



municipal water use

2004 STATISTICS

INTRODUCTION

Many Canadian communities are growing increasingly concerned about having enough fresh water to meet present and future needs. Such concerns are heightened by the rising demand for clean water (both domestically and throughout the world), growing urban populations, and the anticipated impacts of climate change.

Complicating the issue is the high cost of maintaining, replacing or adding new water and wastewater infrastructure. Understanding how Canadian communities use water is a prerequisite to gauging Canada's progress toward the sustainable use of its water resources. To create proactive policies and programs that promote sustainable water use, policy-makers and resource managers need to know, among other things, how much water municipalities are withdrawing and where this water comes from, how much water is used by different sectors and how efficiently they use it, what water treatments are applied, and how municipalities charge for their water-related services.

This report includes updates of water use statistics (2004 data year) that were last published in a similar report for 2001 data. Also included are wastewater statistics that were not included in the previous report.

The database is compiled using the Canada-wide Municipal Water and Wastewater Survey (MWWS). The predecessor of this survey, the Municipal

Water Use and Pricing survey (MUD/MUP), has been conducted once every two or three years by Environment Canada since 1983. The only national survey of its kind in Canada, the MWWS collects extensive information about municipal water and wastewater services in Canada. The resulting geocoded data can be analyzed in several ways; including, by province and territory, economic sector and size of municipal population.

This report summarizes some of the most important findings of the "use" portion of the 2004 survey, which was carried out in 2005/2006. Some analysis of trends is also included. A companion report, due in the summer of 2007, will focus on water conservation measures, and the financing and pricing of municipal water-related services.¹

An explanation of the terminology used in this report can be found in the glossary.

METHODOLOGY

For 2004, the Municipal Water and Wastewater Survey underwent certain changes from the previous MUD surveys. The one-time infrastructure supplement of the 2001 survey was removed,

¹ Both reports, the 2004 survey questionnaire, and both the municipal water use and the pricing databases (and variable description documents) will be posted on Environment Canada's Freshwater Website at www.ec.gc.ca/water/MWWS. Environment Canada will carry out a new, updated MWWS survey in 2007.



and only a few key infrastructure questions were retained. In addition, measures were introduced to track multiple water distribution and wastewater collection systems in a single municipality. The pricing section of the questionnaire was similarly modified to apply to each system (separately for water and for wastewater), and additional details were requested regarding assessed charges. In order to ease municipal response burden, automated email-forwarding and drill-down search/response capabilities were added to the online survey. This resulted in generally improved response rates. The last major improvement was the addition of a complete web-mapping service to the MWWS website, and the corresponding geo-referencing of water intake and wastewater discharge locations.

The 2004 survey collected useful information from approximately 777 municipalities. All of these communities were among the 1271 surveyed in 2001. Imputing for non-response where possible brought the total survey base

for 2004 to 1418 municipalities, representing 28.9 million Canadians. Response rates to the 2004 survey varied depending on the question (see Table 1).

The survey responses were supplemented with call-backs to large municipalities and Internet searches for readily available information. Some missing records were imputed from data collected in previous years, after adjusting for changes in the population in the intervening years. Where amalgamations had occurred, responses from the constituent municipalities were aggregated to develop the missing values.

Information from all these sources was compiled in the 2004 Municipal Water and Wastewater Survey use database, which was used to generate the statistics for this report. Returns from the 660 surveyed rural communities each having fewer than 1000 residents were included in the database for the first time. Any effect on statistics is negligible due to population weighting. In the

Table 1: Water Flows and Metering Rates, by Province/Territory and Municipal Population

Province/ Territory	Percentage of flow from surface water	Total average daily flow (litres per capita)	Average daily residential flow (litres per capita)	Percentage of residential clients that are metered	Percentage of business clients that are metered
Newfoundland & Labrador	93.6	780	501	0.0	49.4
P.E.I.	0.0	569	238	1.5	93.1
Nova Scotia	90.8	546	321	93.3	98.6
New Brunswick	58.8	1384	438	47.8	82.1
Quebec	92.4	848	424	16.0	34.9
Ontario	85.8	481	260	92.0	98.2
Manitoba	91.8	466	219	96.7	96.7
Saskatchewan	86.3	516	303	98.2	98.9
Alberta	94.8	488	271	88.6	98.9
British Columbia	88.3	649	426	29.8	87.1
Yukon	44.8	932	645	8.0	100.0
N.W.T.	100.0	437	257	97.2	100.0
Nunavut	100.0	134	113	76.1	14.8
Municipal Population					
Under 1000	60.4	777	429	38.7	55.5
1000 - 2000	55.6	668	436	43.4	50.4
2000 - 5000	59.4	946	497	34.3	51.3
5000 - 50 000	75.2	701	433	49.2	72.4
50 000 to 500 000	85.1	555	305	62.3	88.1
More than 500 000	99.3	589	291	73.2	84.4
Total, 2004	88.4	609	329	63.3	83.0
Responding Population	24 109 650	25 454 421	25 333 378	25 698 580	20 960 777
Total, 2001	89.2	622	335	60.6	83.1
Responding Population	21 634 144	23 822 869	23 822 869	24 235 565	16 075 854

Source: Municipal Water and Wastewater Survey use database, Sustainable Water Management Division, Environment Canada. Data is aggregated to municipal level and imputed for non-response using previous MUD surveys.

