
Creating census metropolitan area-ecosystems



**Note:** The census metropolitan area (CMA) layer was overlaid onto the Soil Landscapes of Canada (SLC) polygons. SLC polygons that intersect or that were contained within the CMA boundary were selected. Selected SLC polygons were extracted to create the CMA-ecosystem (CMA-E) boundary.

**Source:** Statistics Canada, Environment, Energy, and Transportation Statistics Division, 2016.



## The changing landscape of Canadian metropolitan areas

CMAEs and CMA-Es vary in size, shape and topography. Caution should be used when comparing data for CMA-Es. CMA-Es are not spatially mutually exclusive—they overlap where a SLC polygon crosses more than one CMA boundary, as is the case in Vancouver and Abbotsford–Mission or Toronto and surrounding CMAEs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. For this reason, CMA-E data should not be summed to generate a total.

Data from the Census of Agriculture is not available by CMA. As natural and semi-natural land is calculated as a residual, it is also not available for CMAEs. For this reason, this report provides data for arable land and natural and semi-natural land only by CMA-E. These areas, which include the Soil Landscapes of Canada polygons surrounding the CMA, are a useful geography for presenting information on metropolitan areas' arable and natural and semi-natural land assets.

### **Built-up, settled and road areas**

Built-up area is land that is predominantly built-up or developed, including the vegetation associated with these land covers, such as gardens and parks. It is characterized by a high percentage of impervious surfaces including roadways, parking lots and roof tops. Low-density dwellings and small structures or buildings in rural areas outside core built-up areas may not be captured due to the resolution of the data and overlying tree canopy.

In this report, settled area is defined as built-up area not including roads.

Built-up area for 1971 was estimated using the CLI: LU circa 1966 land use code B – Urban built-up area for all 33 CMAEs covered in this report, supplemented by data from the CLUMP 1971 for 24 of the CMAEs. CLUMP coverage excludes the CMAEs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. As a result, 1971 built-up areas may be underestimated for these CMAEs. On average, CLUMP contributed 27% of the built-up area for CMAEs where it was available (Table B.2).

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**Table B.2**  
**Data processing for the 1971 built-up and settled area, by census metropolitan area (CMA) and census metropolitan area-ecosystem (CMA-E)**

	CMA					CMA-E <sup>1</sup>				
	Built-up area from Canada Land Use Inventory: (CLI: LU) (circa 1966)	Additional built-up area from Canada Land Use Monitoring Program (CLUMP), 1971	Built-up area trimmed using AAFC Land Use, 1990	Roads removed from core built-up area using AAFC Land Use, 1990 <sup>2</sup>	Total remaining - 1971 Settled area <sup>3</sup> (circa 1966)	Built-up area from Canada Land Use Inventory: (CLI: LU)	Additional built-up area from Canada Land Use Monitoring Program (CLUMP), 1971	Built-up area trimmed using AAFC Land Use, 1990	Roads removed from core built-up area using AAFC Land Use, 1990	Total remaining - 1971 Settled area <sup>3</sup>
	square kilometres									
<b>Total census metropolitan area</b>	5,337	1,461	1,752	1,422	3,624	...	...	...	...	...
Abbotsford–Mission	28	..	11	6	11	80	14	38	19	37
Barrie	27	..	8	5	14	187	..	113	20	54
Brantford	46	..	12	10	24	210	41	58	55	137
Calgary	166	98	43	63	158	176	102	50	66	162
Edmonton	226	108	76	73	185	235	108	80	75	189
Greater Sudbury	101	26	46	21	60	176	26	83	32	86
Guelph	26	11	6	8	22	88	31	25	25	68
Halifax	118	90	77	35	96	127	99	88	38	100
Hamilton	160	69	54	50	125	393	198	133	125	332
Kelowna	14	..	2	3	8	18	..	6	4	8
Kingston	56	..	21	9	25	69	..	28	11	30
Kitchener–Cambridge–Waterloo	79	45	17	28	80	232	69	52	68	181
London	124	53	39	34	104	197	55	72	46	135
Moncton	34	..	10	7	17	42	..	13	8	21
Montréal	725	156	129	232	520	864	160	184	259	581
Oshawa	73	10	15	18	51	178	41	48	45	126
Ottawa–Gatineau (Ont.)	244	42	77	56	153	315	42	105	67	185
Ottawa–Gatineau (Que.)	57	24	22	19	41	67	24	26	20	45
Peterborough	40	..	11	8	21	49	..	17	9	23
Québec	218	48	89	57	120	257	48	108	64	134
Regina	73	18	21	23	46	107	18	32	32	61
Saguenay	69	15	29	14	40	87	15	37	17	47
Saint John	494	36	464	20	46	1,135	36	1,092	27	52
Saskatoon	69	18	20	20	45	81	18	25	23	50
Sherbrooke	56	..	18	12	26	98	..	42	17	39
St. Catharines–Niagara	162	73	67	51	117	186	96	78	62	141
St. John's	60	25	29	16	39	68	26	35	18	41
Thunder Bay	66	15	24	15	42	66	15	24	15	42
Toronto	769	249	98	221	699	1,061	306	241	275	850
Trois-Rivières	49	..	16	10	23	116	..	60	17	40
Vancouver	455	109	76	148	339	475	109	83	152	348
Victoria	106	42	33	32	82	108	42	35	33	82
Windsor	121	11	28	28	75	141	11	36	32	84
Winnipeg	229	69	61	69	168	308	69	97	83	197

