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Agricultural Water Use in Canada

2010 — Updated



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Agricultural Water Use in Canada

2010

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User information

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
- 0^s 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
- * significantly different from reference category ($p < 0.05$)

Other symbols

- 0 ... the estimate is calculated from a sample where all the responses are equal to zero, such that the coefficient of variation cannot be calculated

Note to readers

The following tables have been revised:

Tables 4-2, 5-2, 6-2, 7-2, 8-2 and 10-2.

We regret any inconvenience this may have caused.

For more information please *contact us*.

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Cindy De Cuypere	database management
Chris Mohl	methodology
Pierre-Olivier Julien	methodology

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Preface

The Agricultural Water Survey is conducted to gather information on irrigation water use, irrigation methods and practices, and sources and quality of water used for agricultural purposes on Canadian farms.

This survey is part of the Canadian Environmental Sustainability Indicators (CESI) initiative. The data collected will be used in CESI's reporting activities. The information will also be used by Agriculture and Agri-Food Canada to inform water use policy and development of programs for Canadian irrigators. Statistics Canada will also use the survey results to improve the modelling of irrigation volumes by type of crops and continue to report on total water use by sector in Canada.

Highlights

- 7,685 farms irrigated their crops in 2010. The majority of irrigating farms were in British Columbia (40%), followed by Alberta (30%) and Ontario (13%).
- 838 million cubic metres of water was used for irrigation in 2010. The majority of this water was used in Alberta (59%) and British Columbia (28%).
- There was a peak in irrigation water use in the late summer months with 39% of irrigation water being used in July and 29% in August.
- Just over half of all the water used for irrigation in 2010 was used to irrigate field crops while 31% was used to irrigate hay and 17% of irrigation water was used for vegetables, fruit crops and improved pasture.
- There were 528,570 hectares of irrigated land in Canada in 2010. Alberta had the most irrigated land with 356,500 hectares while the whole Atlantic region had less than 2,000 ha.
- Sprinkler irrigation was the most common irrigation method in 2010, being used on 6,035 farms. 1,540 farms used surface (flood) irrigation methods and 1,480 used micro irrigation.
- In 2010, 4,985 farms either did not irrigate or stopped irrigating at some point during the growing season. The majority of these farms were in Alberta (1,845 farms) and British Columbia (1,425 farms). However, 3,875 farms did keep irrigating over the growing season. The main reason for stopping or not irrigating was that the crop did not need irrigating.

Analysis

Number of farms with irrigated crops

In 2010, 7,685 farms irrigated their crops. The majority of irrigating farms were located in British Columbia (40%), followed by Alberta (30%) and Ontario (13%) (Table 2-1). The South Saskatchewan drainage region (Map 3) had the highest number of irrigating farms with 2,435 farms irrigating their crops. The Fraser-Lower Mainland and Okanagan-Similkameen drainage regions also had a large number of farms that irrigated crops, with 1,360 and 1,115 irrigating farms, respectively (Table 2-2).

Hay was the most irrigated crop type, with 2,870 farms having irrigated hay. Improved pasture was the least irrigated crop type, with only 1,160 farms irrigating this crop type (Table 1).

There was a drop in the number of farms with irrigated crops from 10,470 in 2007 to 7,685 in 2010. This decrease was particularly marked in Ontario, where the number of farms with irrigated crops fell from 1,990 in 2007 to 995 in 2010. The decrease is due to the amount of rainfall received by the province. Over the 2007 growing season (April 1 to October 1), the south-east region of the province received 85% or less of its average precipitation while over a similar time period in 2010, the region received 85% to 150% of its average precipitation (Agriculture and Agri-Food Canada, 2010).¹

Irrigation volume

In 2010, 838 million cubic metres of water were used for irrigation. The majority of this water was used in Alberta (59%) and British Columbia (28%) (Table 5-1, Map 1). More than 60% of irrigation water was used in the South Saskatchewan drainage region (Map 2).

