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Canada's watersheds: The demographic basis for an urban-rural dialogue

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Highlights

- ◆ Seventy percent of Canada's population resides in very highly urban and highly urban watersheds. In Ontario, over 6 million individuals occupy just one watershed.
- ◆ The population in very highly urban watersheds increased 45 percent from 1981 to 2001. This represents an increase of over 3 million individuals. Meanwhile, highly rural watersheds saw an increase of only four percent, representing an increase of a little over 9,000 individuals.
- ◆ Most of Canada's rural residents live in watersheds where they are in the minority. An urban-rural dialogue will be a particularly important part of the protocol to manage the water resources within these watersheds.

Introduction

Community sustainability is a major focus for rural policy advocates. One of these key aspects is environmental stewardship and interdependence. Another theme being discussed in policy circles is the extent and importance of the connectivity and mutual interdependence of rural and urban areas of Canada.

Canada's water supply is a fundamental issue for both these policy initiatives. Environmental stewardship is central to the provision of water in sufficient quantity and of a suitable quality for Canada's agricultural, industrial, commercial, recreational and domestic requirements. Most

natural and artificial water bodies within Canada are located in rural areas and the provision and maintenance of this supply is often viewed as the responsibility of rural citizens. With much of this water supply consumed by industrial and domestic use within Canada's cities, water supply also constitutes one important facet of the fundamental interconnectivity of rural and urban areas of Canada.

This bulletin groups watersheds according to the share of their population that is designated as "census rural" in order to profile the rural versus urban demographic structure of watersheds across



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Canada. This is the first time that the demographics of Canada's watersheds have been studied in the Rural and Small Town Canada bulletin series and the intention here is to provide "baseline" data upon which further analytical work can be based and which will help inform the policy debate surrounding the preservation and utilization of Canada's fresh water.

A watershed is defined as an area of land that drains precipitation through a particular river system or group of river systems. In other words it is a region of interconnected waterways which functions as a single system. It is this concept of a unified system, in which upstream activities affect downstream quantity and quality, that makes using river drainage basins as the geographic unit of analysis desirable when conducting any analysis of Canada's water supply.

How many watersheds are inhabited solely by rural residents? How many watersheds are characterized by a majority of rural residents? How many watersheds are inhabited by a vast majority of people living in larger urban centres? Which watersheds are experiencing large population growth? Answers to these questions will help both rural and urban stakeholders to see the relative size of their population group that should be taking an interest in land and water issues in their watershed.

Background

It is generally accepted that Canada has abundant fresh water. The popular image of Canada is a vast land of pristine fresh water lakes and monumental glaciers providing a limitless supply of pure water to our homes, farms and businesses. The reality is somewhat different. In many areas, Canada is facing a scarcity of water.

One in four municipalities faced incidents of water shortages between 1994 and 1999. Despite

this, Canadians are some of the most gluttonous water users with Canadian city dwellers using 326 litres of water per day, twice that of the average European urbanite (Brandes and Reynolds, 2004). It is becoming increasingly clear that some form of water conservation is required.

Infrastructure Canada (2004) found that one of the key challenges to sustainable water use within Canada was high population growth focused on large metropolitan centres which dramatically increased the need for expanded and upgraded water infrastructure in these areas. Canada's large metropolitan centres are no longer traditional, compact urban areas. The expansion of Canada's cities is underlined by Hofmann *et al* (2005) who found that between 1971 and 2001 the urban population increased from 16 million to 24 million and urbanization consumed over 15,000 square kilometres of land. The presence of this "urban sprawl" creates unprecedented water and sewer infrastructure challenges. As a partial result of these challenges, water infrastructure maintenance and repair is often put off in favour of infrastructure expansion into new communities on the urban fringe (Infrastructure Canada, 2004).

Using watersheds as the geographic basis for water management has been extensively advocated by professional, academic and community groups (see for instance Cochrane (2005) and Watersheds of Alberta (2002)). The importance of using watersheds as the basis for policy initiatives has been accepted by most provincial governments in Canada.

To protect sources of drinking water, the Ontario provincial government is developing legislation that would require source protection plans, jointly formulated and implemented on a watershed basis by the stakeholders in that watershed, to be prepared throughout Ontario (Ontario Ministry of the Environment, 2003). This legislation followed from recommendations made during the public inquiry after the tragedy that occurred in Walkerton, Ontario in 2000, when seven people

died and 2,300 others became ill from contaminated drinking water.

In fall 2002, the Quebec provincial government introduced 'integrated watershed management' as a major course of action in the Quebec water policy. This initiative is rooted in an ecosystem approach to management that uses the watershed as a water quality planning unit.

The Saskatchewan provincial government established the Saskatchewan Watershed Authority on October 1, 2002. This authority consolidated the water management components of Saskwater, Saskatchewan Environment and the Saskatchewan Wetland Conservation Corporation.

Box 1. Data and definitions

Data source

This work uses data from the 2003 annual statistics of Human Activity and the Environment (Statistics Canada, 2003) which is a compendium of statistics related to water resources and water use in Canada. The data on the census rural and census urban population for each watershed is taken from the Appendix to this report.

Definition of census rural

Statistics Canada defines census rural areas as those outside of urban areas of 1,000 or more inhabitants with a density of 400 or more persons per square kilometre (Statistics Canada, 2002).

Watersheds

Statistics Canada delineates watersheds at varying scales throughout Canada. At the smallest scale, there are 10 drainage basins that represent the watersheds of Canada's major rivers such as the St. Lawrence, Mackenzie and Fraser rivers. At the largest scale there are 1,104 drainage sub-sub-basins. For this bulletin, we have chosen to portray the rural versus urban demographic structure for the 164 sub-basins delineated by Statistics Canada in 2000 and 2003. These are essentially the drainage areas of the smaller (second tier) rivers that flow into Canada's major rivers. The drainage sub-basins will be referred to as watersheds throughout this bulletin.