1. CMA-E are not spatially mutually exclusive—they overlap where a Soil Landscapes of Canada (SLC) polygon crosses more than one CMA boundary, as is the case in Vancouver and Abbotsford–Mission or Toronto and surrounding CMAs including Hamilton, Oshawa, Kitchener–Cambridge–Waterloo, Guelph, Brantford and Barrie. For this reason, CMA-E data should not be summed to generate a total and caution should be used when comparing data. See CMA-E maps in Section 3: Ecosystem accounts and statistics by census metropolitan area for a visual representation of the CMA-E boundaries.

2. The CLI: LU and CLUMP built-up data include roads located within the core-built-up area; however data for roads outside these areas are not available. The AAFC *Land Use, 1990, 2000 and 2010*, product provides data for settled area and roads. Data presented for roads in 1971 in Table A.1 and elsewhere in this report were modeled to enable comparisons over time.

3. This report defines settled area as built-up area not including roads.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Natural Resources Canada (NRCAN), Canada Centre for Remote Sensing (CCRS), 1999, *Canada Land Inventory Level-1 Lat/Long Digital Data: CLI Land Use (circa 1966) (1:250,000)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli\\_250k/landuse/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/cli_250k/landuse/) (accessed September 15, 2015); NRCAN, CCRS, 1999, *Canada Land Use Monitoring Program (CLUMP) UTM Digital Data: CLUMP Land Use (1971) (1:50,000)*, [ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump\\_1971/](ftp://ftp2.cits.mcan.gc.ca/pub/geott/clump/clump_1971/) (accessed September 15, 2015); Agriculture and Agri-Food Canada (AAFC), 2015, *Land Use 1990, 2000 and 2010*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed September 16, 2015).

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For CLI: LU polygons that had information on more complex land use (includes secondary or tertiary land use) available in these data sets, this analysis used only the primary, or dominant, land use code.

By overlaying the data from AAFC's *Land Use, 1990, 2000 and 2010* over the CLI and CLUMP layer, it was determined that in some cases, the built-up area from these earlier data sets overbounded the built-up from later years. Built-up area normally remains built over time—a logic rule used in AAFC *Land Use*.<sup>89</sup> Since it is assumed that the data quality of the remote sensing product is better than that of the CLI: LU and CLUMP, CLI: LU and CLUMP built-up areas that were not built-up in the 1990 data set were removed from the 1971 built-up data and reclassified according to their 1990 land use. In total, 1,752 square kilometres were trimmed from the CMA built-up area from the CLI and CLUMP layer.