Table 2: Residential Water Services, by Province/Territory and Municipal Population

Province/ Territory	Number of responding municipalities	Total population of responding municipalities	Population Served Water Distribution	As % of responding population	Population Served Water Treatment	As % of responding population
Newfoundland & Labrador	72	365 881	328 338	89.7	276 378	75.5
P.E.I.	9	64 942	55 654	85.7	45 196	69.6
Nova Scotia	34	650 157	497 128	76.5	432 270	66.5
New Brunswick	134	614 514	368 013	59.9	316 306	51.5
Quebec	382	6 693 073	6 171 115	92.2	5 755 495	86.0
Ontario	223	11 854 992	10 692 439	90.2	10 395 886	87.7
Manitoba	62	931 478	832 089	89.3	823 546	88.4
Saskatchewan	91	675 144	645 953	95.7	634 478	94.0
Alberta	147	2 926 493	2 654 159	90.7	2 594 525	88.7
British Columbia	120	3 529 465	3 404 824	96.5	2 712 445	76.9
Yukon	4	24 472	20 260	82.8	1 160	4.7
N.W.T.	7	32 038	28 223	88.1	28 223	88.1
Nunavut	9	19 114	16 510	86.4	5 886	30.8
Municipal Population						
Under 1000	44	32 517	21 689	66.7	11 886	36.6
1000 - 2000	359	512 089	311 565	60.8	207 697	40.6
2000 - 5000	356	1 162 112	836 945	72.0	558 144	48.0
5000 - 50 000	450	6 058 998	4 639 786	76.6	3 829 751	63.2
50 000 - 500 000	74	9 630 056	9 114 750	94.6	8 641 038	89.7
More than 500 000	11	10 985 991	10 789 972	98.2	10 773 280	98.1
Total, 2004	1294	28 381 763	25 714 706	90.6	24 021 797	84.6
Total, 2001	1271	26 697 669	24 199 535	90.6	22 414 062	84.0

Source: Municipal Water and Wastewater Survey use database, Sustainable Water Management Division, Environment Canada. Data is aggregated to municipal level and imputed for non-response using previous MUD surveys.

imputed version of the database, the source of each record (survey, imputed value, etc.) is indicated, meaning that non-imputed totals or averages can be obtained, if desired.

In the 2004 survey, the phrasing of key questions followed as closely as possible that of previous years so as not to obscure any emerging trends. Consequently, the estimates presented in this report, as developed from the raw data, mostly conform to those of recent past surveys.

Most water statistics presented in this report are weighted by the population served to make them more representative of the Canadian population. Similarly, wastewater statistics are weighted by the population served by sanitary sewers.

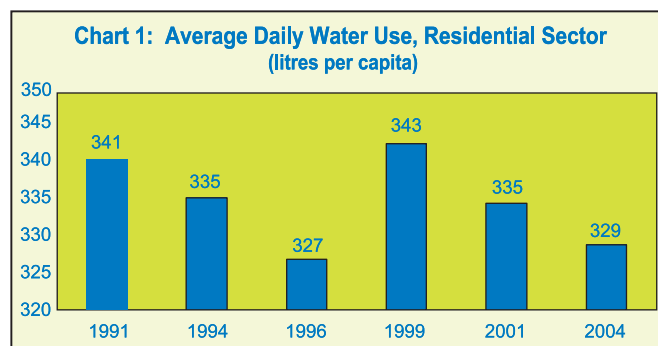
SURVEY HIGHLIGHTS

AVERAGE PER CAPITA RESIDENTIAL WATER USE WAS THE SECOND LOWEST IN OVER A DECADE.

In 2004, average residential water use per person dropped slightly to 329 litres per day, from 335 in 2001 (see Chart 1). This is the second lowest per

capita water use since the 1991 survey. This positive trend notwithstanding, Canadians still rank among the largest consumers of water among OECD countries.

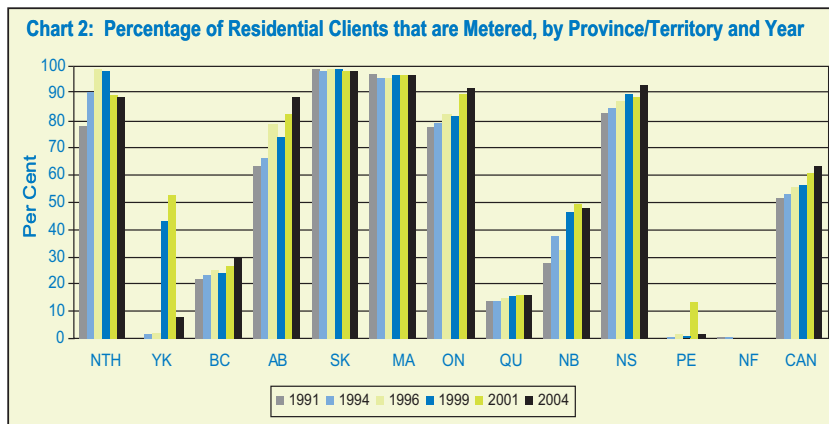
The survey's water use results generally indicate that people living in larger communities use less water than do those living in smaller population centres. For example, residential per capita water use ranged from 291 litres per day in municipalities with a population of 500 000 or more, to 497 litres per day in municipalities with a population between 2000 and 5000 (see Table 1).



THE PERCENTAGE OF CANADIAN RESIDENCES EQUIPPED WITH WATER METERS CONTINUES TO GROW.

One factor that may explain the declining rate of residential water use is the introduction of more appropriate incentives for water conservation, such as water metering and, by inference, volume-based pricing. By 2004, 63% of Canadian residences served by municipal water systems were metered, up from 61% in 2001 (see Chart 2). The latest figures continue the steady upward trend in metering established during the previous decade.