Although there are 164 of these watersheds in Canada, we wanted to be able to roll up our demographic profile by province and territory. Thus, if a watershed existed on both sides of a provincial or territorial boundary, two watersheds were created for statistical purposes. In consequence, the bulletin refers to 206 watersheds within provincial and territorial boundaries. However, the land area within each watershed that crosses a provincial or territorial boundary has not been allocated to each province or territory and thus our discussion of land area is at the Canada level only and consequently refers to 164 watersheds.

This bulletin divides watersheds according to the share of the census rural population within each watershed. Throughout the bulletin the following terminology for watersheds is used:

Very highly urban: Less than 10 percent of their population designated census rural
Highly urban: 10 percent to 24.9 percent of their population designated census rural
Moderately urban: 25 percent to 49.9 percent of their population designated census rural
Moderately rural: 50 percent to 74.9 percent of their population designated census rural
Highly rural: 75 percent or more of their population designated census rural

Watersheds: The numbers

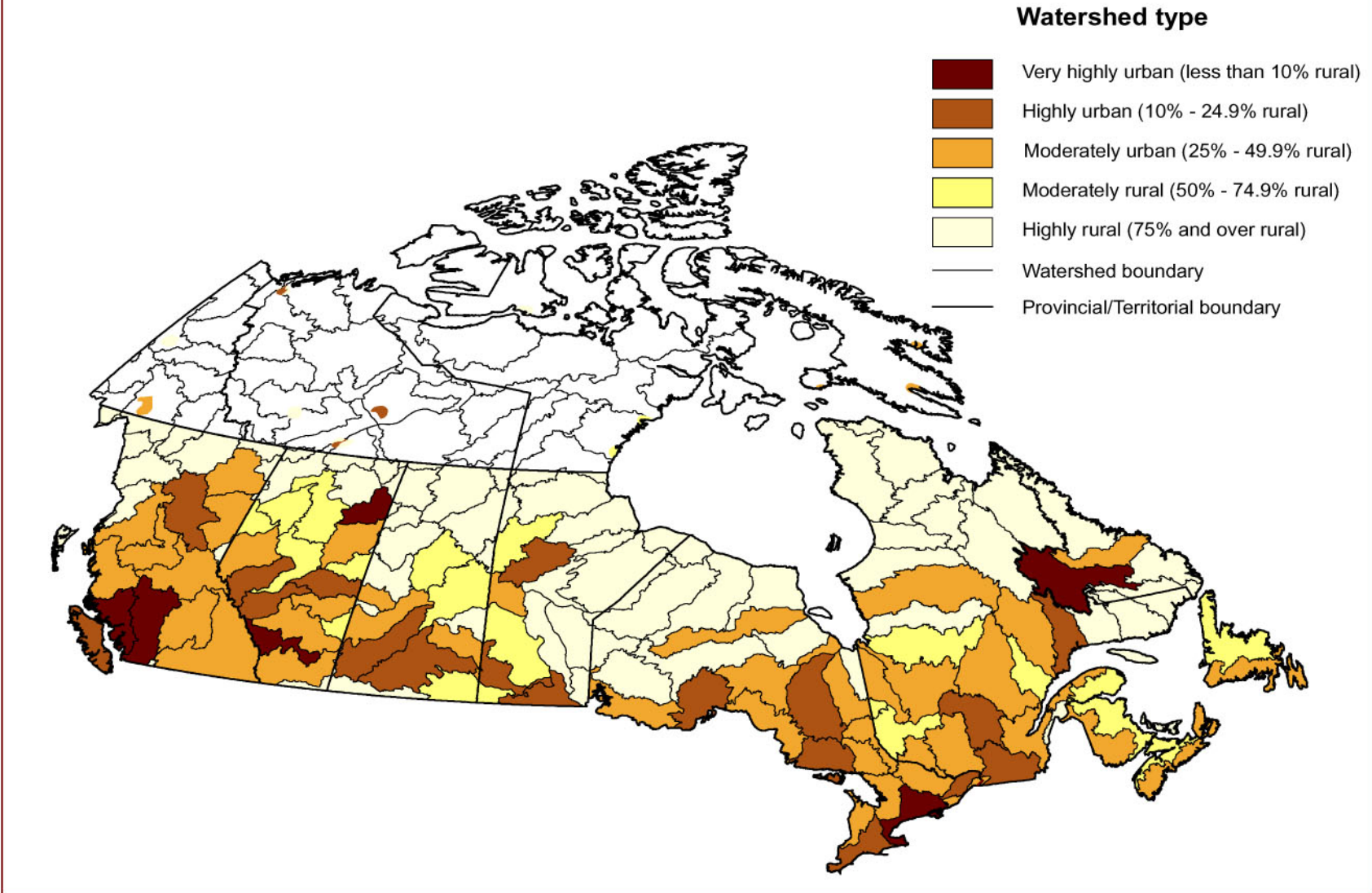
As mentioned in Box 1, Canada's watersheds were divided according to the share of residents that were designated as "census rural". Using this designation, there are six very highly urban watersheds in Canada (Map 1 and Table 1). These represent 3 percent of Canada's watersheds. In addition there are 21 highly urban watersheds, representing 10 percent of all watersheds.

In contrast, over one-half of all watersheds in Canada are highly rural (109 watersheds). The

Northwest Territories contain over one-quarter of all highly rural watersheds. Together, the three Territories account for fully 44 percent of these watersheds. Ontario possesses 6 percent of all highly rural watersheds.

Note that many of the watersheds are dissected by provincial or territorial boundaries. Where this happens, the demographic characteristics have been calculated separately on each side of the border (Box 1). Note also that Map 1 shows only the major population clusters in the three Territories.