The CLI: LU and CLUMP built-up data include roads located within the core built-up areas; however, data for roads outside these areas are not available. The area of these roads therefore needed to be modeled for 1971 in order to enable comparisons over time. As a first step, roads in the core built-up areas were identified using *Land Use, 1990* and were removed from the 1971 base layer to isolate the settled area. Next, the road area was estimated by multiplying the 1971 settled area by the ratio of road area to settled area taken from AAFC's *Land Use, 1990*. This assumes that the ratio of roads to settled area remained constant between 1971 and 1990. The area of these modeled roads is not spatially explicit—it is provided as a total area for the CMA and CMA-E and cannot be attributed to a specific location.

Built-up areas, settled areas and roads were estimated for the 1991, 2001 and 2011 reference years using the Classes 21 - Settlements and 25 - Roads from AAFC's *Land Use, 1990, 2000 and 2010*.

### Arable land and agricultural land by soil capability

Arable land is represented in this analysis using cropland, tame or seeded pasture and summerfallow data from the Census of Agriculture, which is consistent with the variables used by the Food and Agriculture Organization of the United Nations. Data for arable land do not indicate the amount of land that is potentially cultivable.

This analysis focused on arable land rather than total farm area. Census of Agriculture variables 'natural land for pasture' and 'all other land,' which includes land such as wetland and woodland on farms, were not included in recognition of the higher habitat values of these types of farmland.<sup>90</sup>

Since Census of Agriculture data are not available by CMA, arable land for 1971, 1991, 2001 and 2011 is calculated for CMA-Es using the Interpolated Census of Agriculture, which aggregates **dissemination area** (DA) and **enumeration area** (EA) data from the Census of Agriculture by soil landscape and drainage area units.

In the data provided by StatCan to AAFC, farm area data are spatially referenced to the location of the farm headquarters, rather than distributing each field to the actual location.<sup>91</sup> AAFC and StatCan interpolated the data using an area-weighting process to reallocate DA and EA data to the SLC polygons.<sup>92</sup> Arable land data from the Interpolated Census of Agriculture do not have the spatial accuracy to be usefully mapped in Section 3.

Confidentiality procedures are applied to the data provided to AAFC to produce the Interpolated Census of Agriculture in order to avoid the possibility of identifying any specific agricultural operation. This involves the suppression of selected data. It was assumed that the suppression would have relatively little impact on the amount of arable land in each CMA-E.

89 Agriculture and Agri-Food Canada, 2015, *ISO 19131 – Land Use 1990, 2000 and 2010 Data Product Specifications*, <http://open.canada.ca/data/en/dataset/18e3ef1a-497c-40c6-8326-aac1a34a0dec> (accessed October 5, 2015).

90 Javorek, S.K. and M.C. Grant, 2011, "Trends in wildlife habitat capacity on agricultural land in Canada, 1986-2006," *Canadian Biodiversity: Ecosystem Status and Trends 2010*, Technical Thematic Report No. 14, Canadian Council of Resource Ministers, Catalogue no. EN14-43/14-2011E-PDF, [www.biodivcanada.ca/default.asp?lang=En&n=137E1147-1](http://www.biodivcanada.ca/default.asp?lang=En&n=137E1147-1) (accessed January 2, 2014).

91 Agriculture and Agri-Food Canada, 2013, *ISO 19131 Interpolated Census of Agriculture by Soil Landscapes of Canada: Revision A*, <http://open.canada.ca/data/en/dataset/1dee8513-5c73-43b6-9446-25f7b985cd00> (accessed August 7, 2015).

92 Huffman, T., R. Ogston, T. Fiset, B. Daneshfar, P.-Y. Gasser, L. White, M. Maloley and R. Chenier, 2006, "Canadian agricultural land-use and land management data for Kyoto reporting," *Canadian Journal of Soil Science*, Vol. 86, no. 3, p. 431–439.

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To quantify the scope of this assumption, the confidential data were obtained from Agriculture Division, Census of Agriculture Section, for the most recent year, 2011, which also coincided with the year that had the highest count of suppressed farms. The confidential data were summed for CMA-Es. Table B.3 shows that the majority of the arable land estimates are only slightly affected by the suppression.