The survey results also show that, as in previous years, homes in larger communities are more likely to be equipped with water meters than



those in smaller communities (see Table 1). In 2004, the percentage of metered homes ranged from a low of 34% in municipalities with 2000 to 5000 people, to a high of 73% in municipalities with more than 500 000 people. Table 1 also shows that as the number of metered homes in a community increases, water use per capita decreases.

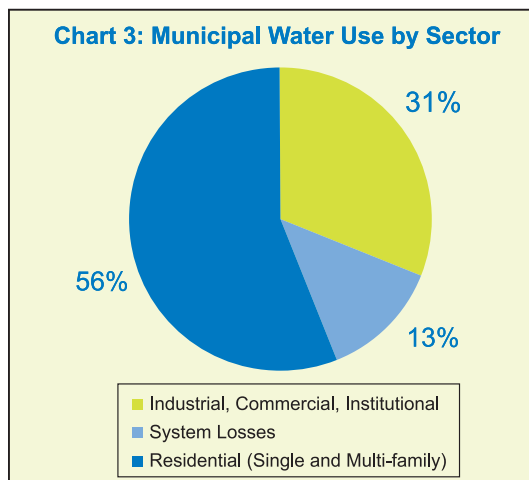
Furthermore, all surveys since at least 1991 indicate that, both nationally and provincially, Canadians use more water when they are charged a flat rate. The 2004 survey shows that in municipalities that charged according to the volume of water used (using 100% metering as a proxy²), the average daily consumption rate was 266 litres per person. In communities that charged a flat or fixed rate (using 0% metering as

a proxy³), the corresponding figure was 76% higher (467 litres per person). These findings continue to suggest that metering and volume-based pricing can be valuable demand-management tools for promoting the responsible use of water resources.

AS MUNICIPALITIES GROW AND THE COMMERCIAL AND INDUSTRIAL SECTORS EXPAND, THE RESIDENTIAL SHARE OF TOTAL WATER USE DECREASES.

In 2004, 56% of all the water used by responding municipalities (representing some 24.3 million Canadians) was consumed by households; this figure remains unchanged from 2001. Commercial and industrial users accounted for 31% of the total (unchanged from 2001), while the remaining

13% went to other uses or was lost in the system, generally due to leaks (See Chart 3). The survey results also show that as municipalities get larger, a progressively smaller portion of the water flows to the residential sector, and progressively more is used by the commercial/industrial sector or is lost in the system. For example, in municipalities with fewer than 2000 residents, 70% of the water went to residential users, on average, while in municipalities with more than 500 000 residents the residential share dropped to 52% (see Table 3).



² That is, using data only from those municipalities that supplied all their customers with water meters, and assuming that any charges for water in these communities were based, at least in part, on the amount of water used.

³ That is, using data only from those municipalities that supplied none of their customers with water meters, and assuming that all customers were billed a fixed charge, regardless of the amount of water they consumed.

Table 3: Water Use (as a Percentage of Water Served), by Province/Territory, by Sector, and Responding Population

Province/ Territory	Residential (%)	Commercial/ Industrial (%)	System Losses (%)	Responding Population
Newfoundland & Labrador	70.7	22.8	6.5	290 638
P.E.I.	40.5	45.5	14.0	49 959
Nova Scotia	59.5	24.6	16.0	479 484
New Brunswick	53.7	37.2	9.1	348 370
Quebec	53.8	26.1	20.1	6 041 380
Ontario	54.3	33.4	12.3	9 775 278
Manitoba	54.2	36.6	9.2	818 193
Saskatchewan	55.7	29.5	14.8	633 420
Alberta	57.7	34.7	7.6	2 520 340
British Columbia	65.9	26.5	7.6	3 259 536
Yukon	68.1	31.9	0.0	19 299
N.W.T.	57.5	31.5	11.0	25 183
Nunavut	78.6	15.6	5.8	7 152
Municipal Population				
Under 1000	71.5	22.2	6.3	19 650
1000 - 2000	70.0	24.0	6.0	236 932
2000 - 5000	67.2	26.8	6.0	651 718
5000 - 50 000	61.1	28.4	10.4	4 294 247
50 000 - 500 000	58.2	30.2	11.6	8 275 715
More than 500 000	52.2	32.1	15.7	10 789 972
Total, 2004	56.4	30.6	13.0	24 268 234
Total, 2001	56.0	31.3	12.7	21 893 832

Source: Municipal Water and Wastewater Survey use database, Sustainable Water Management Division, Environment Canada. Data is aggregated to municipal level and imputed for non-response using previous MUD surveys.

For the 1045 municipalities that responded to the overall water flow question (representing 25.5 million Canadians served water, or a total municipal population of 27.5 million), total water use (all sectors combined, including system losses) works out to a daily average of 609 litres per person served water (see Table 1). Daily per capita total water use is generally lower in larger municipalities than in smaller ones. For example, municipalities with 2000 to 5000 residents used 946 litres per person per day, on average, whereas those with 50 000 to 500 000 residents used 555 litres per person per day. An exception involves municipalities with more than 500 000 people, where the average daily per capita use was 589 litres. Residential water use representing 25.3 million Canadians served water, shows a similar downward trend as municipal population rises. The fact that per capita municipal water use generally goes down as the metering rate goes up (for residential and business clients alike) suggests again that the use of water meters can help reduce water use in most municipalities⁴.