Map 1. Canada's watersheds, by the degree of rurality of the population, 2001



Source: Statistics Canada, Human Activity and the Environment, Annual Statistics, 2003.

Map produced by Spatial Analysis and Geomatics Applications (SAGA), Agriculture Division, Statistics Canada, 2005.

Table 1. Number of watersheds by watershed type, Canada and provinces, 2001

| | Watershed type | | | | | Total |
|---------------------------|--|--------------------------------------|--|--|-------------------------------------|------------|
| | Very highly urban (less than 10% rural) | Highly urban (10% to 24.9% rural) | Moderately urban (25% to 49.9% rural) | Moderately rural (50% to 74.9% rural) | Highly rural (75% or more rural) | |
| | Number of sub-drainage basins | | | | | |
| Newfoundland and Labrador | 1 | 0 | 2 | 1 | 3 | 7 |
| Prince Edward Island | 0 | 0 | 0 | 1 | 0 | 1 |
| Nova Scotia | 0 | 0 | 2 | 1 | 0 | 3 |
| New Brunswick | 0 | 0 | 1 | 1 | 0 | 2 |
| Quebec | 0 | 3 | 10 | 5 | 13 | 31 |
| Ontario | 1 | 5 | 12 | 1 | 6 | 25 |
| Manitoba | 0 | 3 | 1 | 3 | 10 | 17 |
| Saskatchewan | 0 | 2 | 3 | 3 | 12 | 20 |
| Alberta | 2 | 3 | 5 | 6 | 7 | 23 |
| British Columbia | 2 | 2 | 8 | 0 | 10 | 22 |
| Yukon | 0 | 0 | 1 | 0 | 8 | 9 |
| Northwest Territories | 0 | 3 | 0 | 1 | 28 | 32 |
| Nunavut | 0 | 0 | 1 | 1 | 12 | 14 |
| Canada | 6 | 21 | 46 | 24 | 109 | 206 |
| | Share of all sub-drainage basins within each province (percent) | | | | | |
| Newfoundland and Labrador | 14 | 0 | 29 | 14 | 43 | 100 |
| Prince Edward Island | 0 | 0 | 0 | 100 | 0 | 100 |
| Nova Scotia | 0 | 0 | 67 | 33 | 0 | 100 |
| New Brunswick | 0 | 0 | 50 | 50 | 0 | 100 |
| Quebec | 0 | 10 | 32 | 16 | 42 | 100 |
| Ontario | 4 | 20 | 48 | 4 | 24 | 100 |
| Manitoba | 0 | 18 | 6 | 18 | 59 | 100 |
| Saskatchewan | 0 | 10 | 15 | 15 | 60 | 100 |
| Alberta | 9 | 13 | 22 | 26 | 30 | 100 |
| British Columbia | 9 | 9 | 36 | 0 | 45 | 100 |
| Yukon | 0 | 0 | 11 | 0 | 89 | 100 |
| Northwest Territories | 0 | 9 | 0 | 3 | 88 | 100 |
| Nunavut | 0 | 0 | 7 | 7 | 86 | 100 |
| Canada | 3 | 10 | 22 | 12 | 53 | 100 |
| | Share of all sub-drainage basins within each watershed type (percent) | | | | | |
| Newfoundland and Labrador | 17 | 0 | 4 | 4 | 3 | 3 |
| Prince Edward Island | 0 | 0 | 0 | 4 | 0 | 0 |
| Nova Scotia | 0 | 0 | 4 | 4 | 0 | 1 |
| New Brunswick | 0 | 0 | 2 | 4 | 0 | 1 |
| Quebec | 0 | 14 | 22 | 21 | 12 | 15 |
| Ontario | 17 | 24 | 26 | 4 | 6 | 12 |
| Manitoba | 0 | 14 | 2 | 13 | 9 | 8 |
| Saskatchewan | 0 | 10 | 7 | 13 | 11 | 10 |
| Alberta | 33 | 14 | 11 | 25 | 6 | 11 |
| British Columbia | 33 | 10 | 17 | 0 | 9 | 11 |
| Yukon | 0 | 0 | 2 | 0 | 7 | 4 |
| Northwest Territories | 0 | 14 | 0 | 4 | 26 | 16 |
| Nunavut | 0 | 0 | 2 | 4 | 11 | 7 |
| Canada | 100 | 100 | 100 | 100 | 100 | 100 |

Source: Statistics Canada, Human Activity and the Environment, Annual Statistics 2003.

The distribution of Canada's population by watershed

One-third of Canada's population resides in very highly urban watersheds (Table 2). This means that nearly 10 million Canadians live in just six watersheds. A further 37 percent of Canada's population (just over 11 million individuals) resides in highly urban watersheds. This underlines the urban character of Canada's population and the urban pressure in and on specific watersheds.

At the provincial and territorial level, Ontario stands out. Sixty-five percent of Canada's population that resides in very highly urban watersheds are in Ontario. Over 6 million individuals occupy just one watershed covering the greater Toronto area, the Golden Horseshoe and the Niagara Peninsula (Map 1). A further 24 percent of the population in very highly urban watersheds are found in British Columbia (located within two watersheds – covering Greater Vancouver and the Fraser Valley) and another 11 percent are in Alberta (Calgary and Fort

McMurray). It should be noted that the one very highly urban watershed in Newfoundland and Labrador contains less than 14,000 individuals. This watershed covers the towns of Labrador City and Churchill Falls.

One percent of Canada's population resides in highly rural watersheds. Of the total population that resides in these highly rural watersheds, about one-quarter live in Quebec, another one-quarter live in Manitoba and a further one-quarter are in Saskatchewan. Ontario accounts for only 4 percent of the population that resides in this type of watershed. It should be noted that Manitoba and Saskatchewan account for only 4 percent and 3 percent, respectively, of Canada's total population.