### B.3

#### Impact of Interpolated Census of Agriculture suppression for 2011

	Unsuppressed arable	Unsuppressed	Suppressed arable	Farms reporting	Arable land
	land, 2011	number of farms	land area, 2011 <sup>2</sup>	suppressed arable	suppressed, 2011
	square kilometres	number	square kilometres	number	percentage
<b>CMA-ecosystem</b>					
Abbotsford–Mission	438	3,338	1	24	0
Barrie	1,165	1,693	2	26	0
Brantford	2,133	3,378	3	41	0
Calgary	6,257	3,536	38	92	1
Edmonton	9,937	6,526	69	243	1
Greater Sudbury	246	488	5	27	2
Guelph	1,226	2,195	1	6	0
Halifax	168	382	5	33	3
Hamilton	1,791	3,463	1	13	0
Kelowna	86	1,001	13	182	13
Kingston	850	1,452	13	61	1
Kitchener–Cambridge–Waterloo	1,594	2,617	1	10	0
London	5,963	7,251	1	25	0
Moncton	151	291	5	24	3
Montréal	4,081	5,329	22	182	1
Oshawa	1,421	2,428	4	31	0
Ottawa–Gatineau (Ont.)	2,900	3,642	12	101	0
Ottawa–Gatineau (Que.)	530	766	5	22	1
Peterborough	810	1,499	3	14	0
Québec	1,150	2,054	25	108	2
Regina	11,633	2,742	14	12	0
Saguenay	535	558	5	23	1
Saint John	80	206	11	52	12
Saskatoon	10,483	2,881	14	22	0
Sherbrooke	889	1,662	2	25	0
St. Catharines–Niagara	1,034	2,393	0	4	0
St. John's	23	117	3	13	11
Thunder Bay	131	223	3	20	2
Toronto	3,867	6,375	5	54	0
Trois-Rivières	2,340	2,776	37	101	2
Vancouver	348	3,107	4	28	1
Victoria	45	724	1	10	1
Windsor	1,690	1,900	x	x	x
Winnipeg	10,118	3,946	60	148	1

1. Total number of farms reporting is per Soil Landscapes of Canada (SLC) polygon.

2. Suppressed arable land is the sum of the confidential values for cropland, tame or seeded pasture and summerfallow contained in SLC polygons. The sum of this data is publishable for the CMA-E geography, where the number of farms is greater than 3.

**Note:** Arable land is the sum of cropland, improved pasture and summerfallow.

**Sources:** Statistics Canada, Environment, Energy and Transportation Statistics Division, 2016, special tabulation of data from Interpolated Census of Agriculture and Agriculture Division.

Arable land lost to settled area from 1971 to 2011 was calculated by overlaying the growth of settled area between 1971 and 2011 on arable land from the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. The following CLI: LU classes were included: cropland, improved pasture and forage crops, orchards and vineyards and horticulture, as well as cropland from *Land Use, 1990*.

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This analysis used settled area rather than built-up area—overlying 2011 built-up area on 1971 built-up area would have overestimated the loss of arable land since the 1971 roads were modeled and therefore not spatially explicit. As a result, loss of arable land is underestimated. However, it is estimated that roads account for more than one-quarter of the growth in built-up area.

Agricultural land lost to settled area by soil capability class was calculated by overlaying the growth in settled area from 1971 to 2011 on the *Canada Land Inventory: Soil Capability for Agriculture 1969* base layer. Dependable agricultural land represents agricultural land classes 1 through 3—land areas that are not hampered by severe constraints for crop production. Class 4 to 6 is marginal agricultural land that requires conservation or management practices for crop and/or forage crop production. For complex soil capability polygons, only the primary or dominant soil capability class was used in this analysis. Agricultural land lost to road growth was not included in this analysis.

Soil capability data for Kelowna CMA-E was not included in *CLI: Soil Capability for Agriculture*. The agricultural capability data for Kelowna were taken from British Columbia's Provincial Agricultural Land Commission,<sup>93</sup> which uses similar soil capability classifications.

### Natural and semi-natural land

Natural and semi-natural land is the residual area remaining after subtracting built-up area and arable land from the total area of the CMA-E. In addition, for 2011, areal information on forest and water was specified. Water area was derived from *CanVec+* geospatial data set. Forest area was calculated by summing the land cover classes 210–Coniferous, 220–Deciduous and 230–Mixedwood from *AAFC Crop Inventory, 2011* (30 m) for all land that was not otherwise categorized as built-up, arable or water. Other natural and semi-natural land was derived as a residual of the total area.

