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In this issue

Temperature trends in Canada

This article describes annual and seasonal time series of temperature departures from normal over a 62 year period and is the second in an ongoing series of short analytical articles featuring climate related data. This and future articles in the series are the product of ongoing collaboration among Statistics Canada, Environment Canada and Natural Resources Canada.

Operation and maintenance costs of drinking water plants

Operation and maintenance (O&M) costs associated with the acquisition and treatment of water will vary by treatment technology, annual production volumes and the type of source water processed. This study analyzes the data collected by the 2007 Survey of Drinking Water Plants to illustrate how O&M costs vary by these factors. It examines two drinking water treatment systems: conventional systems, which treated the most surface water and unfiltered systems, which treated the most groundwater.

Ecoregion profile: Fescue Grassland

The Fescue Grassland ecoregion profile is the sixth in a series of ecoregion profiles. The information presented includes a brief description of the physical setting, a snapshot of land cover and use as well as statistics on selected socio-economic characteristics of the region. This is Canada's sixth most densely populated ecoregion.

Table 1
Latest Canadian indicators

	Period	Percentage change
		%
Population	2009 to 2010	1.2
Gross domestic product, monthly	December 2010	0.5
Greenhouse gas emissions	2007 to 2008	-2.1
Particulate matter ($PM_{2.5}$)	2000 to 2008	n.s.s. [1]
Ground-level ozone (median percentage change per year)	1990 to 2008	0.6
Natural resource wealth	2008 to 2009	-37.8

1. Not statistically significant.

Source(s): Statistics Canada, CANSIM tables 051-0001 and 378-0005 (accessed February 28, 2011). Statistics Canada, 2011, *Gross Domestic Product by Industry*, Catalogue no. 15-001-X. Environment Canada, 2010, *National Inventory Report 1990-2008: Greenhouse Gas Sources and Sinks in Canada*, Catalogue no. En81-4/2008E-PDF. Environment Canada, 2011, *Measuring Sustainability: Canadian Environmental Sustainability Indicators*, *www.ec.gc.ca/indicateurs-indicators/default.asp?lang=EnXXn=ED311E59-1&offset=6&toc=show* (accessed February 28, 2011).

Temperature trends in Canada

Jeff Fritzsche, Environment Accounts and Statistics Division

The data in this article consist of annual and seasonal time series of temperature departures from normal over a 62 year period (1948 to 2009) for eleven climatic regions as well as for Canada as a whole (Map 1). The temperature departure from normal is the difference between the observed temperature values and a temperature 'normal' which is the average of observed temperatures over a specified time period.[1] The period used to calculate the normal employed in this analysis is 1961 to 1990, as reported by Environment Canada in the *Climate Trends and Variations Bulletin* (CTVB).[2]

A new data collaboration

This article is the second of an ongoing series in *EnviroStats* showcasing data related to Canada's climate and the impacts of climate change. The focus of these articles is short statistical analyses of climate-related data, such as sea ice extent and snow cover. The first in the series was released in September, 2010 (*www.statcan.gc.ca/pub/16-002-x/2010003/part-partie2-eng.htm*) and examined the cumulative mass balance of six Canadian glaciers.

The articles are the product of an ongoing collaboration among Statistics Canada, Environment Canada and Natural Resources Canada.

The data featured in the articles will be made available through the Statistics Canada website, both in free CANSIM data tables and through new articles re-examining trends in the data every few years.

Surface air temperature is considered by the World Meteorological Organization-Global Climate Observing System as an Essential Climate Variable,[3] part a group of variables related to the atmosphere. Air temperature is also one of several variables used by the United Nations Framework Convention on Climate Change (UNFCCC) and the Intergovernmental Panel on Climate Change (IPCC) to assess long-term changes to climate.[4]

1. Environment Canada, 2011, *Calculation of the 1971 to 2000 Climate Normals for Canada*, *http://climate.weatheroffice.gc.ca/prods_servs/normals_documentation_e.html* (accessed January 10, 2011).
2. Environment Canada, 2011, *Climate Trends and Variations*, *www.ec.gc.ca/adsc-cmda/default.asp?lang=En&n=F3D25729-1* (accessed February 7, 2011).
3. Global Climate Observing System, 2011, *Global Climate Observing System*, *www.wmo.int/pages/prog/gcos/index.php?name=EssentialClimateVariable* (accessed February 14, 2011).
4. Global Observing Systems Information Center, n.d. (no date), *GCOS Essential Climate Variables (ECV) Data & Information Access Matrix*, *http://gosic.org/ios/MATRICES/ECV/ecv-matrix.htm* (accessed February 14, 2011).

Background and methodology

The departures from normal data used in this study were taken directly from the *Climate Trends and Variations Bulletin* for Canada (CTVB).[5] The data consists of annual mean, and seasonal mean, maximum and minimum temperature departures from normal for the period 1948 to 2009 for each of eleven climatic regions as well as for Canada as a whole (Map 1). To compile a set of data that reflects both the national and regional variations, daily temperature data from more than 330 weather stations were used to compute seasonal and annual departures from normal. These data are housed in the *Adjusted and Homogenized Canadian Climate Data* (AHCCD)[6] archives. For each station, monthly mean temperatures were computed from the record of daily minimum and maximum temperature readings.

Departures from normal are defined as departures from the 1961 to 1990 normal[7] in Celsius degrees (°C). Using departures rather than actual temperatures makes it possible to relate all regional data to the same reference point. The annual departure is the average of all monthly departures and the seasonal departure is the average of the monthly departures in the corresponding season. The seasons are defined as follows: winter (December of the previous year, January, February), spring (March, April, May), summer (June, July, August), and fall (September, October, November).

Since weather stations are not evenly distributed across the country, the temperature departures are first interpolated using Gandin's Optimal Interpolation[8] method using a grid covering the entire country. The gridded departures are averaged over each region and the nation. Next, mean temperature departures are calculated from the gridded maximum and minimum temperature departures. Finally, the gridded mean, maximum, and minimum temperature departures are averaged over Canada and each climatic region to produce national and regional time series used in the trend analysis.

A number of analytical techniques were applied to the data to determine if statistically significant trends exist in the annual and seasonal departure from normal data. These techniques included ordinary least squares analysis and non-parametric analysis using Sen's method.[9] A trend cycle (smoothed time series) was generated from the original time series using a 17-term Henderson filter. Linear regression was run on both the original time series and on the smoothed time series, while Sen's method was applied to the original time series only. All techniques showed that the annual and seasonal departures from normal showed statistically significant increases for all climatic regions over the study period. The Sen's method was used to derive the departure from normal trend results used in this study.

The annual data were tested for the presence of serial correlation and were found not to be correlated to a significant degree. Analysis of the seasonal departure from normal data was undertaken using the SAS/Autoreg procedure, which takes into account the possibility of serially correlated errors in the data.[10]

Results

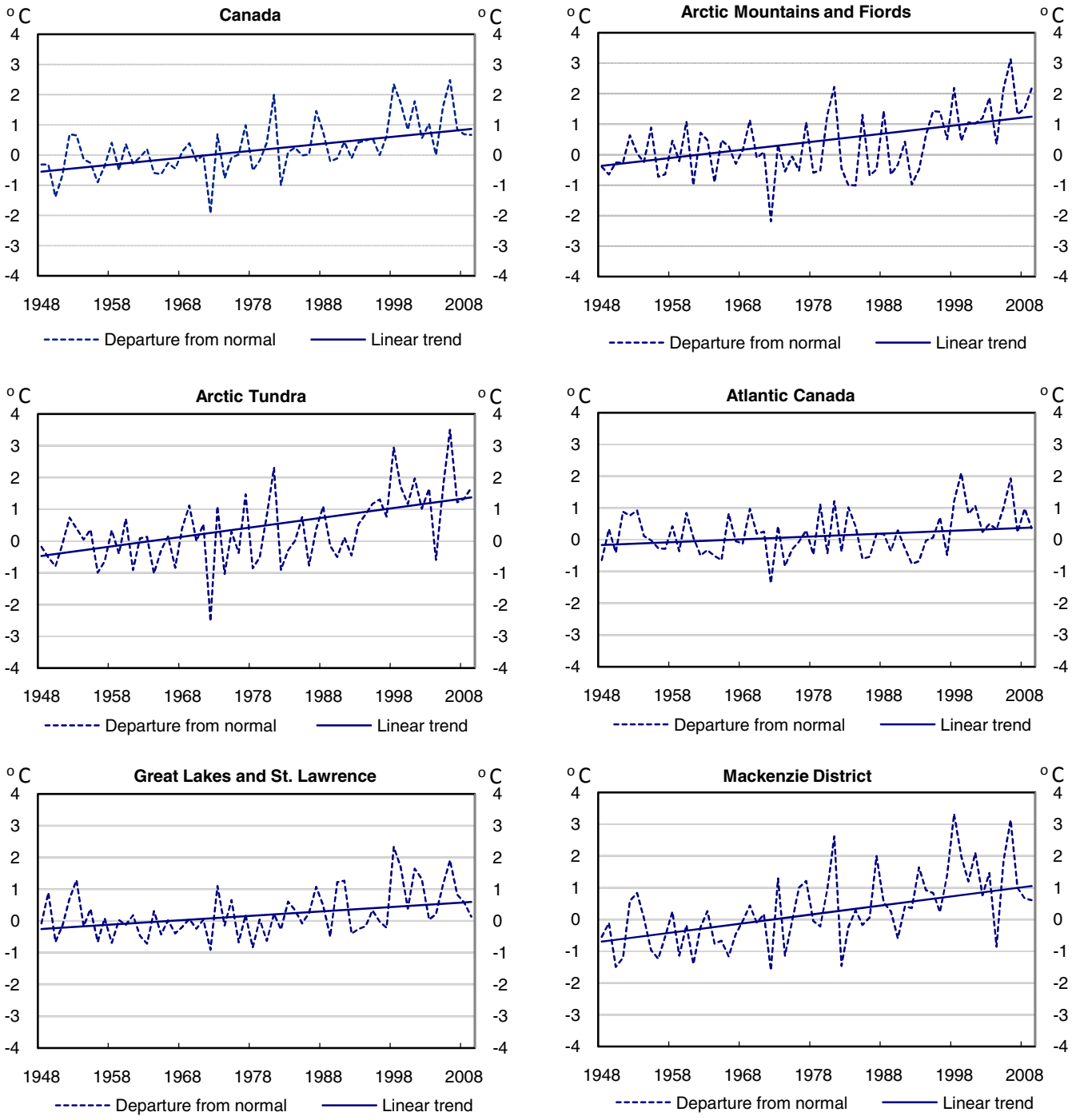
National

Analysis of the national annual mean temperature departure from normal time series (Chart 1) shows a warming trend[11] over the period 1948 to 2009. The linear trend for annual mean temperature departures between 1948 and 2009 moved above the 1961 to 1990 normal beginning in 1973. The linear trend indicates an increase in mean temperature of 1.4°C over the 62 years in the record.

5. Environment Canada, 2010, *About Climate Trends and Variations Bulletin*, *www.ec.gc.ca/adsc-cmda/default.asp?lang=En&n=D48C5C94-1* (accessed February 25, 2011).
6. Environment Canada, 2010, *Adjusted and Homogenized Canadian Climate Data (AHCCD)*, *http://ec.gc.ca/dccha-ahccd/default.asp?lang=En&n=B1F8423A-1* (accessed January 28, 2011).
7. The World Meteorological Organization recommends that countries prepare 30-year climate normals for the periods ending in 1930, 1960 and 1990. See: Environment Canada, 2011, *Calculation of the 1971 to 2000 Climate Normals*, *http://climate.weatheroffice.gc.ca/prods_servs/normals_documentation_e.html* (accessed January 28, 2011).
8. E. Milewska and W.D. Hogg, 2001, "Spatial Representativeness of a Long-Term Climate Network in Canada,"*Atmosphere-Ocean*, Vol. 39, no. 2, pages 145 to 161.
9. P.K. Sen, 1968, "Estimates of the regression coefficient based on Kendall's tau," *Journal of the American Statistical Association*, Vol. 63, pages 1379 to 1389.
10. To enquire about the statistical analysis used in this article, contact the Information Officer (613-951-0297; *environ@statcan.gc.ca*), Environment Accounts and Statistics Division.
11. The annual mean temperature departure trends for the nation as a whole and for all climatic regions showed confidence levels varying from 90% to 99.9%.