Recall that, taken together, the three Territories account for fully 44 percent of the highly rural watersheds. However, due to the sparseness of the population, this preponderance of highly rural watersheds accounts for only 10 percent of the total population that reside in these watersheds throughout Canada.

Table 2. Total population by watershed type, Canada and provinces, 2001

| | Watershed type | | | | | Total |
|---------------------------|---|--------------------------------------|--|--|-------------------------------------|-------------------|
| | Very highly urban (less than 10% rural) | Highly urban (10% to 24.9% rural) | Moderately urban (25% to 49.9% rural) | Moderately rural (50% to 74.9% rural) | Highly rural (75% or more rural) | |
| | Total population | | | | | |
| Newfoundland and Labrador | 13,966 | 0 | 312,778 | 178,576 | 7,610 | 512,930 |
| Prince Edward Island | 0 | 0 | 0 | 135,294 | 0 | 135,294 |
| Nova Scotia | 0 | 0 | 591,882 | 316,125 | 0 | 908,007 |
| New Brunswick | 0 | 0 | 368,440 | 361,058 | 0 | 729,498 |
| Quebec | 0 | 4,691,988 | 2,286,021 | 186,582 | 72,888 | 7,237,479 |
| Ontario | 6,368,255 | 3,189,769 | 1,812,232 | 28,487 | 11,303 | 11,410,046 |
| Manitoba | 0 | 937,609 | 19,823 | 91,327 | 70,824 | 1,119,583 |
| Saskatchewan | 0 | 607,308 | 199,781 | 107,530 | 64,314 | 978,933 |
| Alberta | 1,041,860 | 1,088,701 | 681,040 | 155,244 | 7,962 | 2,974,807 |
| British Columbia | 2,332,520 | 671,918 | 893,446 | 0 | 9,854 | 3,907,738 |
| Yukon | 0 | 0 | 22,900 | 0 | 5,774 | 28,674 |
| Northwest Territories | 0 | 25,394 | 0 | 0 | 11,966 | 37,360 |
| Nunavut | 0 | 0 | 9,759 | 4,726 | 12,260 | 26,745 |
| Canada | 9,756,601 | 11,212,687 | 7,198,102 | 1,564,949 | 274,755 | 30,007,094 |
| | Share of total population within each province (percent) | | | | | |
| Newfoundland and Labrador | 3 | 0 | 61 | 35 | 1 | 100 |
| Prince Edward Island | 0 | 0 | 0 | 100 | 0 | 100 |
| Nova Scotia | 0 | 0 | 65 | 35 | 0 | 100 |
| New Brunswick | 0 | 0 | 51 | 49 | 0 | 100 |
| Quebec | 0 | 65 | 32 | 3 | 1 | 100 |
| Ontario | 56 | 28 | 16 | 0 | 0 | 100 |
| Manitoba | 0 | 84 | 2 | 8 | 6 | 100 |
| Saskatchewan | 0 | 62 | 20 | 11 | 7 | 100 |
| Alberta | 35 | 37 | 23 | 5 | 0 | 100 |
| British Columbia | 60 | 17 | 23 | 0 | 0 | 100 |
| Yukon | 0 | 0 | 80 | 0 | 20 | 100 |
| Northwest Territories | 0 | 68 | 0 | 0 | 32 | 100 |
| Nunavut | 0 | 0 | 36 | 18 | 46 | 100 |
| Canada | 33 | 37 | 24 | 5 | 1 | 100 |
| | Share of total population within each watershed type (percent) | | | | | |
| Newfoundland and Labrador | 0 | 0 | 4 | 11 | 3 | 2 |
| Prince Edward Island | 0 | 0 | 0 | 9 | 0 | 0 |
| Nova Scotia | 0 | 0 | 8 | 20 | 0 | 3 |
| New Brunswick | 0 | 0 | 5 | 23 | 0 | 2 |
| Quebec | 0 | 42 | 32 | 12 | 27 | 24 |
| Ontario | 65 | 28 | 25 | 2 | 4 | 38 |
| Manitoba | 0 | 8 | 0 | 6 | 26 | 4 |
| Saskatchewan | 0 | 5 | 3 | 7 | 23 | 3 |
| Alberta | 11 | 10 | 9 | 10 | 3 | 10 |
| British Columbia | 24 | 6 | 12 | 0 | 4 | 13 |
| Yukon | 0 | 0 | 0 | 0 | 2 | 0 |
| Northwest Territories | 0 | 0 | 0 | 0 | 4 | 0 |
| Nunavut | 0 | 0 | 0 | 0 | 4 | 0 |
| Canada | 100 | 100 | 100 | 100 | 100 | 100 |

Source: Statistics Canada, Human Activity and the Environment, Annual Statistics 203.

Canada's rural population: Many live in "urban" watersheds

At the Canada level, 11 percent of the rural population resides within very highly urban watersheds, while a further 29 percent inhabit highly urban watersheds (Table 3). Only 19 percent of the rural population resides in moderately rural or highly rural watersheds (Table 4). That is, only 19 percent of the rural population live in a watershed where rural residents constitute a majority of the population. In other words, most of Canada's rural residents (81 percent) live in watersheds where they are in the minority. This represents a key demographic fact facing rural residents who need to interact with urban residents to manage issues of water availability and water quality.

Within Ontario, 25 percent of the rural population inhabit very highly urban watersheds (Table 3). Comparable figures are 24 percent for British

Columbia and 10 percent for Alberta. In contrast, 77 percent of the Northwest Territories rural population resides in highly rural watersheds (recall though the very low share of Canada's total population residing in the Northwest Territories). Ontario has the lowest share of rural residents residing in highly rural watersheds (1 percent), although this represents approximately the same number of individuals in the Northwest Territories residing in highly rural watersheds (between 11,000 and 12,000 residents).