The average volume of water used for irrigation per farm also varied by province. It was highest in Manitoba and Alberta at approximately 245,000 cubic metres and 216,000 cubic metres, respectively, and lowest in Ontario, Quebec and the Atlantic region, with those farms using around 20,000 cubic metres to irrigate their crops in 2010 (Table 6-1).

Farms in the combined Winnipeg, Lower Saskatchewan-Nelson, Churchill drainage regions used the most water for irrigation, approximately 292,000 cubic metres, on average, in 2010. Farms in the Ottawa drainage region used the least, applying just under 13,000 cubic metres of water (Table 6-2).

The amount of water used for irrigation dropped by almost half (44%) between 2007 and 2010.² This was particularly true of Ontario, Saskatchewan and Alberta, which saw 67%, 65% and 55% decreases in the volume of water used for irrigation, respectively. As mentioned earlier, south-eastern Ontario experienced a dry growing season in 2007, contributing to more irrigation that year. In addition, Saskatchewan and Alberta experienced a wetter than average growing season in 2010, resulting in relatively low irrigation in 2010 (Agriculture and Agri-Food Canada, 2010).

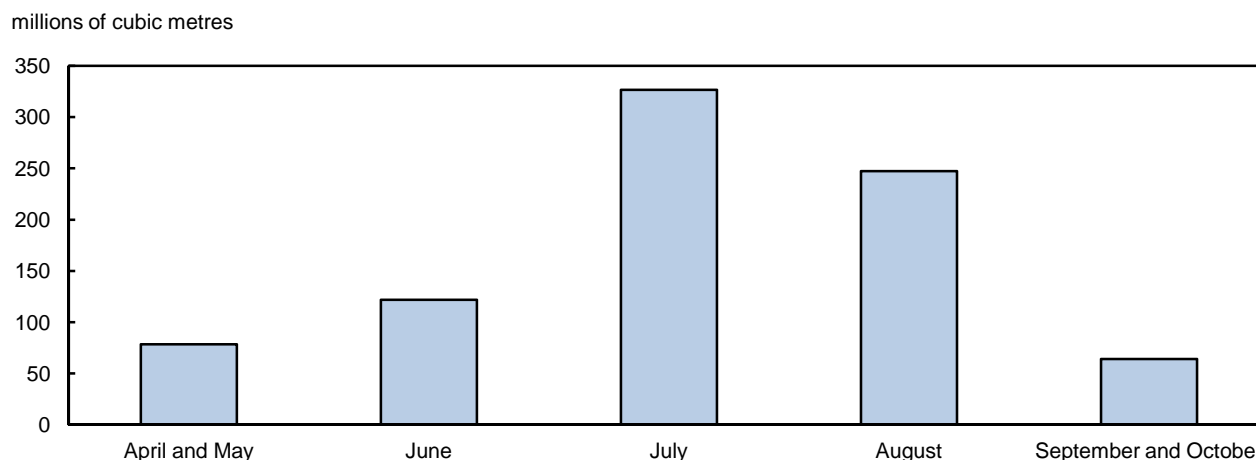
Just over half (52%) of all the water used for irrigation in 2010 was used to irrigate field crops. Another 31% was used to irrigate hay while only 17% of irrigation water was used for vegetables, fruit crops and improved pasture (Table 3).

1. Agriculture and Agri-Food Canada, 2010, *Drought Watch: Map Archive*, www.agr.gc.ca/drought (accessed May 18, 2010).

2. The 2007 AWS irrigation volume estimate included water used for pre-planting and post harvest irrigation. While the 2010 AWS did not specifically collect this information, the 2007 and 2010 AWS estimates are considered to be comparable because pre-planting and post harvest irrigation make up a small portion of total irrigation water volume.

There was a peak in irrigation use in the late summer months (Chart 1). Just under 24% of irrigation water was used in the months of April, May and June while the bulk of irrigation water was used in July (39%) and August (29%) (Table 3). This irrigation profile was true for all five crop types and in all provinces.