Natural and semi-natural land lost to settled area from 1971 to 2011 was calculated by overlaying the 1971 to 2011 settled area growth on natural and semi-natural land from the CLI: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using *AAFC's Land Use, 1990*.

Included CLI classes were woodlands, rough grazing and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas. As well, a small amount of land categorized as mines, quarries, sand and gravel pits was included in the natural and semi-natural category. For the trimmed areas, land reclassified from *Land Use, 1990*, included classes forest, forest wetland, grassland managed, grassland unmanaged, trees, treed wetland, wetland, wetland herb, wetland shrub, water, settlement, roads and other land. Natural and semi-natural land lost to roads was not included in this analysis.

### Population and dwellings

Detailed population and dwelling data are available from the Census of Population. Data are available for EAs for 1971 and 1991, and, following an improvement of the official geography of the Census, the finer scale **dissemination block** (DBs) for 2001 and 2011.<sup>94</sup> Both EA and DB population and dwelling data are attached to a representative point.

With regards to CMAs, a boundary adjustment was required to make individual CMAs comparable through time since some had expanded between 1971 and 2011. The 2011 boundary was selected in all cases. Population and dwelling counts for EAs and DBs were tabulated to comply with the 2011 boundary.

For the process of transferring census data to settled areas (as defined by the land use products), EA and DB points were selected if they fell in or within 400 metres of the settled area. This specific distance was selected because of the average spatial relationship between EAs, DBs and the scale of settled areas.

This study presents population and dwelling density measures by CMA as the ratio of settled area population or dwellings to the settled area (km<sup>2</sup>), which is defined as built-up area excluding roads.

93 Provincial Agricultural Land Commission, 2015, *Maps and GIS*, [www.alc.gov.bc.ca/alc/content/alr-maps/maps-and-gis](http://www.alc.gov.bc.ca/alc/content/alr-maps/maps-and-gis) (accessed October 16, 2015).

94 Statistics Canada, 2011, *Dissemination Block Boundary Files, Census year 2011*, Catalogue no. 92-163-X; Statistics Canada, 2007, *Dissemination Block Boundary Files, Census year 2006*, Catalogue no. 92-163-X; Statistics Canada, Statistical Registers and Geography Division, *Geographic Attribute File, Census Year 1991 and 1971*.

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It is worth noting that while most people live in settled areas, some live in low-density areas that may not be captured as settled in the satellite imagery product (and therefore not counted), a scenario that occurs more frequently in rural areas. Also, because DBs are of finer scale than EAs, the comparability of the data over time may be limited.

Table B.4 provides a summary of the above information on sources and methods.