When looking at the provincial breakdown of the population within each watershed type (Table 3), it can be seen that Ontario accounts for 68 percent of the total rural population residing within very highly urban watersheds while British Columbia accounts for a further 23 percent and Alberta 9 percent. A meaningful rural-urban dialogue concerning water management issues is particularly appropriate in these provinces.

Table 3. Census rural population by watershed type, Canada and provinces, 2001

| | Watershed type | | | | | Total |
|---------------------------|---|--|---|---|--|------------------|
| | Very highly urban (less than 10% rural) | Highly urban (10% to 24.9% rural) | Moderately urban (25% to 49.9% rural) | Moderately rural (50% to 74.9% rural) | Highly rural (75% or more rural) | |
| | Census rural population | | | | | |
| Newfoundland and Labrador | 744 | 0 | 113,205 | 95,175 | 7,610 | 216,734 |
| Prince Edward Island | 0 | 0 | 0 | 74,619 | 0 | 74,619 |
| Nova Scotia | 0 | 0 | 207,800 | 193,198 | 0 | 400,998 |
| New Brunswick | 0 | 0 | 167,403 | 194,193 | 0 | 361,596 |
| Quebec | 0 | 552,849 | 694,246 | 112,524 | 60,711 | 1,420,330 |
| Ontario | 439,404 | 624,925 | 654,673 | 17,194 | 11,303 | 1,747,499 |
| Manitoba | 0 | 175,889 | 7,793 | 67,047 | 63,533 | 314,262 |
| Saskatchewan | 0 | 137,657 | 90,593 | 65,682 | 55,965 | 349,897 |
| Alberta | 58,519 | 160,757 | 247,560 | 94,849 | 7,962 | 569,647 |
| British Columbia | 144,916 | 137,941 | 305,174 | 0 | 9,854 | 597,885 |
| Yukon | 0 | 0 | 6,057 | 0 | 5,774 | 11,831 |
| Northwest Territories | 0 | 3,563 | 0 | 0 | 11,966 | 15,529 |
| Nunavut | 0 | 0 | 3,247 | 2,549 | 12,260 | 18,056 |
| Canada | 643,583 | 1,793,581 | 2,497,751 | 917,030 | 246,938 | 6,098,883 |
| | Share of rural population within each province (percent) | | | | | |
| Newfoundland and Labrador | 0 | 0 | 52 | 44 | 4 | 100 |
| Prince Edward Island | 0 | 0 | 0 | 100 | 0 | 100 |
| Nova Scotia | 0 | 0 | 52 | 48 | 0 | 100 |
| New Brunswick | 0 | 0 | 46 | 54 | 0 | 100 |
| Quebec | 0 | 39 | 49 | 8 | 4 | 100 |
| Ontario | 25 | 36 | 37 | 1 | 1 | 100 |
| Manitoba | 0 | 56 | 2 | 21 | 20 | 100 |
| Saskatchewan | 0 | 39 | 26 | 19 | 16 | 100 |
| Alberta | 10 | 28 | 43 | 17 | 1 | 100 |
| British Columbia | 24 | 23 | 51 | 0 | 2 | 100 |
| Yukon | 0 | 0 | 51 | 0 | 49 | 100 |
| Northwest Territories | 0 | 23 | 0 | 0 | 77 | 100 |
| Nunavut | 0 | 0 | 18 | 14 | 68 | 100 |
| Canada | 11 | 29 | 41 | 15 | 4 | 100 |
| | Share of rural population within each watershed type (percent) | | | | | |
| Newfoundland and Labrador | 0 | 0 | 5 | 10 | 3 | 4 |
| Prince Edward Island | 0 | 0 | 0 | 8 | 0 | 1 |
| Nova Scotia | 0 | 0 | 8 | 21 | 0 | 7 |
| New Brunswick | 0 | 0 | 7 | 21 | 0 | 6 |
| Quebec | 0 | 31 | 28 | 12 | 25 | 23 |
| Ontario | 68 | 35 | 26 | 2 | 5 | 29 |
| Manitoba | 0 | 10 | 0 | 7 | 26 | 5 |
| Saskatchewan | 0 | 8 | 4 | 7 | 23 | 6 |
| Alberta | 9 | 9 | 10 | 10 | 3 | 9 |
| British Columbia | 23 | 8 | 12 | 0 | 4 | 10 |
| Yukon | 0 | 0 | 0 | 0 | 2 | 0 |
| Northwest Territories | 0 | 0 | 0 | 0 | 5 | 0 |
| Nunavut | 0 | 0 | 0 | 0 | 5 | 0 |
| Canada | 100 | 100 | 100 | 100 | 100 | 100 |

Source: Statistics Canada, Human Activity and the Environment, Annual Statistics 2003.

Table 4. Census rural population by watersheds with a majority urban and majority rural population, Canada and provinces, 2001

| | Watersheds with a majority urban population | | | Watersheds with a majority rural population | | |
|----------------------------------|---|------------------|-------------------------------------|---|------------------|-------------------------------------|
| | Number | Rural population | Share of rural population (percent) | Number | Rural population | Share of rural population (percent) |
| Newfoundland and Labrador | 3 | 113,949 | 52 | 4 | 102,785 | 48 |
| Prince Edward Island | 0 | 0 | 0 | 1 | 74,619 | 100 |
| Nova Scotia | 2 | 207,800 | 52 | 1 | 193,198 | 48 |
| New Brunswick | 1 | 167,403 | 46 | 1 | 194,193 | 54 |
| Quebec | 13 | 1,247,095 | 88 | 18 | 173,235 | 12 |
| Ontario | 18 | 1,719,002 | 98 | 7 | 28,497 | 2 |
| Manitoba | 4 | 183,682 | 58 | 13 | 130,580 | 42 |
| Saskatchewan | 5 | 228,250 | 65 | 15 | 121,647 | 35 |
| Alberta | 10 | 466,836 | 82 | 13 | 102,811 | 18 |
| British Columbia | 12 | 588,031 | 98 | 10 | 9,854 | 2 |
| Yukon | 1 | 6,057 | 51 | 8 | 5,774 | 49 |
| Northwest Territories | 3 | 3,563 | 23 | 29 | 11,966 | 77 |
| Nunavut | 1 | 3,247 | 18 | 13 | 14,809 | 82 |
| Canada | 73 | 4,934,915 | 81 | 133 | 1,163,968 | 19 |

Source: Statistics Canada, Human Activity and the Environment, Annual Statistics 2003.