Chart 1
National irrigation volumes by month, 2010



Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Irrigation intensity (the volume of water used for irrigation per unit area) varied widely by crop type. Vegetable crops received only 867 cubic metres/ha of irrigation while fruit crops received 3,123 cubic metres/ha. Irrigation intensity also varied by province. In Alberta, hay crops received 1,537 cubic metres/ha of irrigation while in British Columbia hay crops received 3,371 cubic metres/ha (Table 4-1). This disparity in irrigation intensity for hay is due in part to differences in the precipitation received by the two provinces over the growing season.

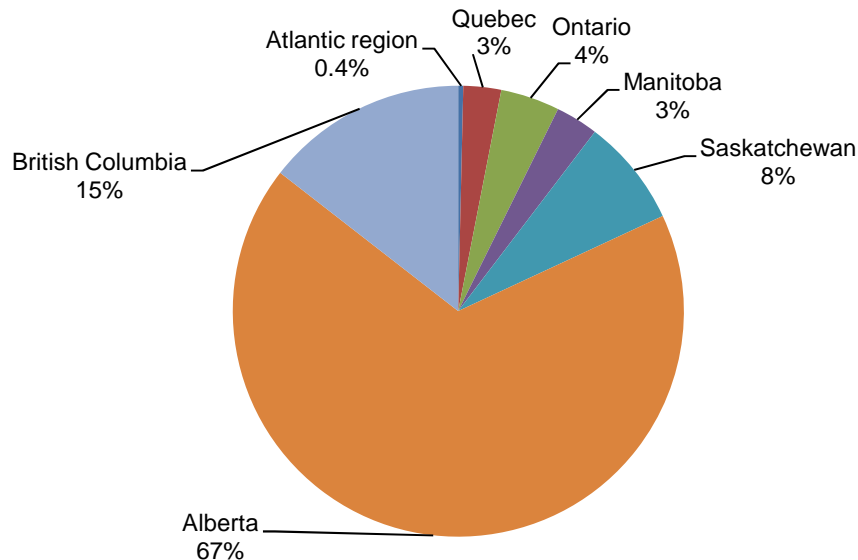
There was also a wide variation in the average volume of irrigation water used per farm. On average, farms used 109,128 cubic metres of water for irrigation, regardless of crop type. Farms with field crops used the most water for irrigation, applying 164,548 cubic metres of water, while the average fruit farm applied 22,106 cubic metres to its crops (Table 6-1).

Area of irrigated land

There were 528,570 hectares of irrigated land in Canada in 2010 (Table 7-1), compared to 721,896 hectares in 2007. This represents a more than 25% decrease in irrigated land between the two time periods.

Alberta had the most irrigated land in 2010 with 356,500 hectares (67% of total irrigated land) while the Atlantic region had the least with 1,880 hectares (Table 7-1, Chart 2). The average Canadian farm irrigated 69 hectares of land. The average farm in Manitoba irrigated 161 hectares while the average farm in the Atlantic region irrigated 11 hectares of land (Table 8-1).

Chart 2
Percentage of total irrigated area by province or region, 2010



Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Of all the drainage regions, the South Saskatchewan drainage region had the most irrigated land (380,070 ha) while the Ottawa drainage region had the least (1,110 ha) (Table 7-2). Farms in the combined Winnipeg, Lower Saskatchewan-Nelson, Churchill drainage regions had the highest average irrigated areas at 191 hectares of land while, on average, farms in the combined North Shore-Gaspé, Saint John-St. Croix, Maritime Coastal, Newfoundland-Labrador drainage regions irrigated 12 hectares of land each (Table 8-2).

Field crops were grown on the majority of irrigated land in 2010. Irrigated field crops were grown on 328,870 hectares of land, while only 15,950 hectares of fruit crops were irrigated (Table 7-1). The average field crop farm irrigated 123 hectares of field crops compared to the seven hectares of fruit crops irrigated on fruit farms (Table 8-1).