⁴ Although businesses that were metered apparently used less water, this does not necessarily mean that they used water more efficiently. Determining the efficiency of water use would require knowledge of specific commercial/industrial processes involving water—information that the present survey was not designed to capture.

WATER METERS ARE MORE COMMON IN INDUSTRIAL, COMMERCIAL AND INSTITUTIONAL BUILDINGS THAN IN RESIDENTIAL ONES.

For the 709 municipalities that responded to this question (representing over 20 million Canadians served water), 83% of their serviced businesses are equipped with water meters. Only 63% of residences are similarly equipped (according to the 25.7 million Canadians served water in the 1157 municipalities that responded to this question). The higher rate of metering of industrial/institutional/commercial customers holds true for all provinces. In addition, the proportion of industrial/commercial/institutional customers that are metered tends to be higher in larger communities. Table 1 shows that fully 88% of such business clients are metered in communities of 50 000 to 500 000 people, whereas in communities of 1000 to 2000 people the figure drops to 50%.

THE TOTAL NUMBER OF CANADIANS WHO ARE SERVED BY WATER DISTRIBUTION OR WATER TREATMENT CONTINUES TO RISE.

Comparing only those municipalities that were surveyed in both 2001 and 2004 shows that the number of Canadians in the responding municipalities rose from 26.7 million in 2001 to

28.4 million in 2004 (see Table 2). The picture by size group, when all responding municipalities over 1000 population are included, shows that the percentage of the population that is connected to water distribution systems and those served water treatment is seen to increase in step with population size (Table 2). The percentage of the population receiving these services in 2004 (for the 1294 municipalities that responded) was 90.6% for water service and 84.6% for water treatment; the first ratio remains unchanged from 2001, while water treatment increased from 84% in 2001.

PROBLEMS WITH WATER AVAILABILITY AND WATER QUALITY CONTINUE TO EXIST IN CANADA.

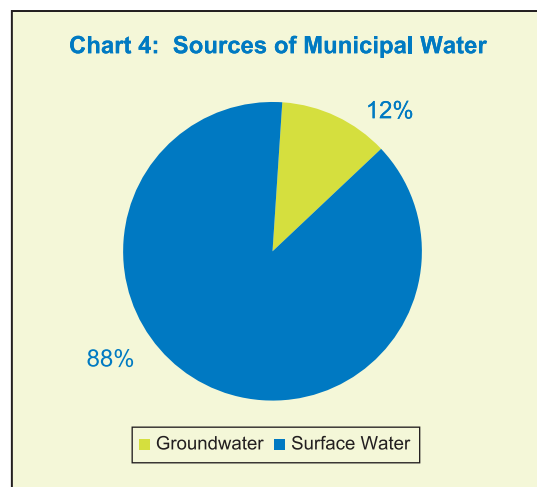
In 2004, 72 of 510 responding municipalities, representing 14.1% of the responding population served water, indicated that they experienced water shortages. The problem was variously identified as existing at the water source, at a treatment facility, or in the distribution system.

Based on information provided by the 507 responding municipalities, 107 of them, accounting for 21.1% of the populations served water, had some sort of water quality problem since 2001. Water quality problems were variously identified as microbiological, chemical, radiological or aesthetic. In addition, 44 of the 507 municipalities, accounting for 12.4% of the population served water, reported one or more boil-water days since 2001.

In 2004, the water provided by Canadian municipalities to roughly 93% of the population served water was treated in some way prior to distribution; 7% of the population served water received untreated water (see Table 2). Smaller municipalities (under 5000 population) were more likely to supply untreated water (affecting as much as 34% of the group's population served), while those over 5000 population were the least likely to serve water that had not been treated in some way (affecting as much as 5% of the group's population served). According to this same table, of the population served water in the smallest size group (below 1000 population), 55% had it treated, while in the largest size group (over 500 000 population), 99.9% of those served water had it treated in some way. This section of the survey also indicated that fluoridated water was served to as much as 56% of the responding population served.

IN GENERAL, CANADIAN MUNICIPALITIES RELY HEAVILY ON SURFACE WATER, WHILE GROUNDWATER REMAINS AN IMPORTANT SOURCE FOR SMALLER COMMUNITIES.

In 2004, 88% of the water supplied by municipalities came from surface sources, 12% from groundwater (see Chart 4). Smaller communities relied more heavily on groundwater than did larger ones. For example, communities of between 2000 and 5000 people took 40.6% of their water from below ground, whereas those with more than 500 000 people obtained just 0.7% of their water in this way (see Table 1). The 2004 survey shows that many municipalities rely on some combination of surface and groundwater sources for their water supply.



THE TOTAL NUMBER OF CANADIANS WHO ARE SERVED EITHER BY SEWAGE COLLECTION OR SEWAGE TREATMENT SHOWS STEADY INCREASE.

Using the same population as sampled in those served by water distribution systems, 28.4 million people representing 1294 municipalities are being served by sewage collection and treatment systems in 2004. Those populations connected to sewage systems show an increase since 2001 from 88.1% to 88.7% in 2004. In the case of sewage treatment, there has been a slight increase from 85.7% in 2001 to 85.9% in 2004. Similar to the trend displayed by the populations served by municipal water distribution systems (see Table 2), the percentage of the responding population connected to sewage collection and treatment increased with population size (see Table 4).