The relationship between population and area

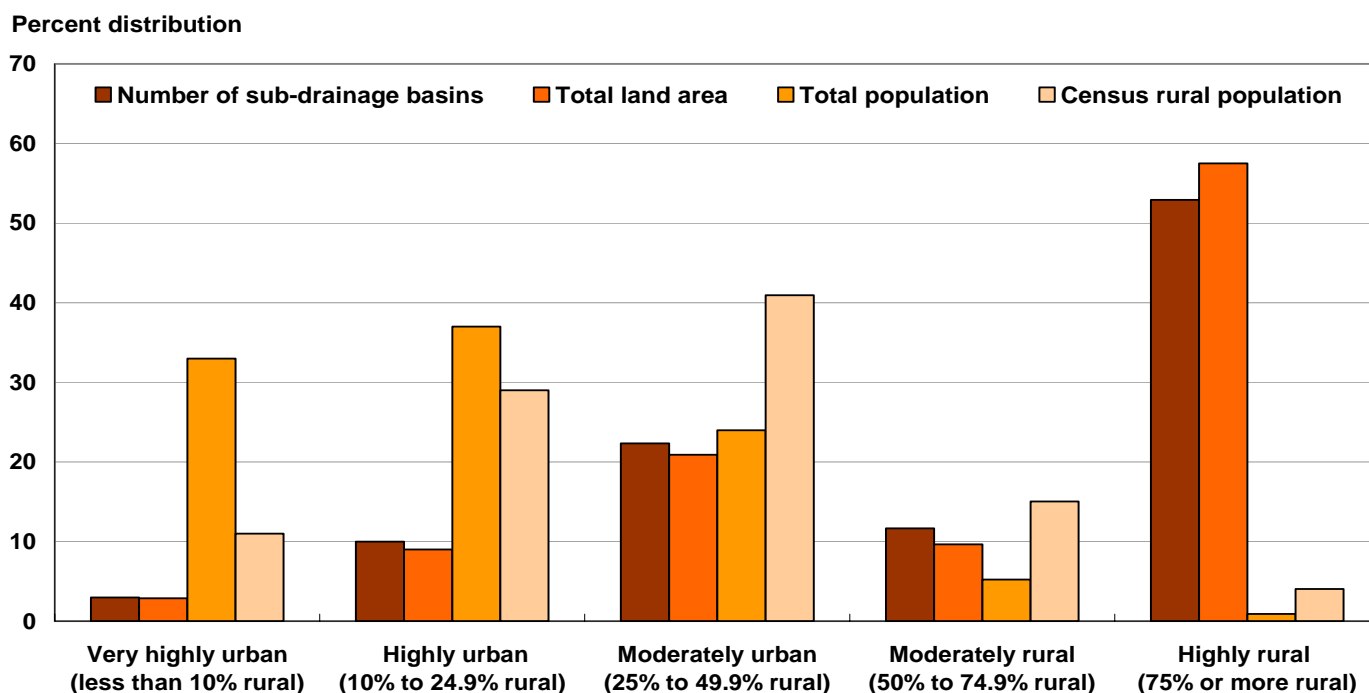
Figure 1 highlights the relationship between the number of watersheds, the area they occupy and the demographic pattern of their residents. Once again, the data is broken down by the share of each watershed's population that is designated "census rural." Because many watersheds transcend provincial and territorial boundaries, data on the area of watersheds are only tabulated at the Canada level (Box 1).

In 2001, 33 percent of Canada's population (representing nearly 10 million individuals) resided in six very highly urban watersheds. These six watersheds occupy only 2.9 percent of Canada's land area. As we have seen, these six

watersheds contain 11 percent of Canada's census rural population. The limited land area helps clarify the importance of a rural-urban dialogue to be part of the protocol in managing the water resources in these watersheds.

At the other end of the scale, 6 percent of Canada's population lives within the 133 moderately rural and highly rural watersheds where the majority of the population is "census rural". Further, these watersheds cover over 57 percent of Canada's land area. The small population numbers, large area and relatively high share of census rural population in these sparsely-populated watersheds imply that a rural-to-rural dialogue, in addition to an urban-rural dialogue, is needed to manage the water resources in these watersheds.

Figure 1 Characteristics of watersheds by watershed type, Canada, 2001



Source: Statistics Canada, Human Activity and the Environment, Annual Statistics, 2003

Change over time

The previous sections have described the rural versus urban demographic profile of Canada’s watersheds as of 2001. This section briefly looks at how these patterns have changed over a 20 year period (1981 to 2001). Once again the watersheds are divided according to the share of the population that is designated “census rural” in 2001. The Northwest Territories and Nunavut have not been shown in this section because the creation of Nunavut and the subsequent political division of some watersheds makes comparison impossible.