**Table B.4**  
**Sources and methods**

Data or area	Data reference year			
	1971	1991	2001	2011
Census metropolitan areas (CMA)	2011 CMA boundaries were used for all years. Total area excludes water.			
Census metropolitan area-ecosystems (CMA-E)	Included all Soil Landscapes of Canada (SLC) polygons (version 3.2) that were contained within or that intersected the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E. Total area includes water.			
Built-up, settled and road areas	Used <i>Canada Land Inventory: Land Use</i> (CL: LU), circa 1966 and <i>Canada Land Use Monitoring Program</i> (CLUMP), 1971 land use code B – Urban built-up area with adjustments to subtract roads from the core built-up area to produce the settled area. CLUMP coverage excludes the CMAs of Moncton, Trois-Rivières, Sherbrooke, Peterborough, Kingston, Barrie, Brantford, Kelowna and Abbotsford–Mission. Land areas that were not built-up in Agriculture and Agri-Food Canada's (AAFC) <i>Land Use, 1990</i> were removed and reclassified based on the 1990 data. The sources for 1971 do not contain the same level of road detail. To address this, roads were modeled by multiplying settled area by the ratio of roads to settled area from <i>Land Use, 1990</i> .	Used the AAFC 30 m <i>Land Use, 1990</i> codes 21 (Settlement—Built-up and urban) and 25 (Roads—primary, secondary and tertiary).	Used the AAFC 30 m <i>Land Use, 2000</i> codes 21 (Settlement—Built-up and urban) and 25 (Roads—primary, secondary and tertiary).	Used the AAFC 30 m <i>Land Use, 2010</i> codes 21 (Settlement—Built-up and urban) and 25 (Roads—primary, secondary and tertiary).
Arable land	Composed of the variables cropland, summerfallow and tame or seeded pasture from the Interpolated Census of Agriculture. Data suppressed to meet the confidentiality requirements of the Statistics Act were converted to values of zero. This suppression had little effect on the estimates in most CMA-Es—see Table B.3. This data is available only for CMA-Es.			
Natural and semi-natural land	Calculated as a residual, i.e., the area left over once the built-up and arable areas were subtracted from the total CMA-E area. Because it was calculated residually, it includes some homes and other buildings, particularly those located on large lots and in rural areas.			
Water	..	..	..	Derived from Natural Resource Canada's <i>CanVec+</i> geospatial dataset.
Forest	..	..	..	Areas that are not built-up, arable or water, but that are classed as 210—Coniferous, 220—Deciduous and 230—Mixedwood in <i>AAFC Crop Inventory, 2011</i> .
Other natural and semi-natural land	..	..	..	Calculated as a residual, once the built-up, arable, forest and water areas were subtracted from the total CMA-E area.

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**Table B.4 (concluded)**  
**Sources and methods**

Data or area	Data reference year			
	1971	1991	2001	2011
Arable Land lost to settled area	Calculated by overlaying the growth in settled area between 1971 and 2011 on the CL: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's <i>Land Use, 1990</i> . Included the following CLI classes: cropland, improved pasture and forage crops, orchards and vineyards and horticulture, as well as cropland from <i>Land Use, 1990</i> . Arable land lost to roads was not included.			
Agricultural Land lost to settled area, by soil capability	Calculated by overlaying the growth in settled area between 1971 and 2011 on the <i>Canada Land Inventory: Soil Capability for Agriculture</i> layer. Included Class 1 to 3 (dependable agricultural land) and Class 4 to 6 (land with important limitations for agriculture). Agricultural land lost to roads was not included.			
Natural and semi-natural Land lost to settled area	Calculated by overlaying the growth in settled area between 1971 and 2011 on the CL: LU base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's <i>Land Use, 1990</i> . Included the following CLI classes: woodlands, rough grazing and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas. A small amount of land classed as mines, quarries sand and gravel pits was also included. For land reclassified from <i>Land Use, 1990</i> , the following classes were included: forest, forest wetland, grassland managed, grassland unmanaged, trees, treed wetland, wetland, wetland herb, wetland shrub, water, settlement, roads and other land. Natural and semi-natural land lost to roads was not included.			
Population and dwelling	Used enumeration area points from the Census of Population. Total population and dwelling data were recompiled to meet the 2011 CMA boundaries. Settled area population and dwelling data take points located within 400 m of the 1971 settled area.	Used enumeration area points from the Census of Population. Total population and dwelling data were recompiled to meet the 2011 CMA boundaries. Settled area population and dwelling data take points located within 400 m of the 1991 settled area.	Used dissemination block points from the Census of Population. Total population and dwelling data were recompiled to meet the 2011 CMA boundaries. Settled area population and dwelling data take points located within 400 m of the 2001 settled area.	Used dissemination block points from the Census of Population. Settled area population and dwelling counts take points located within 400 m of the 2011 settled area.

Source: Environment, Energy and Transportation Statistics Division, 2016.



### C. Glossary

**Agricultural land:** agricultural land refers to both ‘dependable agricultural land’ and to ‘agricultural land with limitations’ as defined by the *Canada Land Inventory: Soil Capability* data. Although agricultural land can also be understood to mean all land used by farms—represented by the variable total farm area from Statistics Canada’s Census of Agriculture—this usage does not occur in this report.