In 2004, total wastewater flow works out to a daily average of 651 litres per person served by

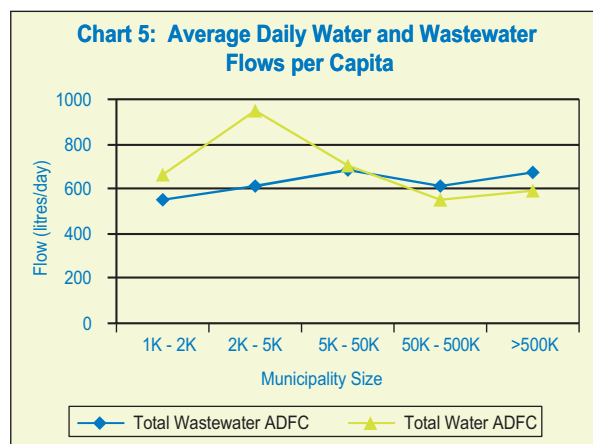
Table 4: Residential Wastewater Services, by Province/Territory and Municipal Population

Province/ Territory	Number of responding municipalities	Total population of responding municipalities	Population on Sanitary Sewers	As % of responding population	Population served Sewage Treatment	As % of responding population
Newfoundland & Labrador	72	365 881	310 637	84.9	63 031	17.2
P.E.I.	9	64 942	60 242	92.8	60 242	92.8
Nova Scotia	34	650 157	480 789	73.9	192 058	29.5
New Brunswick	134	614 514	402 814	65.5	400 097	65.1
Quebec	382	6 693 073	6 022 270	90.0	5 897 273	88.1
Ontario	223	11 854 992	10 454 623	88.2	10 398 191	87.7
Manitoba	62	931 478	845 848	90.8	841 478	90.3
Saskatchewan	91	675 144	642 313	95.1	641 123	95.0
Alberta	147	2 926 493	2 654 835	90.7	2 648 078	90.5
British Columbia	120	3 529 465	3 234 417	91.6	3 183 799	90.2
Yukon	4	24 472	20 329	83.1	17 779	72.7
N.W.T.	7	32 038	28 167	87.9	28 167	87.9
Nunavut	9	19 114	15 213	79.6	15 212	79.6
Municipal Population						
Under 1000	44	32 517	18 033	55.5	10 794	33.2
1000 - 2000	359	512 089	299 107	58.4	265 263	51.8
2000 - 5000	356	1 162 112	807 342	69.5	736 636	63.4
5000 - 50 000	450	6 058 998	4 425 181	73.0	4 174 480	68.9
50 000 - 500 000	74	9 630 056	8 889 504	92.3	8 477 572	88.0
More than 500 000	11	10 985 991	10 733 329	97.7	10 721 784	97.6
Total, 2004	1294	28 381 763	25 172 496	88.7	24 386 529	85.9
Total, 2001	1271	26 697 669	23 531 968	88.1	22 884 761	85.7

Source: Municipal Water and Wastewater Survey use database, Sustainable Water Management Division, Environment Canada. Data is aggregated to municipal level and imputed for non-response using previous MUD surveys.

sanitary sewers, representing 24 million Canadians, with all producer types combined (see Table 5). Total wastewater flow per capita does not display a consistent trend as municipality size gets larger. However, with the exception of the 2000 to 5000 population size group, similarities are evident between daily water flows per capita and daily wastewater flows per capita (see Chart 5).

In 2004, wastewater used for sanitary purposes made up 66% of the total annual flow into sanitary sewer systems, according to municipalities representing 7.6 million Canadians served by sanitary sewers. Looking at the remainder, 20% was produced by the industrial/commercial sector, 5% was stormwater and 9% resulted from infiltration caused by groundwater leakage into sewer systems (See Chart 6). In smaller communities, wastewater is primarily produced domestically; whereas in larger communities this portion decreases (see Table 5). For example, in communities of less than 1000 people, 93% of wastewater flow was



residential, whereas in those with more than 50 000 people, only 60% was produced by the residential sector.

IN CANADA, MOST SANITARY WASTEWATER RECEIVES AT LEAST SECONDARY-LEVEL TREATMENT.

In 2004, secondary mechanical (conventional) treatment was the most widely used level of treatment across Canada, making up 47% of the

Table 5: Wastewater Flows per capita and Producer Types, by Province/Territory and Municipal Population