At the Canada level, the difference in growth between the more urban watersheds and more rural watersheds is dramatic. The population in the very highly urban watersheds increased 45 percent from 1981 to 2001 (Table 5). This

represents an increase of over 3 million individuals. Again recall that only six watersheds were in this category. Amongst highly urban watersheds the comparable figures were 18 percent and 1.7 million individuals. At the other extreme, highly rural watersheds saw an increase of only 4 percent, representing an increase of little over 9,000 individuals.

At the provincial and territorial level, the very highly urban watersheds in British Columbia increased by 57 percent while those in Alberta increased by 53 percent (representing 850,000 and 360,000 individuals, respectively). The comparable figure for the one very highly urban sub-basin in Ontario was 40 percent. However this represented an increase of over 1.8 million individuals. The one very highly urban sub-basin in Newfoundland and Labrador actually declined by 29 percent – a reduction of 5,700 individuals.

There was a mixed picture with the highly rural watersheds at the provincial and territorial level. Manitoba's population in these watersheds

increased by 30 percent while British Columbia's decreased by 27 percent.

Table 5. Change in total population of watersheds by watershed type, Canada and provinces, 1981 to 2001

| | Watershed type | | | | | Total |
|----------------------------------|---|--------------------------------------|--|--|-------------------------------------|------------------|
| | Very highly urban (less than 10% rural) | Highly urban (10% to 24.9% rural) | Moderately urban (25% to 49.9% rural) | Moderately rural (50% to 74.9% rural) | Highly rural (75% or more rural) | |
| | Change in total population, 1981 to 2001 | | | | | |
| Newfoundland and Labrador | -5,741 | ... | -51,297 | 1,974 | 313 | -54,751 |
| Prince Edward Island | ... | ... | ... | 12,788 | ... | 12,788 |
| Nova Scotia | ... | ... | 34,953 | 25,612 | ... | 60,565 |
| New Brunswick | ... | ... | 22,859 | 10,236 | ... | 33,095 |
| Quebec | ... | 603,808 | 212,946 | -16,010 | -1,668 | 799,076 |
| Ontario | 1,807,832 | 578,488 | 398,548 | -413 | 484 | 2,784,939 |
| Manitoba | ... | 93,852 | -2,429 | -14,262 | 16,181 | 93,342 |
| Saskatchewan | ... | 36,224 | -15,826 | -7,206 | -2,572 | 10,620 |
| Alberta | 362,610 | 225,602 | 125,893 | 22,519 | 459 | 737,083 |
| British Columbia | 850,134 | 167,785 | 148,955 | ... | -3,603 | 1,163,271 |
| Yukon | ... | 6,002 | ... | ... | -481 | 5,521 |
| Canada | 3,014,835 | 1,711,761 | 874,602 | 35,238 | 9,113 | 5,645,549 |
| | Percent change in total population, 1981 to 2001 | | | | | |
| Newfoundland and Labrador | -29 | ... | -10 | 46 | 4 | -10 |
| Prince Edward Island | ... | ... | ... | 10 | ... | 10 |
| Nova Scotia | ... | ... | 6 | 9 | ... | 7 |
| New Brunswick | ... | ... | 7 | 3 | ... | 5 |
| Quebec | ... | 15 | 10 | -8 | -2 | 12 |
| Ontario | 40 | 22 | 28 | -1 | 4 | 32 |
| Manitoba | ... | 11 | -11 | -14 | 30 | 9 |
| Saskatchewan | ... | 6 | -7 | -6 | -4 | 1 |
| Alberta | 53 | 26 | 23 | 17 | 6 | 33 |
| British Columbia | 57 | 33 | 20 | ... | -27 | 42 |
| Yukon | ... | 36 | ... | ... | -8 | 24 |
| Canada | 45 | 18 | 14 | 3 | 4 | 23 |

Note: The creation of Nunavut makes it impossible to accurately calculate the change in population for the area now covered by the Northwest Territories and Nunavut. Consequently these have been excluded from this table.
... not applicable.

Source: Statistics Canada, Human Activity and the Environment, Annual Statistics 2003.

Table 6. Change in census rural population of watersheds by watershed type, Canada and provinces, 1981 to 2001

| | Watershed type | | | | | Total |
|---|--|--------------------------------------|--|--|-------------------------------------|----------------|
| | Very highly urban (less than 10% rural) | Highly urban (10% to 24.9% rural) | Moderately urban (25% to 49.9% rural) | Moderately rural (50% to 74.9% rural) | Highly rural (75% or more rural) | |
| Change in rural population, 1981 to 2001 | | | | | | |
| Newfoundland and Labrador | -197 | ... | -18,238 | 73 | 313 | -18,049 |
| Prince Edward Island | ... | ... | ... | -3,372 | ... | -3,372 |
| Nova Scotia | ... | ... | 9,109 | 11,289 | ... | 20,398 |
| New Brunswick | ... | ... | 17,924 | 489 | ... | 18,413 |
| Quebec | ... | -14,548 | 195 | -10,351 | 470 | -24,234 |
| Ontario | 35,270 | 29,373 | 101,059 | 3,238 | 484 | 169,424 |
| Manitoba | ... | 14,458 | 65 | -10,751 | 14,908 | 18,680 |
| Saskatchewan | ... | -27,949 | -20,514 | -8,457 | 1,670 | -55,250 |
| Alberta | 19,798 | 5,318 | 21,175 | 12,718 | 459 | 59,468 |
| British Columbia | -15,838 | 8,058 | 4,213 | ... | -3,603 | -7,170 |
| Yukon | ... | 3,973 | ... | ... | -481 | 3,492 |
| Canada | 39,033 | 18,683 | 114,988 | -5,124 | 14,220 | 181,800 |
| Percent change in rural population, 1981 to 2001 | | | | | | |
| Newfoundland and Labrador | -29 | ... | -10 | 46 | 4 | -10 |
| Prince Edward Island | ... | ... | ... | -4 | ... | -4 |
| Nova Scotia | ... | ... | 5 | 6 | ... | 5 |
| New Brunswick | ... | ... | 12 | 0 | ... | 5 |
| Quebec | ... | -3 | 0 | -8 | 1 | -2 |
| Ontario | 9 | 5 | 18 | 23 | 4 | 11 |
| Manitoba | ... | 9 | 1 | -14 | 31 | 6 |
| Saskatchewan | ... | -17 | -18 | -11 | 3 | -14 |
| Alberta | 51 | 3 | 9 | 15 | 6 | 12 |
| British Columbia | -10 | 6 | 1 | ... | -27 | -1 |
| Yukon | ... | 191 | ... | ... | -8 | 42 |
| Canada | 6 | 1 | 5 | -1 | 7 | 3 |