**Agricultural land with limitations:** represents agricultural land Class 4 to 6 in the *Canada Land Inventory: Soil Capability for Agriculture*. In this classification, Class 4 land is marginal for crop production and requires the use of additional management or conservation practices, Class 5 is capable of permanent pasture and hay and Class 6 is suitable for natural pasture. Growth in settled area on agricultural land by soil capability class is calculated by overlaying the growth in settled area from 1971 to 2011 on the *Canada Land Inventory: Soil Capability for Agriculture, 1969* base layer. Agricultural land lost to roads is not included.

**Arable land:** arable land areas are represented here by the variables cropland, tame or seeded pasture and summerfallow from the Interpolated Census of Agriculture. Use of these variables is consistent with data presented for arable land in Canada by the Food and Agriculture Organization of the United Nations. Data for arable land do not indicate the amount of land that is potentially cultivable.

**Arable land lost to settled area:** calculated by overlaying the growth in settled area from 1971 to 2011 on arable land from the *Canada Land Inventory: Land Use* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC’s *Land Use, 1990*. Included the following CLI: LU classes: cropland, improved pasture and forage crops, orchards and vineyards and horticulture, as well as cropland from *Land Use, 1990*. Arable land lost to roads is not included in this analysis.

**Built-up area:** areas characterized by a high percentage of impervious surfaces such as roadways, parking lots and roof tops. Low-density dwellings and small structures or buildings in rural areas outside core built-up areas may not be captured due to the resolution of the data and overlying tree canopy. The spatial data sets used to represent built-up areas in this report include land that is predominantly developed, including the vegetation associated with this land cover. This includes roads, paved surfaces, buildings, railways, industrial sites, mine structures, farmsteads and similar land covers and may include parks and golf courses. Data for built-up area are further categorized in this report as settled areas and roads.

**Census metropolitan area (CMA):** A census metropolitan area (CMA) is formed by one or more adjacent municipalities centred on a population centre (known as the core). A CMA must have a total population of at least 100,000 of which 50,000 or more must live in the core. To be included in the CMA other adjacent municipalities must have a high degree of integration with the core, as measured by commuting flows derived from previous census place of work data. Once an area becomes a CMA, it is retained as a CMA even if its total population declines below 100,000 or the population of its core falls below 50,000.

**Census metropolitan area-ecosystem (CMA-E):** a spatial unit that combines CMAs with an environmental geography—the Soil Landscapes of Canada (SLC). The CMA-E combines any SLC polygon that is contained within or that intersects the CMA boundary, as well as SLC polygons that are fully contained within this newly formed boundary of the CMA-E.

**Core:** A CMA can have two types of core—the core and the secondary core. The core is the population centre with the highest population, around which a CMA is delineated. The core must have a population (based on the previous census) of at least 50,000 persons. The secondary core is a population centre within a CMA that has at least 10,000 persons and was the core of a census agglomeration (CA) that has been merged with an adjacent CMA.

**Densification:** the act or process of increasing density—for example of population or dwellings. See also intensification.



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**Dependable agricultural land:** represents agricultural land Class 1 to 3 in the *Canada Land Inventory: Soil Capability for Agriculture*. In this classification, Class 1 has no significant limitations in use for crops, Class 2 has moderate limitations that require moderate conservation practices and Class 3 has moderately severe limitations that restrict the range of crops or that require special conservation practices. Growth in settled area on agricultural land by soil capability class is calculated by overlaying the growth in settled area from 1971 to 2011 on the *Canada Land Inventory: Soil Capability for Agriculture*, 1969 base layer. Agricultural land lost to roads is not included.

**Dissemination area (DA):** census geography used from 2001 to 2011, representing a small, relatively stable geographic unit composed of one or more adjacent dissemination blocks. It is the smallest standard geographic area for which all census data can be disseminated.

**Dissemination block (DB):** census geography used in 2011 and 2006, termed 'block' in 2001. It is an area bounded on all sides by roads and/or boundaries of standard geographic areas. The dissemination block is the smallest geographic area for which population and dwelling counts can be disseminated. It replaced the enumeration area as the basic unit for dissemination.

**Dwelling density:** calculated here as the number of dwellings in the settled area divided by the settled area.

**Ecosystem goods and services:** the tangible goods (e.g., fish, timber) and less tangible services (e.g., clean air, productive soil) that arise from ecosystem structures and functions and that provide benefits to people.