Chart 1

Mean temperature departures from 1961 to 1990 normal and linear trend for Canada and climatic regions,[1] 1948 to 2009



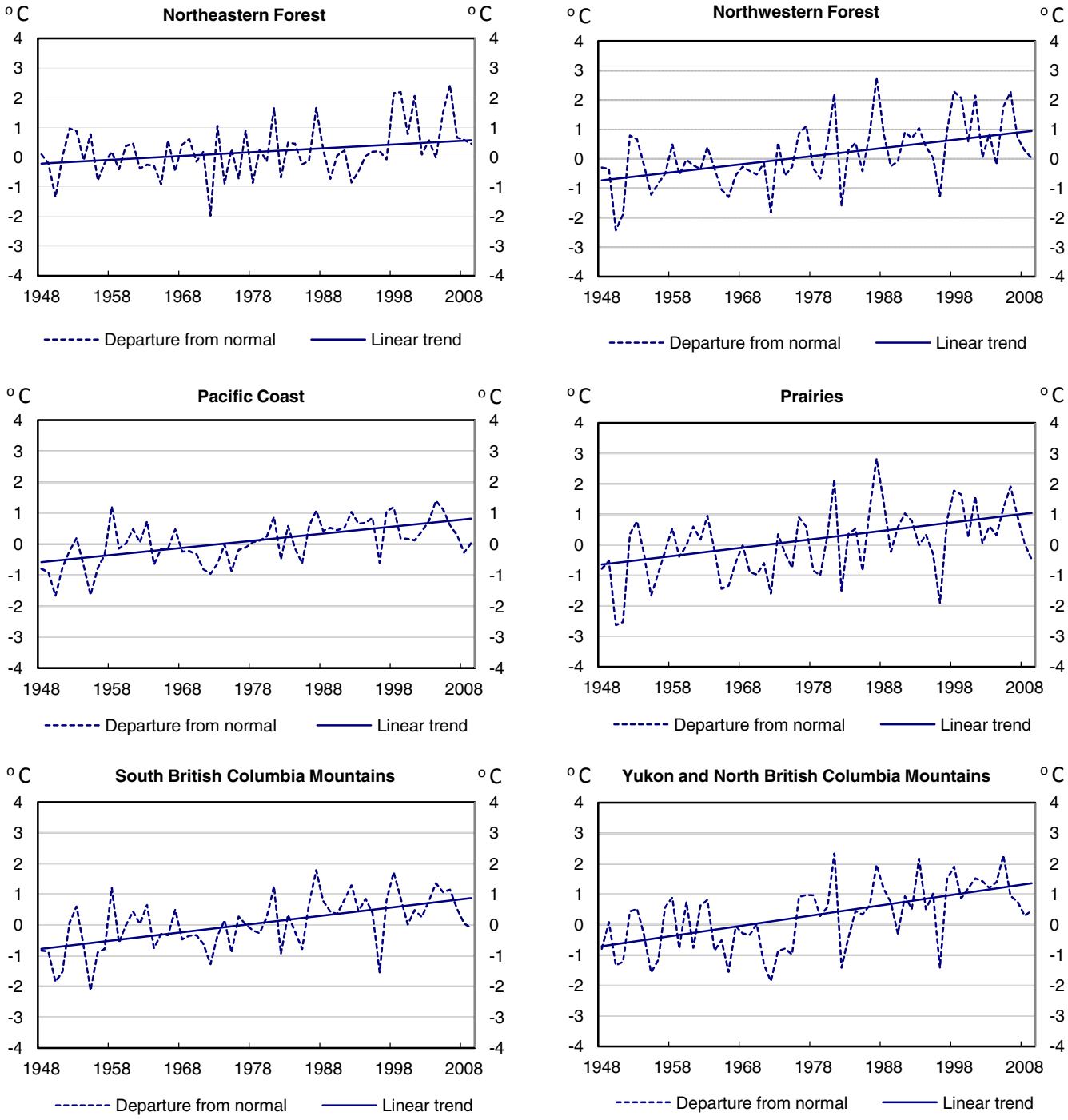
1. See Chart 2 for the following climatic regions: Northeastern Forest, Northwestern Forest, Pacific Coast, Prairies, South British Columbia Mountains, and Yukon and North British Columbia Mountains.

Note(s): The value and the confidence interval for each slope were calculated according to Sen's method.

Source(s): Environment Canada, 2010, *Climate Trends and Variations Bulletin (CTVB)*, *www.ec.gc.ca/adsc-cmda/default.asp?lang=En&n=F3D25729-1* (accessed February 11, 2011).

Chart 2

Mean temperature departures from 1961 to 1990 normal and linear trend for climatic regions,[1] 1948 to 2009



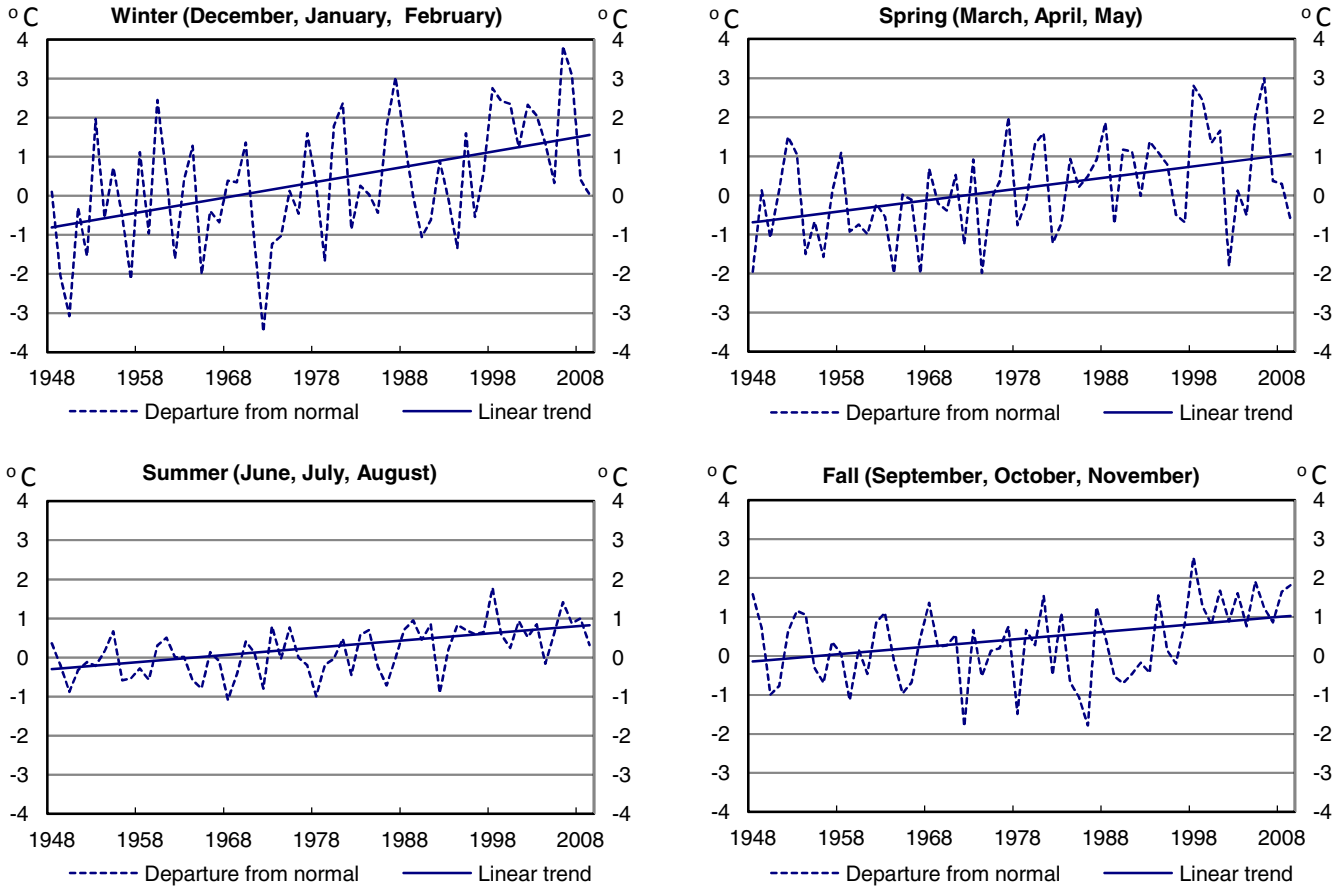
1. See Chart 1 for Canada and the following climatic regions: Arctic Mountains and Fiords, Arctic Tundra, Atlantic Canada, Great Lakes and St. Lawrence,and Mackenzie District.

Note(s): The value and the confidence interval for each slope were calculated according to Sen's method.

Source(s): Environment Canada, 2010, *Climate Trends and Variations Bulletin (CTVB)*, *www.ec.gc.ca/adsc-cmda/default.asp?lang=En&n=F3D25729-1* (accessed February 11, 2011).

Analysis of seasonal national mean temperature departures from normal shows that mean winter and spring temperatures got milder over the study period with these trends showing increases of 2.4°C and 1.8°C over the past 62 years.[12] Mean summer and fall temperatures showed a smaller increase in departure from normal. This indicates that increased winter and spring temperatures contributed to the warming trend to a greater degree than other seasons (Chart 3).

Chart 3
Seasonal departure of mean temperature from 1961 to 1990 normal and linear trend for Canada, 1948 to 2009



Note(s): The value and the confidence interval for each slope were calculated according to Sen's method.
Source(s): Environment Canada, 2010, *Climate Trends and Variations Bulletin (CTVB)*, *www.ec.gc.ca/adsc-cmda/default.asp?lang=En&n=F3D25729-1* (accessed February 11, 2011).

Regional

Annual departure from normal

Although all eleven climatic regions showed positive warming trends over the study period, there were regional differences (Charts 1 and 2). The climatic regions showing the strongest warming trends are found in the far north of Canada; namely, the Arctic Tundra, Arctic Mountains and Fiords, Mackenzie District, and Yukon and North British Columbia Mountains climatic regions. The trends for these regions show increases in temperatures of 1.6°C to 2.2°C over the study period.

12. The seasonal mean temperature departure trends for the nation showed confidence levels varying from 99% to 99.9%.

The Mackenzie District climatic region recorded the strongest warming trend from 1948 to 2009 rising a total of 2.2°C, while the Atlantic Canada climatic region recorded the smallest trend increase in mean temperature over the period, 0.5°C in total.

Across southern Canada (the Great Lakes and St. Lawrence, the Prairies and the South British Columbia Mountains climatic regions) and the west coast (Pacific Coast climatic region), the mean temperature departure trend increased between 0.9°C and 1.7°C over the study period. The Northeastern Forest climatic region, which encompasses a section of Manitoba, most of Ontario and Quebec as well as Labrador, recorded a smaller warming trend (0.8°C) over the study period.