Note: The creation of Nunavut makes it impossible to accurately calculate the change in population for the area now covered by the Northwest Territories and Nunavut. Consequently these have been excluded from this table.
... not applicable

Source: Statistics Canada, Human Activity and the Environment, Annual Statistics 2003.

The changes in the rural population over the same 20 year time period, as might be expected, are far less spectacular than those of the total population. It is notable that in percentage terms the rural population increased more in the very highly urban class of watersheds than in any other class with the exception of the highly rural watersheds (Table 6). The rise was 6 percent representing 39,000 individuals. The largest rise in absolute numbers was seen in the moderately urban watersheds (115,000 individuals representing an increase of 5 percent).

At the provincial and territorial level, the rural population increased in all classes of watershed in Ontario and Alberta. In contrast, in Saskatchewan, the rural population declined in all classes of watersheds with the exception of the highly rural.

Demographic change in Canada's most populous watersheds

There was an increase in the total population of the 16 most populous watersheds in Canada. Increases ranged from 9 to 41 percent between 1981 and 2001 (Table 7). In contrast, the percent change in the rural population was much smaller and four of the most populous watersheds actually recorded a decline in their rural population.

It is interesting to note that the watershed with the largest percent increase in total population, the Lower Fraser River, showed a 10 percent decrease in its rural population. It is likely that in this watershed many communities that were designated census rural in 1981 had surpassed the threshold for being designated census urban by 2001. In consequence these were re-assigned as urban by 2001.

Table 7. Change in total and rural population of the most populated watersheds, Canada, 1981 to 2001

| Watershed | 2001 population | | 1981 population | | Change in population: 1981 to 2001 | | Percent change in population: 1981 to 2001 | |
|------------------------------------|-----------------|---------|-----------------|---------|------------------------------------|---------|--|-------|
| | Total | Rural | Total | Rural | Total | Rural | Total | Rural |
| Lake Ontario and Niagara Peninsula | 6,368,255 | 439,404 | 4,560,423 | 404,134 | 1,807,832 | 35,270 | 28 | 8 |
| Central St. Lawrence | 4,516,239 | 525,820 | 3,895,362 | 533,625 | 620,877 | -7,805 | 14 | -1 |
| Northern Lake Erie | 2,032,283 | 381,715 | 1,649,123 | 381,437 | 383,160 | 278 | 19 | 0 |
| Lower Fraser | 1,712,430 | 119,605 | 1,008,559 | 131,958 | 703,871 | -12,353 | 41 | -10 |
| Lower St. Lawrence | 1,155,135 | 309,200 | 1,052,259 | 325,544 | 102,876 | -16,344 | 9 | -5 |
| Bow | 1,024,550 | 57,920 | 670,162 | 38,617 | 354,388 | 19,303 | 35 | 33 |
| Lower Ottawa (Ont.) | 709,610 | 151,036 | 493,691 | 123,890 | 215,919 | 27,146 | 30 | 18 |
| Central North Saskatchewan | 702,226 | 107,360 | 533,508 | 106,973 | 168,718 | 387 | 24 | 0 |
| Eastern Georgian Bay | 682,624 | 228,519 | 410,132 | 178,345 | 272,492 | 50,174 | 40 | 22 |
| Vancouver Island | 665,695 | 136,674 | 496,692 | 128,239 | 169,003 | 8,435 | 25 | 6 |
| Red | 640,410 | 123,790 | 528,217 | 109,953 | 112,193 | 13,837 | 18 | 11 |
| Southern Coastal Waters of B.C. | 620,090 | 25,311 | 473,827 | 28,796 | 146,263 | -3,485 | 24 | -14 |
| Lower Ottawa (Que.) | 483,061 | 177,074 | 364,220 | 133,440 | 118,841 | 43,634 | 25 | 25 |
| Columbia - U.S.A. | 444,638 | 136,686 | 341,572 | 134,482 | 103,066 | 2,204 | 23 | 2 |
| Southeastern Atlantic Ocean | 444,428 | 148,173 | 386,841 | 131,472 | 57,587 | 16,701 | 13 | 11 |
| Central Ottawa | 376,026 | 98,251 | 300,424 | 74,479 | 75,602 | 23,772 | 20 | 24 |

Source: Statistics Canada, Human Activity and the Environment, Annual Statistics 2003.

Conclusion

This work has classified Canada's watersheds according to the degree of rurality of the resident population and investigated some of the attendant demographic characteristics. In doing so, it has cast fresh light on some of the impacts of the increasing urbanization of Canada's population. In particular, we found that, within our most urban watersheds, nearly 10 million people resided in just six watersheds and that these watersheds cover less than 3 percent of Canada's

total area. Moreover, the population of these watersheds increased by 45 percent, or over 3 million individuals, between 1981 and 2001. These facts vividly highlight the challenge faced in supplying this population with adequate supplies of water of an acceptable quality. At the same time, the fact that 11 percent of Canada's rural population occupy these same watersheds points to the need for a meaningful rural/urban dialogue in the management of their water resources.

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