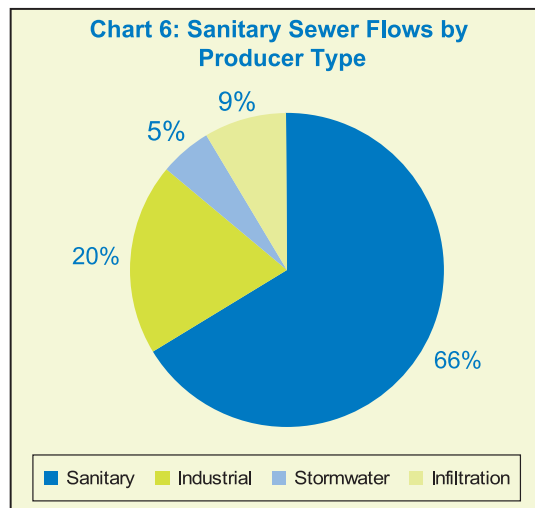
Province/ Territories	Total Wastewater ADFC*	Total population on Sanitary Sewers	Producers Breakout Percentages**					
			Total Breakout Population on Sewers***	Breakout ADFC*	Sanitary % of flow	Industrial % of flow	Storm water % of flow	Infiltration % of flow
Newfoundland & Labrador	770	78 505	35 105	190	75.4	17.0	5.5	2.1
P.E.I.	576	60 242	5 768	130	73.9	13.7	1.3	11.1
Nova Scotia	299	463 039	91 087	166	48.3	24.2	14.1	13.4
New Brunswick	766	401 545	121 294	338	66.8	13.8	11.4	8.1
Quebec	1086	5 348 171	1 205 901	288	56.8	14.9	11.4	16.9
Ontario	522	10 196 217	3 727 976	192	69.1	22.6	2.9	5.3
Manitoba	522	840 165	678 398	194	73.6	10.8	5.2	10.4
Saskatchewan	406	637 831	261 130	143	48.2	42.8	0.2	8.9
Alberta	486	2 620 828	443 502	156	61.4	32.9	0.7	5.0
British Columbia	596	3 323 133	968 484	172	72.9	18.7	2.6	5.7
Yukon	624	20 329	0					
N.W.T.	410	28 167	15 999	137	65.2	32.8	0.0	2.0
Nunavut	191	13 881	0					
Municipal Population								
Under 1000	457	13 121	2 571	116	93.3	5.4	0.0	1.3
1000 - 2000	556	248 051	34 848	252	69.6	14.7	7.1	8.5
2000 - 5000	611	697 717	98 363	215	63.9	25.0	4.1	7.0
5000 - 50 000	681	4 036 182	1 290 777	244	60.6	21.6	6.6	11.3
50 000 - 500 000	615	8 303 653	2 627 126	175	59.9	29.1	4.1	6.9
More than 500 000	673	10 733 329	3 500 959	209	72.2	13.9	5.3	8.7
Responding Population	651	24 032 053	7 554 644	203	66.0	20.2	5.2	8.6

* ADFC = Average Daily Flow per capita.

** Producers Breakout Percentages relate to the total average daily flow per capita for the population group responding to the producers question and are NOT directly comparable to the average daily flows per capita of the larger group responding to the total flows question in the left columns of the above table.

*** Low response rates, due to an inability to impute for non-responses using older MUD surveys, mean these estimates may not reflect the overall Canadian population (only 7.55 million total responding population on sanitary sewers).

Source: Municipal Water and Wastewater Survey use database, Sustainable Water Management Division, Environment Canada.
Data is aggregated to municipal level and imputed for non-response using previous MUD surveys.



total responding population served by sanitary wastewater collection systems. This is according to 874 municipalities representing 22 million Canadians served with sanitary sewers (See Table 6). Of this total population, 23% are served by primary treatment levels, 21% by tertiary levels, 6% by waste stabilization ponds (WSPs), 0.2% by preliminary treatment levels, and 3.2% were not served by wastewater treatment facilities at all.

As municipalities increase in size, wastewater treatment levels within the facilities become more refined in order to serve the larger populations (see Chart 5). For example, an increasing trend can be seen in the proportions of the population served by primary, secondary mechanical and tertiary level treatments as

Table 6: Wastewater Treatment Levels, by Province/Territory and Municipal Population Served Sanitary Sewers

Province/ Territory	Treatment Levels*						Secondary Treatment or Better** (%)	Responding Population on Sanitary Sewers	Number of Municipalities Responding
	by population 0	1	2	3	4	5			
Newfoundland & Labrador	82.9	1.1	7.7	7.0	1.2	0.0	8.2	295 774	61
P.E.I.	0.0	0.0	85.7	6.6	7.7	0.0	14.3	56 523	7
Nova Scotia	60.4	0.4	5.9	5.0	27.4	0.9	33.3	477 985	30
New Brunswick	0.8	0.0	30.1	26.7	39.5	3.0	69.1	319 326	52
Quebec	2.9	0.7	48.7	11.2	28.7	7.8	47.7	3 914 073	212
Ontario	0.1	0.1	11.1	0.9	55.2	32.6	88.7	9 816 295	150
Manitoba	0.3	0.0	1.6	10.9	87.1	0.1	98.0	833 329	46
Saskatchewan	0.3	0.0	0.3	19.1	45.4	34.9	99.4	637 739	69
Alberta	0.2	0.0	28.2	11.3	35.5	24.9	71.7	2 526 489	124
British Columbia	1.2	0.0	35.0	3.9	52.5	7.5	63.8	3 059 509	108
Yukon	0.0	0.0	56.1	43.9	0.0	0.0	43.9	2 190	2
N.W.T.	0.0	0.0	4.7	95.3	0.0	0.0	95.3	25 405	5
Nunavut	0.0	0.0	0.0	100.0	0.0	0.0	100.0	15 212	8
Municipal Population									
Under 1000	44.4	0.0	0.0	41.5	14.1	0.0	55.6	17 127	29
1000 - 2000	10.8	0.0	4.6	63.5	17.9	3.2	84.5	255 925	195
2000 - 5000	9.7	0.0	3.5	50.6	27.5	8.7	86.7	681 832	246
5000 - 50 000	5.9	1.1	13.8	20.0	30.3	28.9	79.2	3 731 092	339
50 000 - 500 000	5.7	0.0	14.0	0.9	43.7	35.8	80.3	6 560 544	54
Over 500 000	0.1	0.0	32.8	0.0	56.8	10.3	67.1	10 733 329	11
Total	3.2	0.2	22.7	6	47	20.9	73.9	21 979 848	874

* Treatment Levels are 0) No Treatment, 1) Preliminary Treatment, 2) Primary Treatment, 3) Waste Stabilization Ponds, 4) Secondary Mechanical Treatment, and 5) Tertiary or Advanced Treatment.