Seasonal departure from normal by region

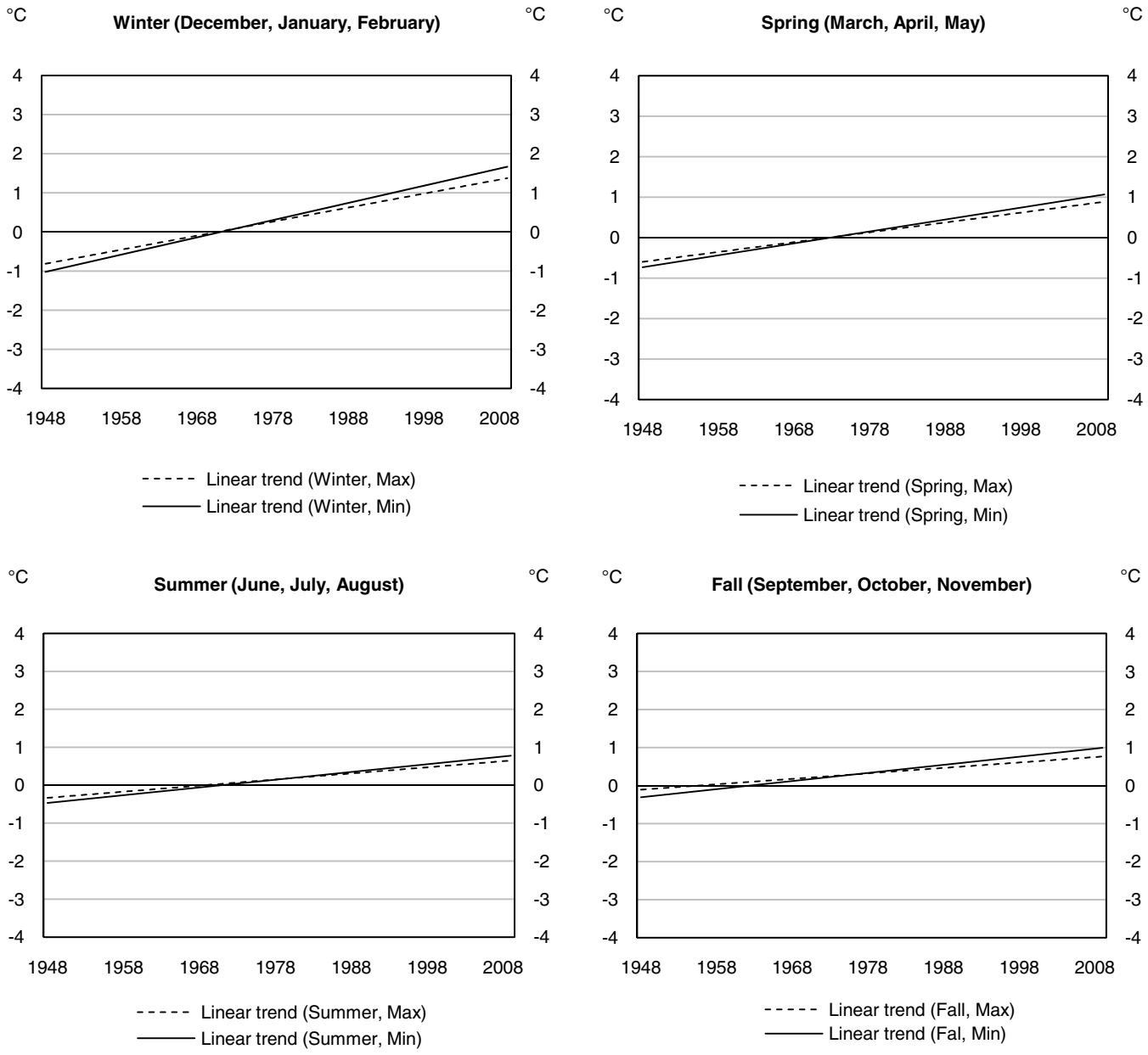
On a regional basis, analysis of seasonal mean temperature departures from normal indicates that the Atlantic Canada climatic region experienced significantly cooler winters over the period while seven of the eleven climatic regions experienced warmer winters over the study period.

Analysis of national seasonal mean minimum temperature and maximum temperature departures from normal provides further support for these findings. Results show that the trends in the mean minimum winter and spring temperature departures increased faster than the mean maximum temperature departures. The trends in fall and summer mean minimum and mean maximum departures also increased, but at slower rates (Chart 4).[13]

13. The seasonal mean minimum are maximum temperature departure trends for the nation showed confidence levels of 99.1% for all but the fall maximum (90% confidence level) and the fall minimum (99% confidence level).

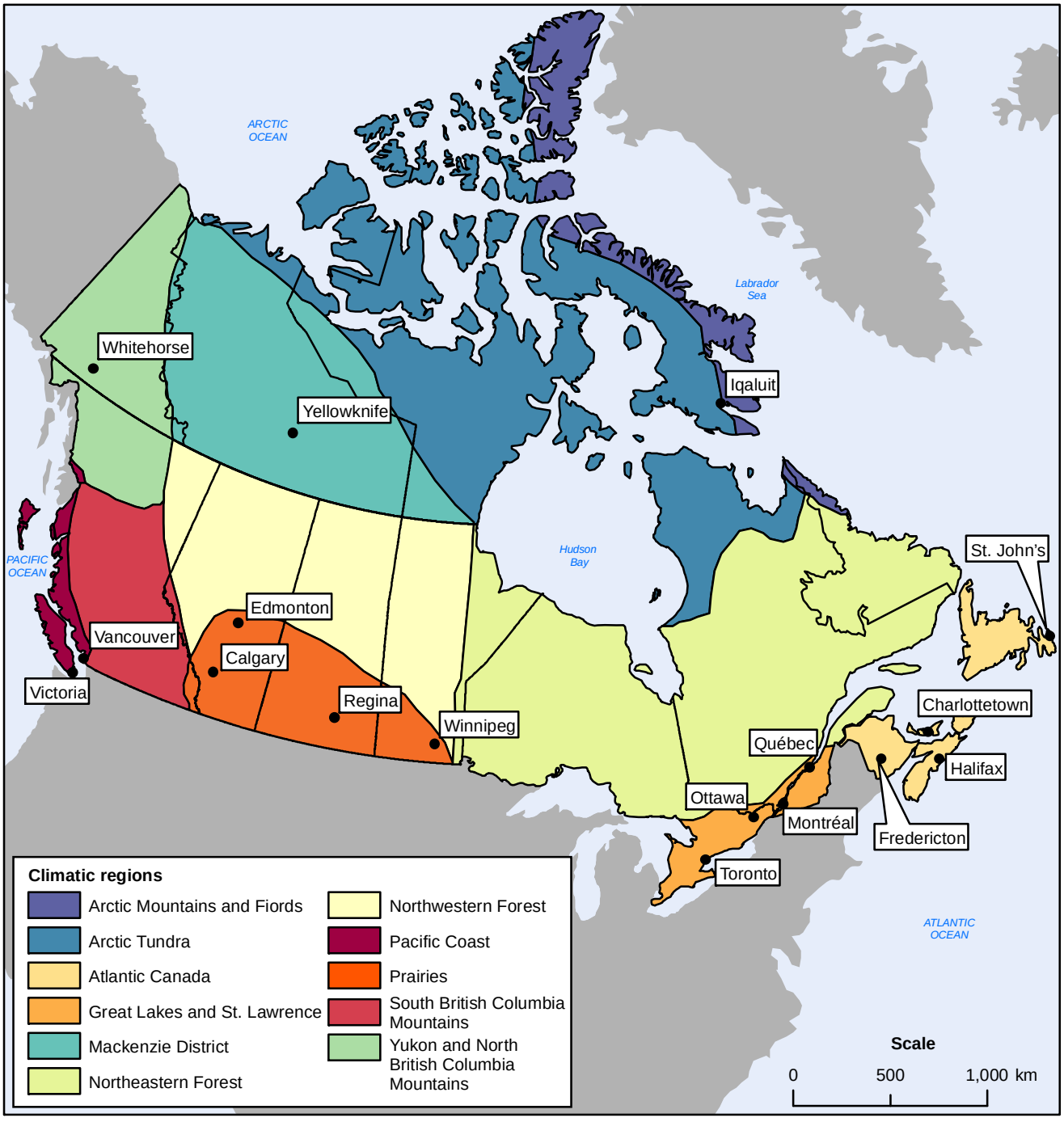
Chart 4

Linear trends associated with the seasonal mean minimum and maximum temperature departure from 1961 to 1990 normal for Canada, 1948 to 2009



Note(s): The value and the confidence interval for each slope were calculated according to Sen's method.
Source(s): Environment Canada, 2010, *Climate Trends and Variations Bulletin (CTVB)*, *www.ec.gc.ca/adsc-cmda/default.asp?lang=En&n=F3D25729-1* (accessed February 11, 2011).

Map 1
Canada's climatic regions



Source(s): Environment Canada, Atmospheric Environment Service, Climate Research Branch, 1998, *Climate Trends and Variations Bulletin for Canada*, Ottawa.

Operation and maintenance costs of drinking water plants

Terence Nelligan, Environment Accounts and Statistics Division, Sharon Wirth, Business Survey Methods Division, Cindy De Cuypere, Environment Accounts and Statistics Division and Lenka Mach, Social Survey Methods Division

Drinking water plants are a crucial element of the Canadian economy as they treat water that is supplied to commercial, institutional, industrial and residential users. In 2007, 86% of households received their water from a municipal water source.[14] That year drinking water plants produced 5,617 million cubic metres (Mm^3) of potable water. Surface water supplies provided 88% of the water and served 24 million Canadians. Groundwater supplies provided 10% of the water and served 3.5 million Canadians. The remaining 2% came from groundwater under the direct influence of surface water (GUDI sources) which served 460,000 people in 2007.[15]

Operation and maintenance (O&M) costs data collected by the 2007 Survey of Drinking Water Plants include expenditures on materials (chemicals and replacement parts), labour and energy for the acquisition and treatment of water, but exclude water distribution costs. In 2007, $807 million was spent on O&M. The largest component of these expenses was labour costs ($302 million), while material and energy costs represented $198 million and $199 million respectively. Other costs accounted for the remaining $108 million.[16]

O&M costs associated with the acquisition and treatment of water will vary by treatment technology, annual production volumes and the type of source water processed. This study analyzes the data collected by the survey to illustrate how O&M costs vary by these factors. It examines two drinking water treatment systems: conventional systems, which treated the most surface water and unfiltered systems, which treated the most groundwater.

What you should know about this study

Data sources

The primary data source for this article was the 2007 Survey of Drinking Water Plants, a new survey conducted by Statistics Canada. The survey provides national and regional information related to the production of drinking water. With a target population of all drinking water plants serving communities of 300 or more people, it collects data on the volumes of water withdrawn and treated, treatment type, capital and operating costs and water quality. The treatment plants covered by the survey provided water for about 85% of the Canadian population. For further information on data quality, concepts and methodology please refer to: Survey of Drinking Water Plants (survey no. 5149).

Conventional treatment of surface water

Surface waters such as lakes, rivers and streams are susceptible to pollution and almost always require treatment by coagulation, flocculation, sedimentation, granular media filtration and disinfection. This combination of processes is referred to as 'conventional' treatment.[17] Table 2 shows that in 2007, over half (53.5%) of the total volume of surface water treated at drinking water plants (2,640 Mm^3) was treated by conventional systems. This water served 13 million people.[18] Because of their dominance in the treatment of surface water, the analysis in this article focuses on conventional treatment plants. Survey data were used to develop a model explaining how O&M costs vary with annual production volumes for conventional treatment plants treating surface water.

14. Statistics Canada, 2007, *Households and the Environment*, Catalogue no. 11-526-X, Table *4*.
15. Statistics Canada, 2009, *Survey of Drinking Water Plants*, *2005 to 2007*, Catalogue no. 16-403-X, Tables *5* and *6*.
16. Statistics Canada, 2009, *Survey of Drinking Water Plants, 2005 to 2007*, Catalogue no. 16-403-X, Table *11*.
17. Department of National Health and Welfare, 1993, *Guidelines for Canadian Drinking Water Quality - Water Treatment Principles and Applications: A Manual for the Production of Drinking Water*, Canadian Water and Wastewater Association, Ottawa.
18. Statistics Canada, Environment Accounts and Statistics Division, 2011, Survey of Drinking Water Plants, special tabulation.

Table 2
Percentage of surface water and groundwater volumes processed by drinking water plants, by treatment category, 2007

	Surface water	Groundwater [1]
	percent of total water treated	
Treatment category [2]		
Conventional treatment	53.5	3.8
Direct filtration	8.3	2.0
Other filtration systems	19.1	10.8
Disinfection and other (unfiltered systems)	11.6	34.0
Disinfection only	7.5	29.6
No treatment	0.1	17.4
No disinfection with other treatment	0.0	2.6

1. Includes groundwater under the direct influence of surface water (GUDI).
2. For the main processes applied in each treatment category refer to Statistics Canada, 2009, *Survey of Drinking Water Plants, 2005 to 2007*, Catalogue no. 16-403-X, Appendix *I*.

Note(s): Excludes Nunavut due to low response. Figures may not add up to totals due to rounding.
Source(s): Statistics Canada, Environment Accounts and Statistics Division, 2011, Survey of Drinking Water Plants, special tabulation.

Unfiltered systems treating groundwater

With respect to groundwater supplies, in most cases the ground can protect the water from microbial contamination. Treatment approaches therefore differ from those applied to surface water supplies.[19] Table 2 shows that in 2007, about one third (34%) of the total volume of water treated from groundwater supplies (232 Mm^3) was produced by systems that applied disinfection as well as other processes. These are referred to as unfiltered systems treating groundwater.[20] This water served one million people.[21] Because these systems were among the dominant ones in the treatment of groundwater, the analysis in this article focuses on unfiltered systems. Survey data were used to develop a model to explain how O&M costs vary with annual production volumes for unfiltered systems treating groundwater.

O&M cost models developed for selected systems

For conventional plants treating surface water, ordinary least squares regression was used to produce a model to estimate annual O&M costs based on the volume of water treated. The following regression model was estimated:

Annual O&M costs (CAN$) = exp(9.18727 + 0.55085*ln(annual production volume in megalitres))

This model was developed using data from 274 treatment plants, of which 22 had imputed data for either total O&M costs or annual production volume. The coefficient of determination (R^2) for the model was 0.73, meaning that the volume of water treated explains 73% of the variability in total O&M costs.