**Ecosystems:** ecological communities of living species that interact with their environment and function as a unit. For accounting purposes, the concept is generalized, with ecosystems defined as the area where living species interact among themselves and with their environment.

**Enumeration area (EA):** census geography used from 1961 to 1996. It was the geographic area canvassed by one census representative and was the smallest standard geographic area for which census data were reported. Wherever possible, EA limits followed visible features such as streets and rivers. The number of dwellings in an EA generally varied between a maximum of 440 in large urban areas to a minimum of 125 in rural areas.

**Intensification:** refers to development within existing built-up areas, including infill development and redevelopment of previously built areas from lower density to higher density dwelling types. See also densification.

**Land cover:** the observed physical and biological surface of the Earth and includes biotic (living, such as natural vegetation) and abiotic (non-living, such as rocks) surfaces. Land cover can be determined by field assessment and using aerial and satellite imagery.

**Land use:** describes the economic and social functions of land to meet human demands, including activities and institutional arrangements to maintain or restore natural habitats. Typical land use classes include agriculture, settled areas and managed areas.

**Natural and semi-natural land:** calculated as the residual area remaining after subtracting built-up area and arable land from the total area. It includes areas such as forests, grasslands, shrublands, barrenlands, wetlands and water that have undergone little human induced modification. However, because it was calculated residually, it also includes some homes and other buildings, particularly those located on large lots and in rural areas, since these may not be captured by satellite imagery as built-up, due in part to the resolution of the data, but also overlying tree canopy.

**Natural and semi-natural land lost to settled area:** calculated by overlaying the growth in settled area from 1971 to 2011 on natural and semi-natural land from the *Canada Land Inventory: Land Use (CLI: LU)* base layer and, for areas where the 1971 settled area was trimmed, on the area reclassified using AAFC's *Land Use, 1990*. Included the following CLI: LU classes: woodlands, rough grazing and rangeland, outdoor recreation areas, rock and unvegetated surfaces, open wetland and unmapped areas. Natural and semi-natural land lost to roads is not included in this analysis.

**Natural capital:** the stock of natural assets—land, air, water, living organisms, natural resources—that supplies ecosystem goods and services and other natural resources.

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**Other natural and semi-natural land:** For 2011, the natural and semi-natural land category was broken out into three categories: water, forest and other. This latter category was calculated as a residual, once the built-up, arable, forest and water areas were subtracted from the total CMA-E area.

**Other natural and semi-natural land lost to settled area:** based on the *Canada Land Inventory: Land Use* classes could include rock and unvegetated surfaces; wetland; mines, quarries, sand and gravel pits; outdoor recreation areas and unmapped areas.

**Population centre:** has a minimum population concentration of 1,000 persons and a population density of at least 400 persons per km<sup>2</sup>, based on the current census population count. Population centres are divided into three groups based on the size of their population to reflect the existence of an urban-rural continuum: small (1,000 to 29,000 people), medium (30,000 to 99,999) and large urban (100,000 and over). In 2011, there were 31 large urban population centres with a total population of 20.1 million people, 54 medium population centres with a total population of 2.9 million and 857 small population centres with a total population of 4.1 million. The term 'population centre' replaces the term 'urban area' used prior to the 2011 Census.

**Population density:** calculated here as the settled area population divided by the settled area.

**Reconciliation unit:** a spatial framework used by Environment and Climate Change Canada that combines the Ecological Framework of Canada and provincial and territorial administrative boundaries.

**Settled area:** In this report, settled area is defined as built-up area not including roads.

**Soil Landscapes of Canada (SLC) polygon:** SLC polygons delineate the major permanent natural attributes of soil and land for the whole country. These attributes include soil type, surface form, slope, surface water and water table depth, and therefore provide information on some basic ecosystem characteristics. SLC polygons are the smallest building block for the *National Ecological Framework for Canada*.

**Urban expansion:** growth of built-up areas, particularly on previously undeveloped land in or near cities.

**Urban tree canopy:** the layer of leaves, branches and stems of trees that cover the ground when viewed from above, as in remote sensing imagery, in population centres.