**Secondary Treatment or Better includes populations served by at least WSP, secondary mechanical or tertiary treatment levels

Note: Some inaccuracy from earlier MUD survey treatment level formats may still be evident in these imputed results (about one third of the populations responding was due to results that were imputed using 1999 and earlier MUD surveys which assumed primary and tertiary averaged to secondary level treatment, while recent surveys require secondary level treatment as a prerequisite for tertiary (post-secondary) level treatment).

Source: Municipal Water and Wastewater Survey use database, Sustainable Water Management Division, Environment Canada.

Data is aggregated to municipal level and imputed for non-response using previous MUD surveys.

municipal population size group increases. Conversely, in populations served by waste stabilization ponds (WSPs), the percentage of those served decreases with increasing population size. For example, in populations between 1000 and 2000, 64% are served by waste stabilization ponds, whereas in populations between 50 000 to 500 000 people, this number decreases to only 1%. When one looks at secondary (WSPs and mechanical) and tertiary, combined (accounting for 74% of the population served sanitary sewers), no discernable relationship to community size is evident (See Table 6). Within this grouping, the WSPs are prevalent in the smaller communities (below 5000 population), while mechanical secondary and tertiary treatment facilities are prevalent in the larger communities (greater than 50 000 population).

The various levels of wastewater treatment indicated by municipalities responding to the survey paints a hopeful, yet incomplete, picture of the spectrum of treatment types used in Canada. Collecting such information should prove useful in developing a more complete understanding of this risk to our ecosystems.

CANADIANS RELY HEAVILY ON SURFACE FRESH WATER AS A DESTINATION FOR WASTEWATER DISCHARGE.

For the 890 municipalities that responded to this question (representing 22 million Canadians served sewers), surface fresh water was the main destination for 84.6% of their effluents. Marine water as a main destination for 10.5% of their effluents, and 4.9% was disposed of using “Other” methods or destinations, including infiltration, irrigation, and evaporation processes (See

Table 7: Discharge Destination for Wastewater Flows, by Province/Territory and Municipal Population

Province/ Territory	Total Population of Responding Municipalities	Number of Responding Municipalities	Responding Ww Flow* (MCM)	Wastewater Flow Destination			Responding Flow Sum as % of Total Flow***
				% Fresh Surface	% Marine	% Other**	
Newfoundland & Labrador	232 874	28	22.1	80.4	19.6	0.0	100
P.E.I.	60 242	8	12.7	3.2	96.8	0.0	100
Nova Scotia	460 807	27	50.3	40.4	54.1	5.5	172
New Brunswick	401 545	62	112.2	23.0	62.7	14.2	117
Quebec	4 005 022	212	1 508.2	98.0	1.6	0.4	101
Ontario	9 242 378	167	1 767.8	99.9	0.0	0.1	100
Manitoba	845 574	50	159.9	99.6	0.0	0.4	100
Saskatchewan	639 883	72	94.5	87.6	0.0	12.4	114
Alberta	2 620 929	129	464.8	92.3	4.6	3.0	108
British Columbia	3 332 696	117	722.5	39.7	39.0	21.3	127
Yukon	20 329	3	4.6	97.3	0.0	2.7	103
N.W.T.	28 167	6	4.2	100.0	0.0	0.0	100
Nunavut	15 213	9	1.0	4.8	95.2	0.0	100
Municipality Population							
Under 1000	17 643	28	2.1	46.5	38.4	15.0	118
1000 - 2000	245 676	186	49.4	77.9	12.5	9.7	111
2000 - 5000	694 922	248	152.7	76.6	16.1	7.3	108
5000 - 50 000	3 983 715	357	950.9	78.7	15.7	5.6	109
50 000 - 500 000	7 263 749	62	1 348.8	76.0	12.4	11.6	115
More than 500 000	9 699 953	9	2 420.6	93.3	6.7	0.0	100
Total	21,905,658	890	4,924.6	84.6	10.5	4.9	106

* Ww Flow = Total Wastewater Flow (million cubic metres).

** Other discharge types include such things as infiltration, irrigation, or evaporation

*** Due to the format of previous MUD databases (used to impute for non-response), some double counting of flows will result where a municipality discharges to more than one water body type.

Source: Municipal Water and Wastewater Survey use database, Sustainable Water Management Division, Environment Canada.

Data is aggregated to municipal level and imputed for non-response using previous MUD surveys..

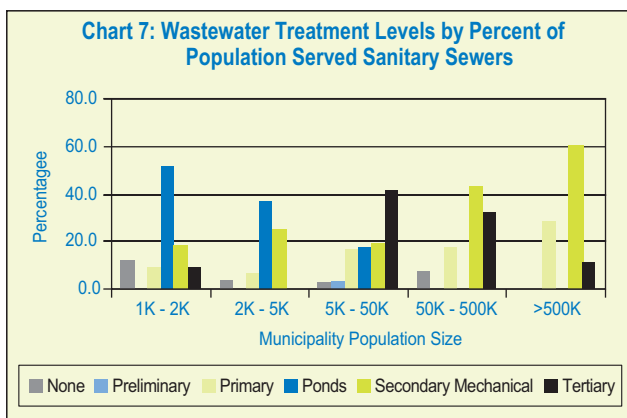
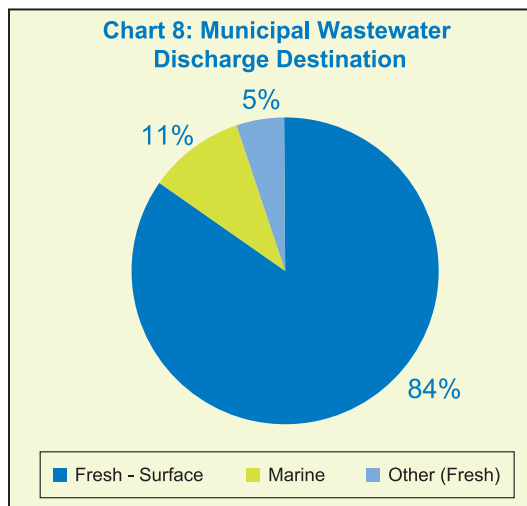