For unfiltered systems treating groundwater, the following regression model was estimated using a similar procedure:

Annual O&M costs (CAN$) = exp(7.77325 + 0.71328*ln(annual production volume in megalitres))

This model was developed using data from 126 plants, of which 18 had imputed data for either total O&M costs or annual production volume. The R^2 for this model was 0.65, meaning that the volume of water treated explains 65% of the variability in total O&M costs.

19. American Water Works Association, 2011, *Water Quality & Treatment: A Handbook on Drinking Water*, Sixth Edition, J.K. Edzwald (ed.), New York , McGraw-Hill.
20. The other unfiltered systems treating groundwater—disinfection only and no treatment—were not included in the analysis.
21. Statistics Canada, Environment Accounts and Statistics Division, 2011, Survey of Drinking Water Plants, special tabulation.

Note to data users regarding the regression models and confidence bands

The variable of interest in this study, total annual O&M costs, is related to the independent variable, annual production volume in megalitres; however, this relationship does not satisfy the assumptions needed for fitting a linear regression model. Thus transformations were applied to the data and it was determined that ln(total annual O&M costs) is linearly related to ln(annual production volume) and this relationship satisfies the assumptions for using ordinary least squares estimates of the regression parameters. Regression models were then developed to show the estimated average annual total O&M costs for a given annual production volume.

The confidence bands shown in the charts were obtained using the output of SAS PROC REG and are the Working-Hotelling 95% confidence bands for the true regression line relating the expected O&M costs of all plants to the volume of water they treat annually. In order to preserve confidentiality, the estimated average annual O&M costs and the confidence bands extend beyond the minimum and maximum observed values for treated volume used to develop the model. The data presented in the charts result from application of the models to arbitrary values of annual water volumes in order to illustrate the relationship between annual production volumes and annual O&M costs.

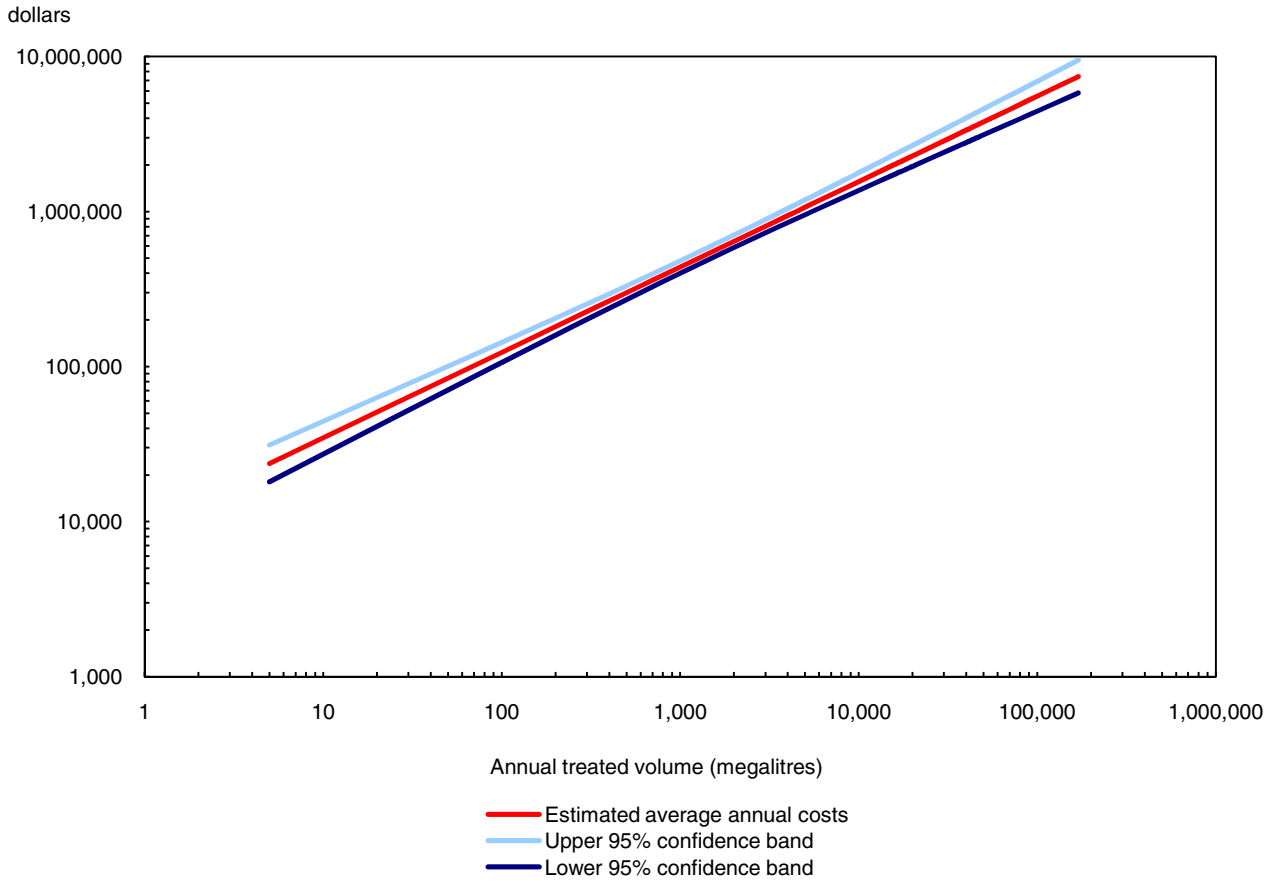
When the models are applied to estimate ln(cost) for a given ln(volume), the estimation is more accurate the closer the ln(volume) is to the mean ln(volume) treated by the plants used in the development of the model. The models are more accurate in estimating O&M costs for small volumes and less accurate for estimating costs for large volumes.

The Survey of Drinking Water Plants was a census of plants serving at least 300 people. Only the data from plants that responded were used in this study. The plants that responded to the survey were assumed to have been selected by stratified simple random sampling. The model was estimated using both a design-based approach (SUDAAN procedure REGRESS) and a model-based approach (SAS procedure REG with a WEIGHT statement), with nearly identical results.

Model results for conventional plants treating surface water

Chart 5 illustrates the model estimates for O&M costs associated with a range of annual production volumes for conventional plants treating surface water. The chart shows that the estimated average annual O&M cost for plants producing 100 megalitres (ML) is about $123,000. The lower and upper confidence bands show that the true average annual O&M cost for all plants producing 100 ML is between $106,000 and $143,000 (with 95% confidence). For plants producing higher volumes, the confidence bands for the annual O&M cost widen. For example, the estimated average annual O&M cost for plants producing 50,000 ML is $3.79 million, with the true figure falling between $3.13 and $4.59 million (with 95% confidence).

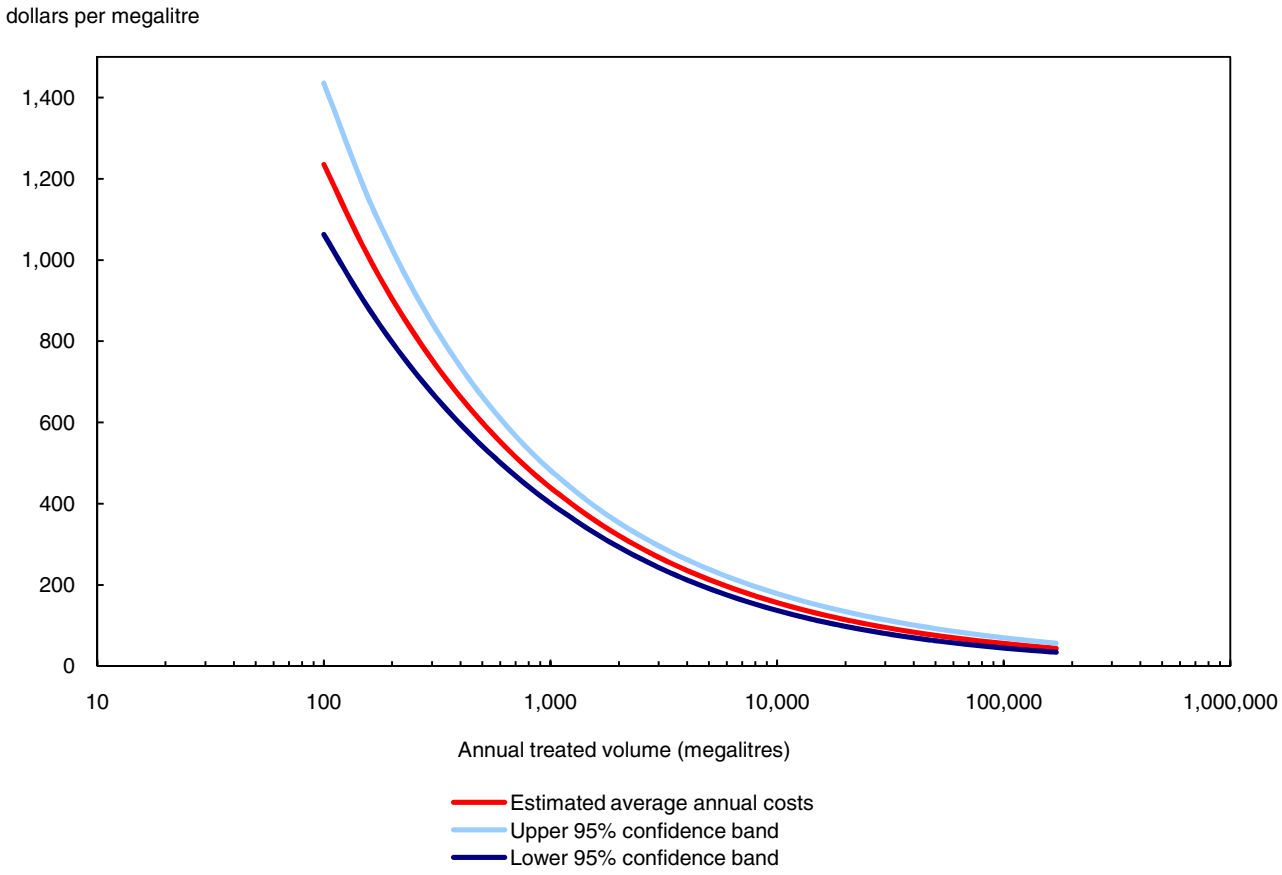
Chart 5
Estimated average annual operation and maintenance costs versus annual treated volume for conventional drinking water plants treating surface water



Note(s): To protect confidentiality, the data presented are application of the model to arbitrary values of annual treated water volumes which extend beyond the range of observations used to develop the model.
Source(s): Statistics Canada, Environment Accounts and Statistics Division, 2011, Survey of Drinking Water Plants, special tabulation.

Using the model, Chart 6 shows the estimated relationship between average O&M costs per ML and total annual production volume for conventional plants treating surface water. The chart shows that the estimated average annual O&M cost per ML for plants producing 100 ML is $1,235/ML, with the true value falling between $1,063/ML and $1,436/ML (with 95% confidence). The cost per ML declines when more water is produced. The estimated average annual O&M cost per ML for plants producing 50,000 ML is just $76/ML.

Chart 6
Estimated average annual operation and maintenance costs per unit of treated water versus annual treated volume for conventional drinking water plants treating surface water



Note(s): To protect confidentiality, data presented are application of the model to arbitrary values starting at 100 ML of annual treated water volumes which extend beyond the maximum observed value used to develop the model.
Source(s): Statistics Canada, Environment Accounts and Statistics Division, 2011, Survey of Drinking Water Plants, special tabulation.

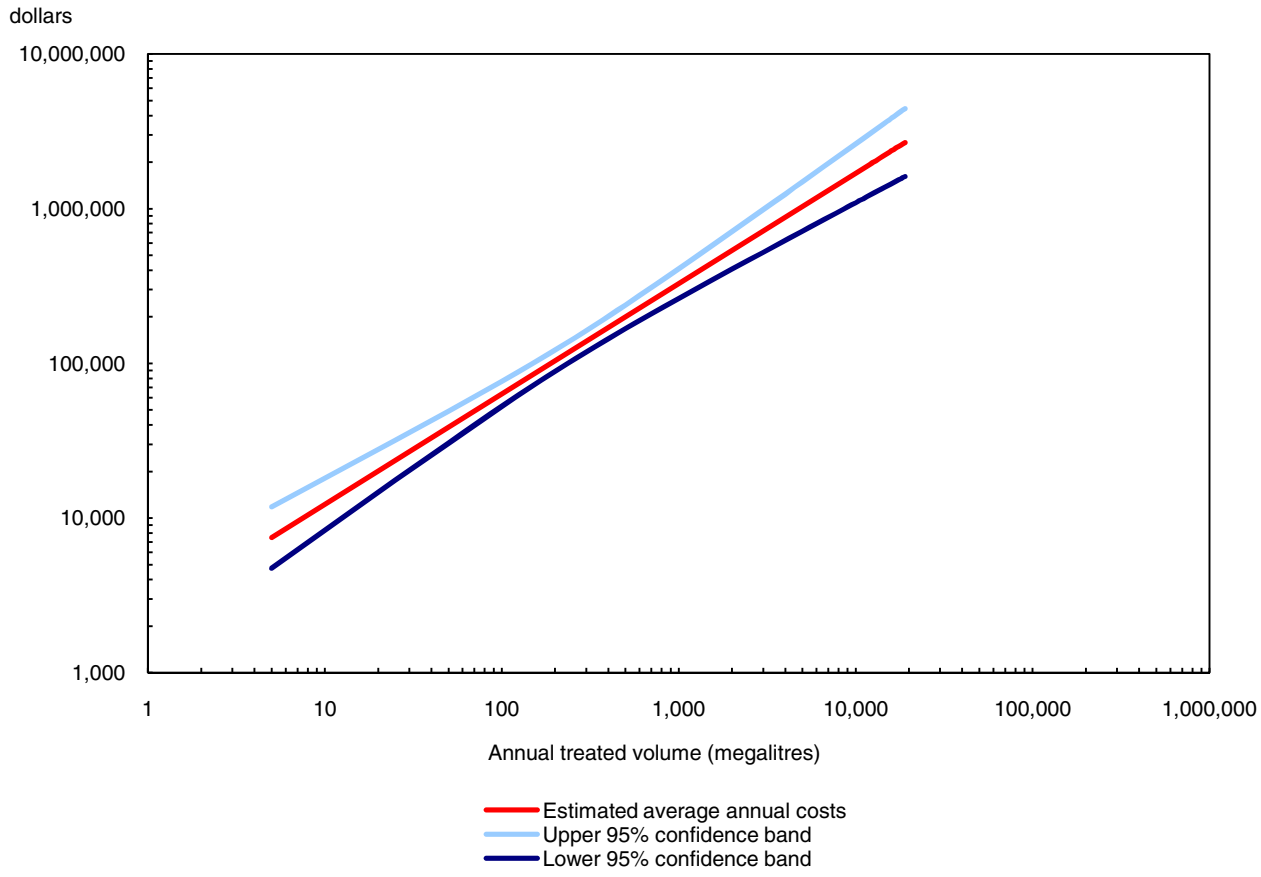
In 2007, the average conventional plant in Canada produced 5,706 ML (15.63 ML per day) and served about 26,000 people.[22] The model estimates O&M costs for this average plant to be $204/ML. This figure increases to $268/ML for plants producing annual volumes half of the average and falls to $147/ML for plants producing annual volumes twice the average.

Model results for unfiltered systems treating groundwater

Chart 7 illustrates results of the model applied to a range of annual production volumes for unfiltered systems treating groundwater. The chart shows that the estimated average annual O&M cost for plants producing 100 ML is $63,000, with the true value falling between $52,000 and $76,000 (with 95% confidence).

22. Statistics Canada, Environment Accounts and Statistics Division, 2011, Survey of Drinking Water Plants, special tabulation.

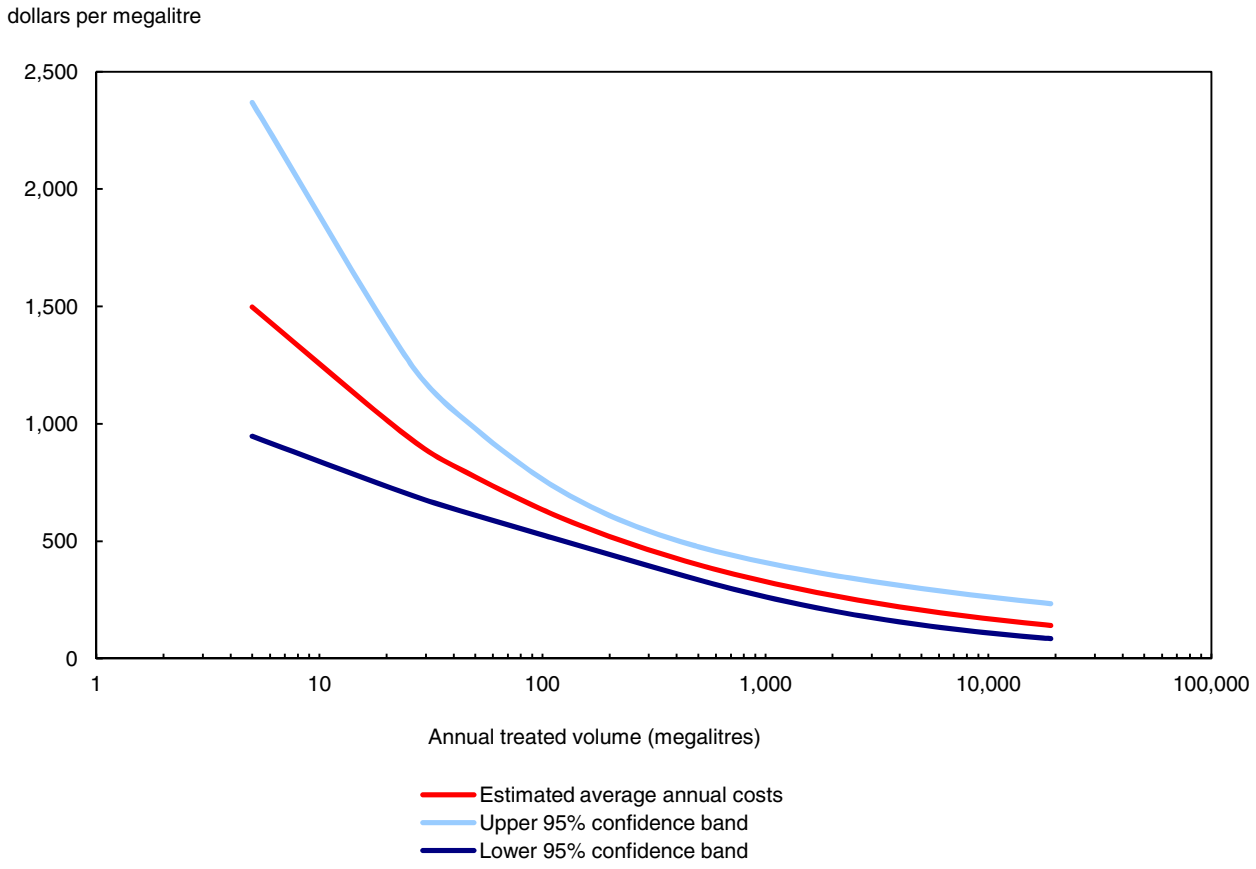
Chart 7
Estimated average annual operation and maintenance costs versus annual treated volume for unfiltered systems treating groundwater



Note(s): To protect confidentiality, data presented are application of the model to arbitrary values of annual treated water volumes which extend beyond the range of observations used to develop the model.
Source(s): Statistics Canada, Environment Accounts and Statistics Division, 2011, Survey of Drinking Water Plants, special tabulation.

Chart 8 shows the estimated relationship between O&M costs per ML and total annual production volume for unfiltered systems treating groundwater. The estimated average annual O&M cost per ML for plants producing 100 ML is $635/ML, with the true value falling between $527/ML and $764/ML (with 95% confidence).

Chart 8
Estimated average annual operation and maintenance costs per unit of treated water versus annual treated volume for unfiltered systems treating groundwater



Note(s): To protect confidentiality, data presented are application of the model to arbitrary values of annual treated water volumes which extend beyond the range of observations used to develop the model.
Source(s): Statistics Canada, Environment Accounts and Statistics Division, 2011, Survey of Drinking Water Plants, special tabulation.

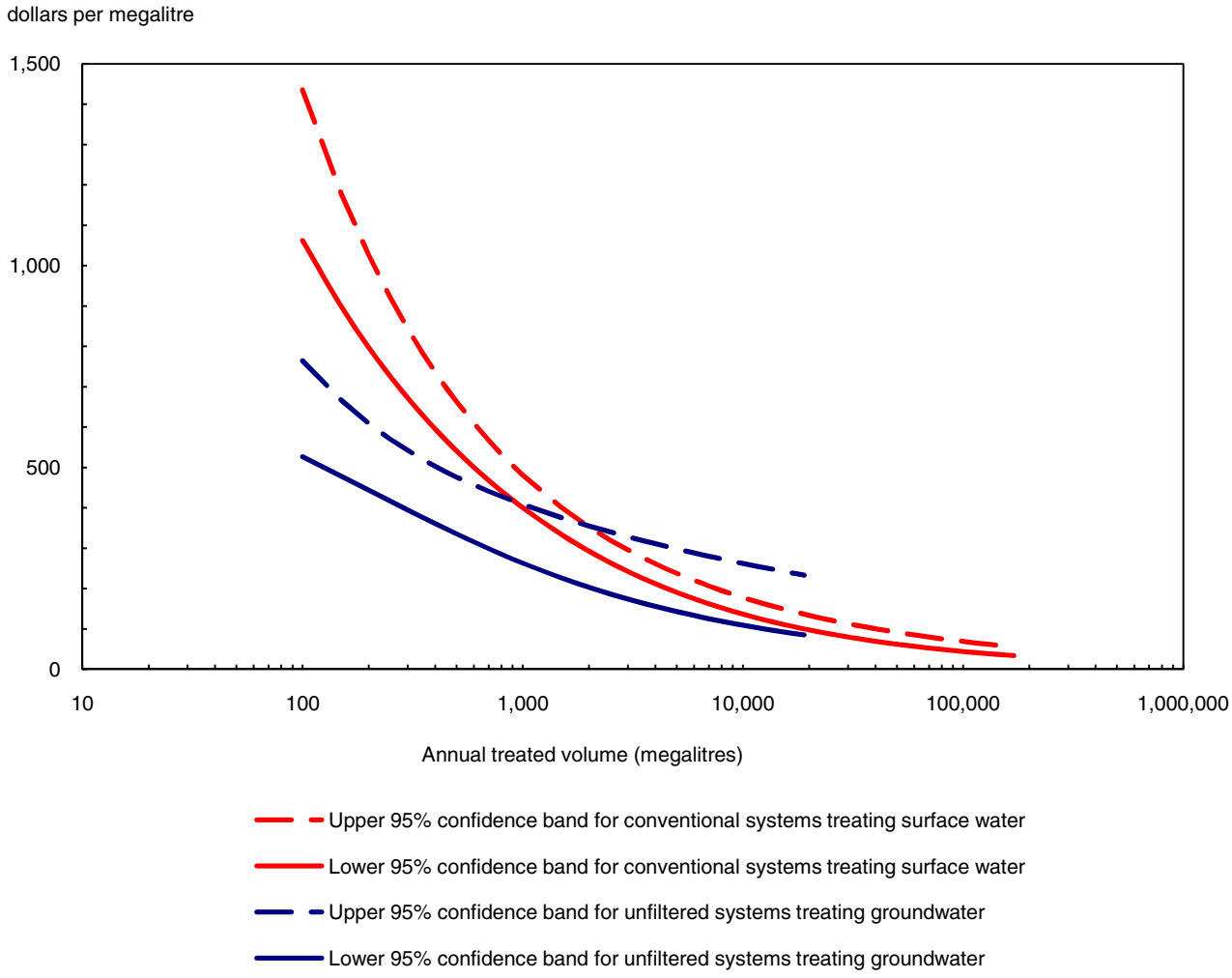
In 2007, the average unfiltered system treating groundwater in Canada produced 817 ML (2.24 ML per day) and served about 5,000 people.[23] The model estimates O&M costs for this average plant to be $350/ML, a figure which increases to $426/ML for plants producing annual volumes half of the average and falls to $287/ML for plants producing annual volumes two times the average.

Annual O&M costs to treat surface water versus groundwater for the selected systems

Chart 9 shows the upper and lower confidence bands for the two selected systems studied.

23. Statistics Canada, Environment Accounts and Statistics Division, 2011, Survey of Drinking Water Plants, special tabulation.