Chart 8). There is no direct correlation between municipality size and marine versus freshwater discharge destination, since this depends on the proximity of the municipality to the type of water body (see Table 7). Smaller municipalities are, however, more likely to use “other” discharge destinations and methods. In addition, when populations on sanitary sewers are looked

at, rather than total flows, the database shows 26.0% of populations in the under 1000 size group, and 15.4% in the 1000 to 2000 size use other destinations or methods of wastewater discharge, versus 9.3% to 0% in the larger municipalities.



CONCLUSIONS

The 2004 survey results suggest that Canada is continuing to make steady progress towards the wise use of its water resources. The sustainable use of this resource is important to ensure that there is enough water to meet the needs of all Canadians, now and in the future. It is also vital to preserving our aquatic ecosystems and the critical services they provide. Understanding how Canadian communities use water and dispose of wastewater will help water managers balance the needs of the Canadian economy, Canadian society and the environment.

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GLOSSARY

Aggregated data - Data created by summing up the separate values of related groups of data.

Assessed charges - Are a type of fixed or flat charges (not based on the volume of water used) for water and/or wastewater services that are provided. The number of plumbing fixtures, bedrooms, or a property value tax bill can be used, for example, to assess a fixed (annual, quarterly,...) charge for a household.

Data source - The source of information gathered by a survey. Data sources for the Municipal Water Use and Pricing survey include municipalities, treatment plants and various water-management professionals.

Flat rate pricing - Methods of charging fixed amounts for water or wastewater-related services, in which the charges are unrelated to the amount of water used or wastewater produced by a customer.

Fluoridation - A water treatment that involves adding fluoride (a naturally occurring element found in rocks and minerals) to municipal water to help prevent tooth decay.

Geocoding - Spatially referencing statistical data by linking it to geographical information, such as longitude and latitude.

Imputation - The process of estimating a missing value that a survey respondent failed to provide. The estimate can be “imputed” from the subject’s responses to similar surveys in previous years, for example, or calculated using various statistical methods.

Municipality - A municipal-level jurisdiction (in an organisational sense and a spatial sense) as defined by Statistics Canada’s Census Subdivisions. For the purpose of the Municipal Water Use and Pricing survey, municipalities may be grouped in some cases.

Municipal Water and Wastewater Survey use database - The municipally aggregated and imputed database created from municipal water and wastewater use survey results, using imputed values where necessary.

OECD - Organisation for Economic Co-operation and Development.

Population served - The portion of the responding population receiving a particular water-related municipal service (i.e., water distribution, water treatment, wastewater collection or wastewater treatment, depending on the question).

Proxy - A statistical variable that is similar enough to another to be used as a substitute for it, usually because it can be more readily measured than the original.

Responding municipality - A municipality for which there was a response to a given question in the 2004 survey (for example, “What was the population served water distribution?”). A municipality that fails to respond to a particular survey question can still be considered a responding municipality if its response can be imputed from other available information (see imputation), or if the information was later acquired through call-backs or Internet searches.

Responding population - The total population of responding municipalities (see responding municipality), as determined by Statistics Canada.

Total Canadian population served - The real on-the-ground total Canadian population receiving a given water-related municipal service.

Unweighted municipalities responding - The number of municipalities responding to the Municipal Water Use and Pricing survey or any portion thereof.

Variable description document - A text document that describes the tables and variables in a given database.

Volume-based pricing - Methods of charging for water- or wastewater-related services that take into account the amount of water used or wastewater produced by a customer.

Wastewater Treatment Levels - Classifications of wastewater treatment types to simplify comparison of the many types of wastewater treatment technologies used, specifically:

- Preliminary treatment: includes grit removal, screening, bar racks, or skimming
- Primary treatment: includes primary sedimentation/clarification, plate/tube settlers, chemical precipitation or flocculation.
- Secondary treatment: treatment for the removal of most of the organic matter or to achieve significant

biochemical oxygen demand and suspended solids reductions.

- Waste Stabilization Ponds (WSPs): aerated, aerobic, facultative, anaerobic, storage ponds. Many WSPs can achieve treatment levels equivalent to conventional (mechanical) secondary treatment.
- Secondary - Mechanical: activated sludge, oxidation ditch, trickling filter, rotating biological contactor, sequencing batch reactor...
- Advanced or Tertiary treatment (or Post Secondary Treatment): enhanced treatment to remove constituents, such as phosphorus and nitrogen,

which may not be satisfactorily reduced from conventional secondary treatment.

Weighting - A statistical technique that takes into account the relative importance, or "weight," of individual elements in a data set instead of treating them all as equal. Calculations using weighted data (a weighted average, for example) often approximate reality more closely than do those using unweighted data.

For more information, visit our Web site (www.ec.gc.ca/water), or contact either the Environment Canada office nearest you, or:

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