Chart 9
Estimated average annual operation and maintenance costs per unit of treated water versus annual treated volume for the selected treatment systems



Note(s): To protect confidentiality, data presented are application of the model to arbitrary values starting at 100 ML of annual treated water volumes which extend beyond the maximum observed value used to develop the model.
Source(s): Statistics Canada, Environment Accounts and Statistics Division, 2011, Survey of Drinking Water Plants, special tabulation.

The models suggest that O&M costs per ML for treating surface water are higher than those treating groundwater for annual production volumes lower than 900 ML, the point where the upper limit for groundwater meets the lower limit for surface water (with 95% confidence).

Application of the regression models shows how O&M costs vary by treatment process applied and source water type for various levels of annual production volumes. The model results provide context for the survey data, which indicate that the average O&M cost for all conventional plants was $161/ML.[24] The model described in this article shows that O&M costs for conventional plants treating surface water can vary significantly from this average, moving

24. Statistics Canada, 2009, *Survey of Drinking Water Plants*, *2005 to 2007*, Catalogue no. 16-403-X, Table *19*.

from $1,400/ML to $35/ML for the range of annual production volumes of 100 ML to 170,000 ML as shown in Chart 9.

Similarly, for unfiltered systems treating groundwater, the model shows that O&M costs can vary from $764/ML to $85/ML for the range of annual production volumes of 100 ML to 19,000 ML. The average O&M cost from the aggregated survey data for all unfiltered systems was $128/ML.[25]

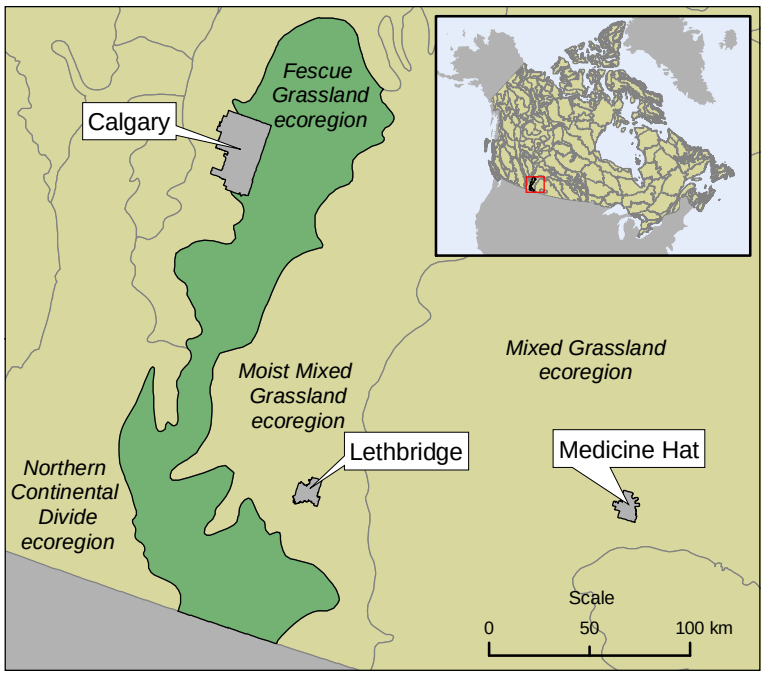
25. Statistics Canada, 2009, *Survey of Drinking Water Plants*, *2005 to 2007*, Catalogue no. 16-403-X, Table *19*.

Ecoregion profile: Fescue Grassland

Michelle-Anne Auger, Hugo Larocque and Doug Trant, Environment Accounts and Statistics Division

The Fescue Grassland ecoregion is located in Alberta and covers an area of more than 14,900 km^2. This is smaller than the average Canadian ecoregion of 45,000 km^2. The Fescue Grassland ecoregion is part of the Prairie ecozone and it extends from Calgary in the north and across the U.S border in southern Alberta (Map 2).

Map 2
Fescue Grassland ecoregion



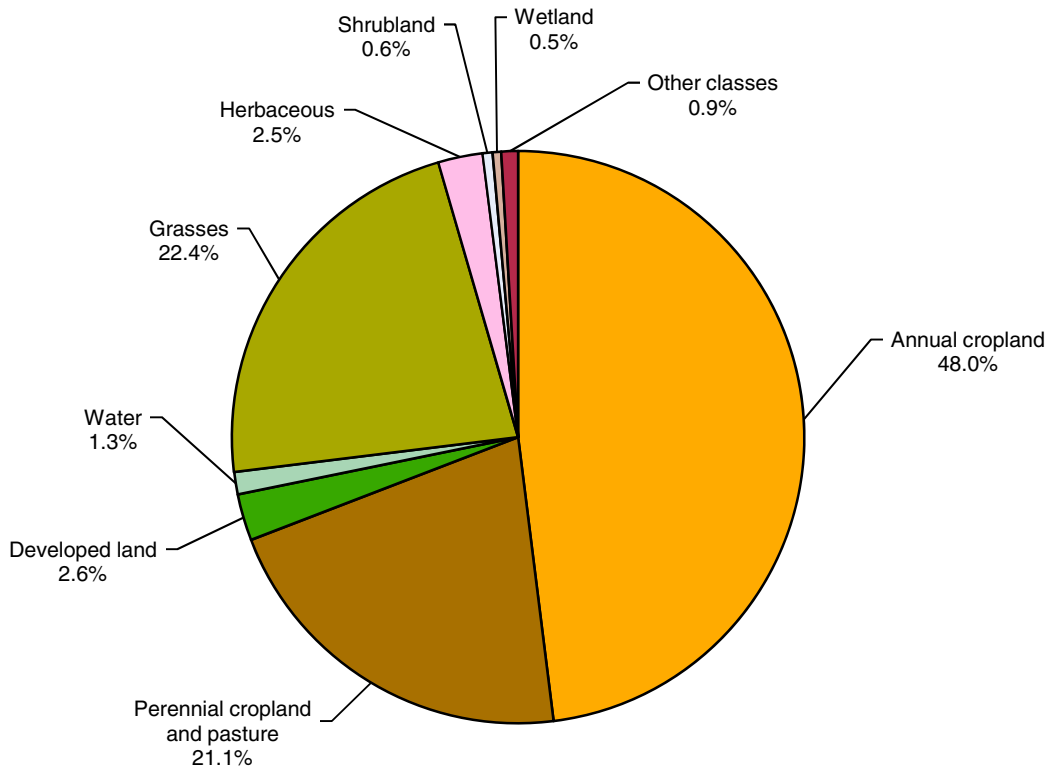
Source(s): Agriculture and Agri-Food Canada, 2008, *A National Ecological Framework for Canada*, http://sis.agr.gc.ca/cansis/nsdb/ecostrat/intro.html (accessed February 19, 2010).

The Fescue Grassland ecoregion was the sixth most densely populated ecoregion in Canada in 2006, with 50 persons per km^2. The population was 746,000 people in 2006, representing a 133.2% increase over 1971 (Table 3). The main population centres in the ecoregion include Cardston, High River and a portion of Calgary.

The Fescue Grassland ecoregion lies in the Chinook[26] climatic belt of southwestern Alberta along the face of the Rocky Mountain foothills. This grassland community is dominated by rough fescue with lesser quantities of Parry oat grass, June grass, and wheat grass. Grazing and tillage have disturbed most of the native land cover in this region. Soils that have formed in the region are deep black with high organic matter due to the combination of favourable climate over thousands of years, grassland vegetation and geology. Sixty-four percent of the region is classified as dependable agricultural land, representing 2.1% of Canada's total stock of dependable agricultural land (Table 3).

The dominant land cover in the ecoregion is crops and pasture, making up 69.1% of the surface area (Chart 10, Map 3, Table 3). Grasses cover 22.4% of the ecoregion, followed by developed land (2.6%), herbaceous cover (2.5%) and water (1.3%).

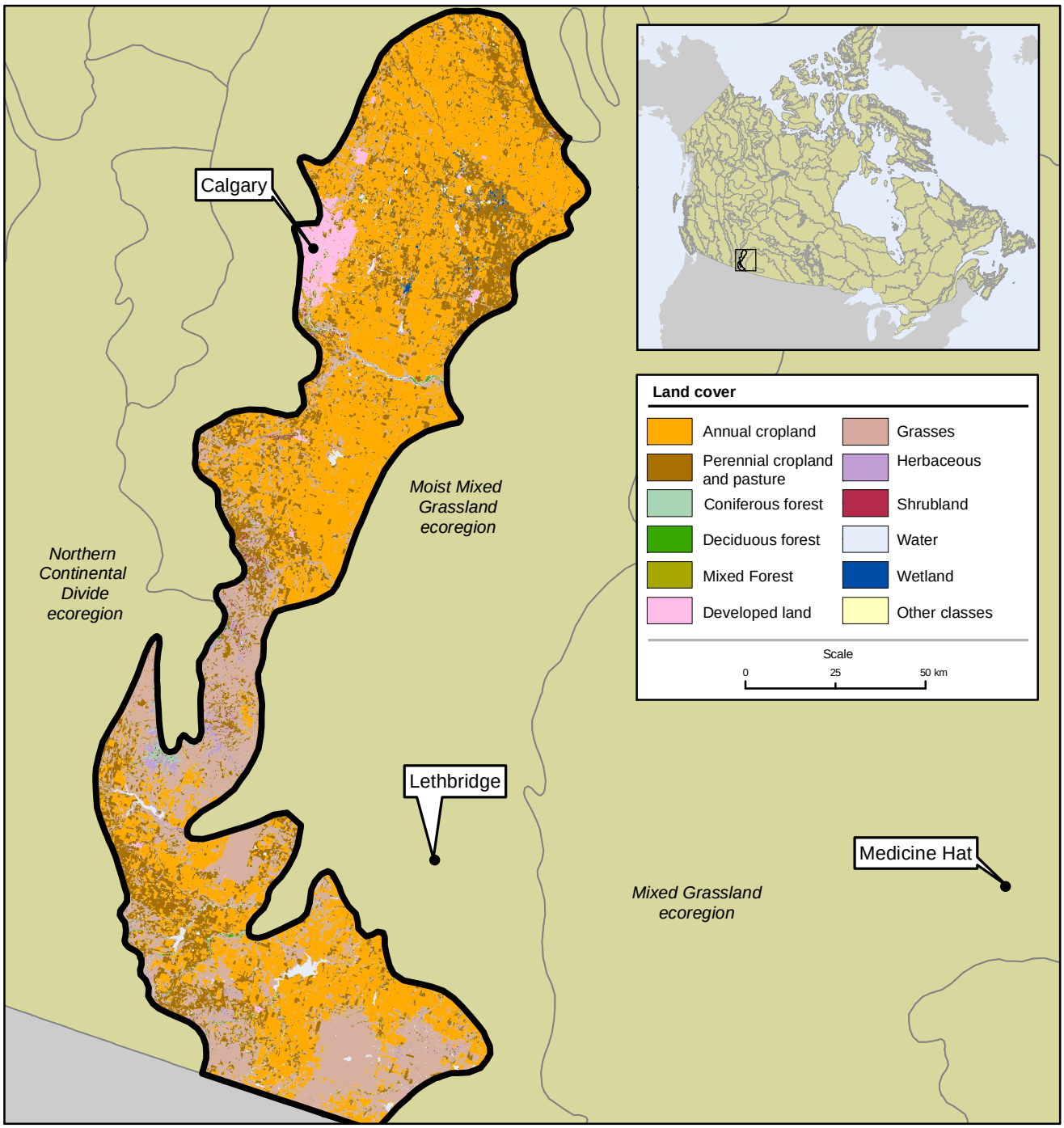
Chart 10
Fescue Grassland ecoregion, land cover by type, circa 2000



Note(s): 'Developed land' includes built-up areas, lawns, road surfaces, industrial sites and farmsteads. 'Other' refers to unclassified land types due to shadow and clouds in the satellite imagery, as well as barren land, rock, forest and exposed land. Land cover is based on LANDSAT satellite data from 1996 to 2003.
Source(s): Natural Resources Canada, 2009, *Land cover, Circa 2000 - Vector*, Earth Sciences Sector, *www.geobase.ca/geobase/en/data/landcover/index.html* (accessed October 8, 2009).

26. A warm dry wind which blows east of the Rocky Mountains.

Map 3
Land cover, Fescue Grassland ecoregion, circa 2000



Source(s): Natural Resources Canada, 2009, *Land Cover, Circa 2000-Vector (LCC2000-v)*, Earth Sciences Sector, www.geobase.ca (accessed October 8, 2009).
Agriculture and Agri-Food Canada, 2008, *A National Ecological Framework for Canada*, http://sis.agr.gc.ca/cansis/nsdb/ecostrat/intro.html (accessed February 19, 2010).

Table 3
Fescue Grassland ecoregion

	Fescue Grassland ecoregion	Canada	Percentage share of Canada total
Total area (km²)	**14,926**	**9,976,182**	**0.1**
Land cover circa 2000 [1, 2]			
Annual cropland (km²)	7,167	..	…
Perennial cropland and pasture (km²)	3,155	..	…
Developed land (km²)	393	..	…
Water (km²)	188	..	…
Grasses (km²)	3,350	..	…
Herbaceous (km²)	375	..	…
Shrubland (km²)	83	..	…
Wetland (km²)	74	..	…
Other classes (km²)	140	..	…
Agricultural land			
Area of dependable agricultural land [3] (km²)	9,556	454,630	2.1
Proportion of area in dependable land (percent)	64.0	4.6	…
Population			
Population in 1971 (number)	320,006	21,568,310	1.5
Population in 1981 (number)	463,129	24,343,181	1.9
Population in 1991 (number)	560,616	27,296,859	2.1
Population in 1996 (number)	602,453	28,846,761	2.1
Population in 2001 (number)	671,754	30,007,094	2.2
Population in 2006 (number)	746,296	31,612,895	2.4
Population density in 2006 (people/km²)	50.0	3.2	…
Change in population 1971 to 2006 (percent)	133.2	46.6	…
Labour force by industry, 2001 and 2006			
Primary industries [4] in 2001	23,130	737,630	3.1
Primary industries [4] in 2006	30,575	762,460	4.0
Change in primary industries [4] (percent)	32.2	3.4	…
Construction and utilities in 2001	32,080	998,040	3.2
Construction and utilities in 2006	41,685	1,202,045	3.5
Change in construction and utilities (percent)	29.9	20.4	…
Manufacturing in 2001	39,210	2,174,285	1.8
Manufacturing in 2006	37,090	2,005,980	1.8
Change in manufacturing (percent)	-5.4	-7.7	…
Retail and wholesale trade 2001	60,635	2,441,410	2.5
Retail and wholesale trade 2006	66,985	2,656,475	2.5
Change in retail and wholesale trade (percent)	10.5	8.8	…
Transportation and warehousing in 2001	26,395	774,220	3.4
Transportation and warehousing in 2006	28,190	820,195	3.4
Change in transportation and warehousing (percent)	6.8	5.9	…
Information, culture and recreation in 2001	19,990	721,150	2.8

See notes at the end of the table.

Table 3 – continued

Fescue Grassland ecoregion

	Fescue Grassland ecoregion	Canada	Percentage share of Canada total
Information, culture and recreation in 2006	19,540	763,640	2.6
Change in information, culture and recreation (percent)	-2.3	5.9	…
Finance, scientific and real estate services in 2001	49,860	1,877,290	2.7
Finance, scientific and real estate services in 2006	65,900	2,115,165	3.1
Change in finance, scientific and real estate services (percent)	32.2	12.7	…
Educational and health care services in 2001	47,195	2,532,380	1.9
Educational and health care services in 2006	53,950	2,866,790	1.9
Change in educational and health care services (percent)	14.3	13.2	…
Accommodation and food services in 2001	27,550	1,046,045	2.6
Accommodation and food services in 2006	29,260	1,126,695	2.6
Change in accommodation and food services (percent)	6.2	7.7	…
Public administration, management and other services [5] in 2001	45,860	2,274,115	2.0
Public administration, management and other services [5] in 2006	51,395	2,541,725	2.0
Change in public administration, management and other services [5] (percent)	12.1	11.8	…
Industry - not applicable in 2001	2,880	295,510	1.0
Industry - not applicable in 2006	3,155	284,955	1.1
Change in industry - not applicable(percent)	9.5	-3.6	…
Total labour force [6] in 2001	382,430	15,872,070	2.4
Total labour force [6] in 2006	434,860	17,146,135	2.5
Change in total labour force [6] (percent)	13.7	8.0	…
Agriculture			
Area of farmland in 1971 (hectares)	1,269,246	68,662,444	1.8
Area of farmland in 2006 (hectares)	1,320,692	67,586,739	2.0
Change in area of farmland (percent)	4.1	-1.6	…
Farms in 1971 (number)	3,208	366,128	0.9
Farms in 2006 (number)	3,250	229,373	1.4
Change in number of farms (percent)	1.3	-37.4	…
Area of cropland in 1971 (hectares)	491,138	27,828,479	1.8
Area of cropland in 2006 (hectares)	681,678	35,912,247	1.9
Change in area of cropland (percent)	38.8	29.0	…
Irrigated area [7] in 1970 (hectares)	10,014	421,342	2.4
Irrigated area [7] in 2005 (hectares)	32,416	844,975	3.8

See notes at the end of the table.

Table 3 – continued

Fescue Grassland ecoregion

	Fescue Grassland ecoregion	Canada	Percentage share of Canada total
Change in irrigated area [7] (percent)	223.7	100.5	…
Cattle in 1971 (number)	381,078	13,276,308	2.9
Cattle in 2006 (number)	622,384	15,773,527	3.9
Change in number of cattle (percent)	63.3	18.8	…
Grain [8] crop area in 1971 (hectares)	345,763	17,492,970	2.0
Grain [8] crop area in 2006 (hectares)	446,019	16,202,357	2.8
Change in grain [8] crop area (percent)	29.0	-7.4	…
Oilseeds [9] area in 1971 (hectares)	48,192	3,050,889	1.6
Oilseeds [9] area in 2001 (hectares)	89,173	14,968,202	0.6
Change in oilseeds [9] area (percent)	85.0	390.6	…
Gross farm sales (excluding forest products) 2005 (thousands of current dollars)	1,074,557	42,191,981	2.5

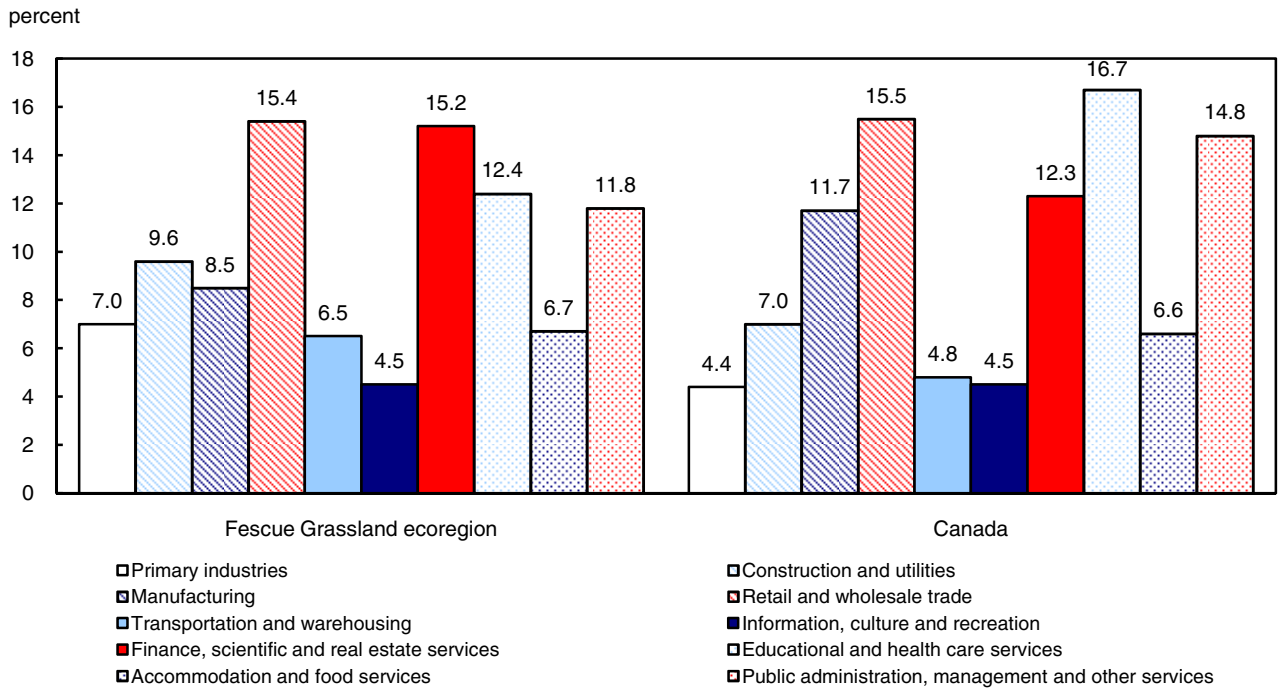
1. Some land cover classes are aggregated. 'Developed land' includes built-up areas, lawns, road surfaces, industrial sites and farmsteads. 'Other' refers to unclassified land types due to shadow and clouds in the satellite imagery, as well as barren land, rock, forest and exposed land. Land cover is based on LANDSAT satellite data from 1996 to 2003.
2. Land cover statistics have not been compiled nationally from this source.
3. Dependable agricultural land is defined as land designated as Class 1, Class 2 and Class 3 by the Canada Land Inventory.
4. Includes agriculture, forestry, fishing and hunting; and mining and oil and gas extraction.
5. Includes management of companies and enterprises; administrative and support, waste management and remediation services; other services (except public administration); and public administration.
6. Figures do not add up to the total due to suppression and random rounding of confidential data.
7. The data for irrigated area are reported for the year preceding the census year.
8. Includes spring and winter wheat, oats, barley, mixed grains, fall and spring rye, grain corn, buckwheat and triticale.
9. Includes canola, flaxseed, mustard seed, sunflowers and safflower.

Source(s): Statistics Canada, CANSIM table 153-0057 (accessed October 8, 2009). Statistics Canada, Census of Population and Census of Agriculture. Statistics Canada, Environment Accounts and Statistics Division, Spatial Environmental Information System. Natural Resources Canada, 2008, *Canada Land Inventory—Land Capability for Agriculture*, Earth Sciences Sector, *www.geogratis.ca/geogratis/en/collection/cli.html* (accessed October 8, 2009). Natural Resources Canada, 2009, *Land Cover, Circa 2000-Vector*, Earth Sciences Sector, *www.geobase.ca/geobase/en/data/landcover/index.html* (accessed October 8, 2009). Agriculture and Agri-Food Canada, 2010, *A National Ecological Framework for Can*ada, *http://sis.agr.gc.ca/cansis/nsdb/ecostrat/intro.html* (accessed February 19, 2010).

More than 434,800 people were employed in the ecoregion in 2006, representing a 13.7% rise over 2001. The national labour force growth rate over the same period was 8.0 % (Table 3). The fastest growing employment category was primary industries (which includes mining and oil and gas extraction industries and agriculture) with a 32.2% rise over 2001. Over the same period employment in manufacturing declined by 5.4% (Table 3). Retail and wholesale trade was the largest employment category in 2006, employing 15.4% of the total labour force, followed by finance, scientific and real estate services at 15.2% and educational and health care services at 12.4% (Chart 11).[27]

27. Not all of Calgary is included in this ecoregion and this may influence reported labour force characteristics.

Chart 11
Labour force by industry, 2006



Note(s): 'Primary industries' includes agriculture, forestry, fishing and hunting; and mining and oil and gas extraction. 'Public administration, management and other services' includes management of companies and enterprises; administrative and support, waste management and remediation services; other services (except public administration); and public administration. Percentages do not add up to 100% due to suppression and random rounding of confidential data.
Source(s): Statistics Canada, Environment Accounts and Statistics Division, 2010, special tabulation of data from the 2006 Census of Population.

The deep organic soils and cool, dry climate of the ecoregion are ideal for animal grazing as well as for the production of grain and oilseed crops. Agriculture in the ecoregion contributed $1.1 billion, or 2.5%, to Canada's total farm sales of $42.2 billion in 2005 (Table 3).

Total farmland area—which includes cropland, summerfallow and pasture lands—increased in the ecoregion from 1.27 million hectares in 1971, to 1.32 million hectares in 2006. In contrast, total farmland area in Canada saw a 1.6% decline over the same period. Between 1971 and 2006, the area of cropland increased by 38.8% in the ecoregion. During the same period the number of cattle rose by 63.3% to 622,384. The area of land irrigated increased by 223.7% to over 32,400 hectares in 2005 (Table 3).

Canadian environment and sustainable development indicators

Table 4
Population indicators

	2004	2005	2006	2007	2008	2009
Population						
Persons [1]	31,940,676	32,245,209	32,576,074	32,929,733	33,315,976	33,720,184
Percent change from previous year	1.0	1.0	1.0	1.1	1.2	1.2
Aged 65 and over (percent of total)	13.0	13.1	13.3	13.5	13.7	13.9
Census metropolitan areas and census agglomerations (percent of total) [2]	..	..	81.1	..	..	..
Density (per square kilometre)	3.5	3.6	3.6	3.7	3.7	3.7

1. Population data is based on the Estimates of Population program, except for data on population in census metropolitan areas and census agglomerations, which is based on the Census of Population.
2. Area consisting of one or more neighbouring municipalities situated around a major urban core. A census metropolitan area must have a total population of at least 100,000 of which 50,000 or more live in the urban core. A census agglomeration must have an urban core population of at least 10,000.

Source(s): Statistics Canada, CANSIM table 051-0001 (accessed February 28, 2011). Statistics Canada, 2007, *Population and Dwelling Count Highlight Tables, 2006 Census*, Catalogue no. 97-550-X2006002.

Table 5
Economy indicators

	2004	2005	2006	2007	2008	2009
Gross Domestic Product (GDP)						
GDP (millions of chained 2002 dollars)	1,211,239	1,247,807	1,283,033	1,311,260	1,318,055	1,285,604
Percent change from previous year	3.1	3.0	2.8	2.2	0.5	-2.5
Per capita (chained 2002 dollars)	37,922	38,697	39,386	39,820	39,562	38,126
Consumer Price Index (2002 = 100)	104.7	107.0	109.1	111.5	114.1	114.4
Unemployment rate (percent)	7.2	6.8	6.3	6.0	6.1	8.3

Source(s): Statistics Canada, CANSIM tables 380-0017, 051-0001, 326-0021 and 282-0002 (accessed March 4, 2011).

Table 6
Social indicators

	2004	2005	2006	2007	2008	2009
Average household spending [1]						
Total (current dollars)	62,464	65,575	67,736	69,946	71,364	71,117
Water and sewage (current dollars)	204	211	221	253	251	259
Electricity (current dollars)	1,040	1,070	1,111	1,147	1,162	1,183
Food (current dollars)	6,772	6,978	7,046	7,305	7,435	7,262
Gasoline and other motor fuels (current dollars)	1,854	2,024	2,079	2,223	2,233	2,218
Personal expenditure on consumer goods and services (millions of chained 2002 dollars)	697,566	723,146	753,263	787,765	810,723	814,344
Residential waste						
Production per capita (kilograms)	386	..	387	..	387	..
Disposal (tonnes)	8,961,583	..	8,893,494	..	8,536,891	..
Disposal per capita (kilograms)	281	..	273	..	256	..
Diversion (tonnes)	3,363,803	..	3,722,843	..	4,360,505	..
Diversion per capita (kilograms)	105	..	114	..	131	..
Diversion rate (percent of waste production)	27	..	30	..	34	..
Distance driven by light vehicles [2] (millions of kilometres)	285,164	289,717	296,871	300,203	294,361	303,576
Asthma (percent of population age 12 and over)	..	8.3	..	8.1	8.4	8.1

1. Data on average household spending is based on the Survey of Household Spending (SHS). For information on the difference between the SHS and personal expenditure data please see: Statistics Canada, 2008, *Guide to the Income and Expenditure Accounts*, Catalogue no. 13-017-X.
2. Distance driven for vehicles weighing less than 4.5 tonnes, excluding the territories.

Source(s): Statistics Canada, CANSIM tables 203-0001, 203-0003, 203-0002, 203-0007, 380-0017, 153-0041, 153-0042, 051-0001, 405-0063 and 105-0501 (accessed March 4, 2011).

Table 7
Energy indicators

	2004	2005	2006	2007	2008	2009
Primary energy availability (terajoules)	11,527,500	11,307,113	11,176,879	11,969,050	11,179,124	10,962,914
Primary and secondary energy						
Exports (terajoules)	9,810,695	9,641,137	9,833,549	10,308,635	10,265,704	8,816,828
Residential consumption (terajoules)	1,313,015	1,296,644	1,243,425	1,336,452	1,356,259	1,316,207
Established reserve						
Crude bitumen (closing stock, [1] millions of cubic metres)	1,660	1,620	3,340	3,500	4,300	4,220
Crude oil (closing stock, [1] millions of cubic metres)	603.8	752.3	712.6	721.8	688.8	..
Natural gas (closing stock, [1] billions of cubic metres)	1,497.5	1,553.7	1,577.7	1,534.3	1,671.2	..
Recoverable reserves						
Coal (closing stock, [1] millions of tonnes)	4,666.3	4,560.4	4,468.8	4,395.1	4,331.5	..
Uranium (closing stock, [1] tonnes)	444,000	431,000	423,400	482,000	447,000	..
Electricity generation						
Total (megawatt hours)	571,291,905	597,810,875	585,097,531	603,572,420	601,719,256	575,414,339
Hydro-electric (percent of total)	58.7	60.1	60.0	60.6	62.0	63.1
Nuclear (percent of total)	14.9	14.5	15.8	14.6	14.7	14.8
Fossil fuel and other fuel combustion (percent of total)	26.4	25.4	24.2	24.8	23.3	22.1

1. The size of the reserve at year-end.

Source(s): Statistics Canada, CANSIM tables 128-0009, 153-0012, 153-0013, 153-0014, 153-0017, 153-0018, 153-0019, 127-0001 and 127-0002 (accessed March 4, 2011).

Table 8
Environment and natural resources indicators

	2004	2005	2006	2007	2008	2009
Greenhouse gas (GHG) emissions (megatonnes of carbon dioxide equivalent (CO_2eq))	741	731	718	750	734	..
GHG emissions per capita (tonnes of CO_2eq)	23.2	22.7	22.0	22.8	22.0	..
GHG emissions by final demand						
Total household [1] (megatonnes of CO_2eq)	423	415	411 [p]	..	..	..
Total household per capita (tonnes of CO_2eq)	13.2	12.9	12.6 [p]	..	..	..
Direct household [2] (megatonnes of CO_2eq)	110	111	109 [p]	..	..	..
Indirect household [3] (megatonnes of CO_2eq)	313	304	302 [p]	..	..	..
Exports (megatonnes of CO_2eq)	277	274	264 [p]	..	..	..
Value of selected natural resources						
Land (millions of current dollars)	1,227,819	1,367,002	1,532,193	1,708,196	1,824,120	1,891,438
Timber (millions of current dollars)	311,771	283,572	265,747	246,713	236,556	192,660
Subsoil resource stocks (millions of current dollars)	566,179	805,761	931,530	941,765	1,543,864	914,173
Average farm pesticide expenditures (current dollars)	7,602	7,792	8,268	9,147	11,361	11,572
Air quality [4]						
Ozone (population weighted, parts per billion)	36	40	38	39	37	..
$PM_{2.5}$ (population weighted, micrograms per cubic metre)	9	10	8	8	8	..

1. Total household greenhouse gas emissions are the sum of direct plus indirect household greenhouse gas emissions.
2. Direct household greenhouse gas emissions include all greenhouse gas emissions due to energy use in the home and for private motor vehicles.
3. Indirect household greenhouse gas emissions are those business-sector emissions due to the production of the goods and services purchased by households. An estimate of the greenhouse gas emissions from foreign companies due to the production of the imported goods purchased by Canadian households is included.
4. Ground level ozone and fine particulate matter ($PM_{2.5}$) are two key components of smog that have been linked to health impacts ranging from minor respiratory problems to hospitalizations and premature death. Exposure studies indicate that adverse health effects can occur even with low concentrations of these pollutants in the air. Annual data are revised, based on the latest release of the Canadian Environmental Sustainability Indicators report.

Source(s): Statistics Canada, CANSIM tables 051-0001, 153-0046, 378-0005 and 002-0044 (accessed February 28, 2011). Environment Canada, 2010, *National Inventory Report 1990-2008: Greenhouse Gas Sources and Sinks in Canada*, Catalogue no. En81-4/2008E-PDF. Environment Canada, 2010, *Environmental Indicators - Air Quality Data*, *www.ec.gc.ca/indicateurs-indicators/default.asp?lang=en&n=B1385495-1#air1_en* (accessed February 28, 2011). Statistics Canada, Environment Accounts and Statistics Division, Material and Energy Flow Accounts.

Updates

New releases

Survey of Drinking Water Plants

Additional data from the Survey of Drinking Water Plants are now available at the national level, by source water type and treatment category for the 2005, 2006 and 2007 reporting years.

Released March 23, 2011. For more information, or to enquire about the concepts, methods or data quality of this release, contact the information officer (613-951-0297; fax: 613-951-0634; *environ@statcan.ca*), Environment Accounts and Statistics Division.

Survey of Industrial Processes – Retail gasoline outlets, 2009

The survey of industrial processes (SIP) is a pilot survey that was conducted to assess the feasibility of collecting data on operational activities and engineering processes of small and medium enterprises (SME) across Canada. For the 2009 reference period, the SIP pilot survey covered all retail gasoline outlets, including marinas with gas docks, across Canada. This release focuses on general statistics relating to equipment, processes, and activities reported by retail gasoline outlets at the national level. As a proof of concept Statistics Canada is currently assessing the utility of the data collected from this pilot survey for estimating environmental outcomes such as gasoline evaporative losses from this SME sector of the Canadian economy. Outcomes and estimates will be published in an upcoming report.

Released March 23, 2011.

Environment Accounts and Statistics Product Catalogue

Environment Accounts and Statistics Division is Statistics Canada's focal point for the collection, analysis and dissemination of environmental information. This reference guide briefly describes the division's programs, as well as all publications and electronic products offered on a quarterly, annual, biennial and occasional basis.

Released March 17, 2011 (Statistics Canada Catalogue no. *16-257-X*).

Households and the Environment, 2009

Statistics Canada conducts the Households and the Environment Survey every two years to measure household behaviours with respect to the environment. The survey collects information that can be used to measure changes in environmental practices at the household level. The subjects examined include energy and water conservation, drinking water source and treatment, radon awareness and testing, indoor and outdoor air quality, and the use and disposal of potentially hazardous household substances.

Released March 9, 2011 (Statistics Canada Catalogue no. *11-526-X*).

New developments

Industrial Water Survey, 2009

Statistics Canada recently completed the data collection phase of the biennial Industrial Water Survey. The survey gathered information on the intake and discharge of water by three groups of industries during 2009: manufacturing, mining and thermal-electric generating industries. It collected information on sources of water, purposes for which the water was used, whether water was re-circulated or re-used, where the water was discharged and what treatments were used. It also collected information on water acquisition costs, treatment costs and operating and maintenance expenses related to water intake and discharge.

Currently the data are being processed and the final report is scheduled for release in the fall.

Results from the 2007 version of the survey are found here: *Industrial Water Use, 2007*.

CANSIM tables and updates

CANSIM is Statistics Canada's key socio-economic database.

Updates have been made to the following CANSIM tables:

CANSIM table 153-0041, Disposal of waste, by source, Canada, provinces and territories, every two years

CANSIM table 153-0042, Materials diverted, by source, Canada, provinces and territories, every two years

CANSIM table 153-0043, Materials diverted, by type, Canada, provinces and territories, every two years

CANSIM table 153-0044, Business sector characteristics of the waste management industry, Canada, provinces and territories, every two years

CANSIM table 153-0045, Local government characteristics of the waste management industry, Canada, provinces and territories, every two years

CANSIM table 153-0059, Households and the environment survey, use of energy-saving lights, Canada and provinces, every two years

CANSIM table 153-0060, Households and the environment survey, use of thermostats, Canada and provinces, every two years

CANSIM table 153-0062, Households and the environment survey, dwelling's main source of water, Canada and provinces, every two years

CANSIM table 153-0063, Households and the environment survey, primary type of drinking water consumed, Canada and provinces, every two years

CANSIM table 153-0066, Households and the environment survey, treatment of drinking water, Canada and provinces, every two years

CANSIM table 153-0098, Households and the environment survey, knowledge of radon and testing, Canada and provinces, every two years

Summary tables and updates

The following summary tables have been added to the Statistics Canada website:

Disposal and diversion of waste, by province and territory

Waste disposal by source, province and territory

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Symbols

The following standard symbols are used in Statistics Canada publications:

.	not available for any reference period
..	not available for a specific reference period
...	not applicable
0	true zero or a value rounded to zero
0s	value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
p	preliminary
r	revised
x	suppressed to meet the confidentiality requirements of the *Statistics Act*
E	use with caution
F	too unreliable to be published

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