Irrigation methods

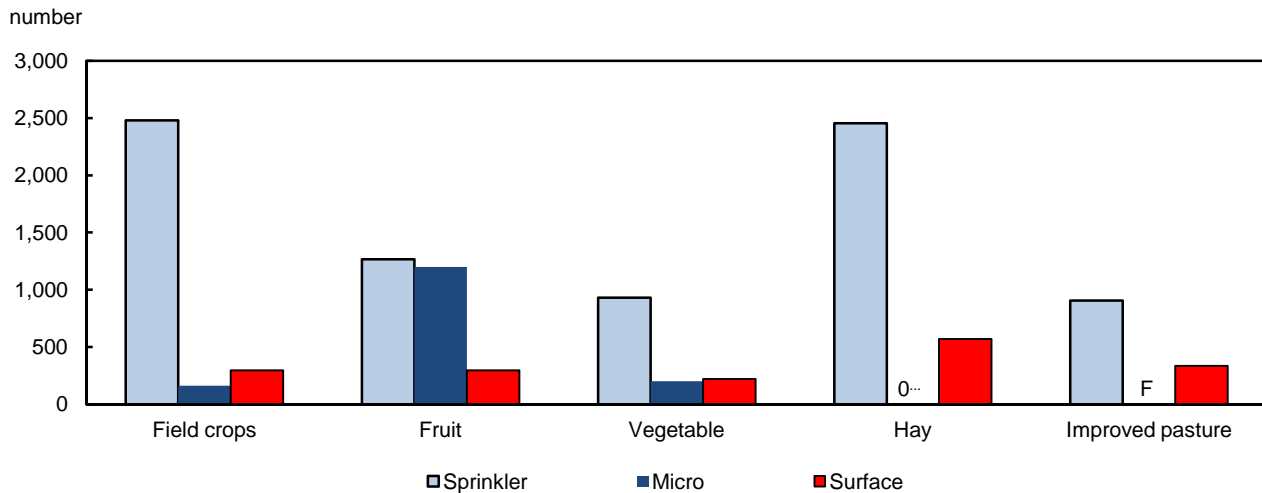
There are three different categories of irrigation methods: sprinkler, micro and surface irrigation. Sprinkler systems distribute water onto crops in a high-velocity, high-volume spray. Micro irrigation systems deliver water onto the soil surface very close to the crop or below the soil. With surface irrigation, also known as flood irrigation, the water flows by gravity over land.

As it was in 2007, sprinkler irrigation was by far the most popular irrigation method in 2010, with it being used on just over 6,000 farms. 1,540 farms used surface irrigation methods and 1,480 used micro irrigation (Table 9-2). Farms in British Columbia were the biggest users of sprinkler irrigation with more than 2,500 farms in that province using that method. British Columbia farms were also the biggest users of micro irrigation (815 farms) and Alberta farms were the largest users of surface irrigation (660 farms) (Table 9-2).

Farms in the South Saskatchewan drainage region were the biggest users of sprinkler and surface irrigation, with 2,075 farms using sprinklers and 700 farms using surface irrigation methods. Meanwhile, farms in the Okanagan-Similkameen drainage region were the biggest users of micro irrigation with 485 farms using this irrigation method (Table 9-3).

Irrigation methods differed by crop type. While sprinkler irrigation was the most common irrigation method for all crop types, micro irrigation was just as common as sprinkler irrigation for fruit crops (Chart 3). However, micro irrigation was the least common for field crops and vegetable crops and it was not used at all for hay crops (Table 9-1). One reason for this is that sprinkler irrigation is well-suited for irrigating large areas: the average irrigated field crop area per farm was 123 hectares in 2010, as opposed to seven hectares for fruit crops (Table 8-1).

Chart 3
Number of farms by irrigation method and crop type, 2010



Note(s): A farm may use more than one irrigation method.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Irrigation practices

Energy or water conservation practices³

A variety of energy or water conservation methods were practiced on farms in 2010. As in 2007, the most widespread practice was watering crops at night or in the morning (3,695 farms), followed by the use of water or energy saving nozzles (2,685 farms). However, in 2010, 1,955 farms did not practice any energy or water saving methods, up from 960 farms in 2007 (Table 10-1). This increase could be related to the fact that fewer farms irrigated in 2010 than in 2007 therefore water conservation practices like watering at night or in the morning or pressure reduction would not apply.

The uptake of the various energy or water conservation practices differed between the provinces and drainage regions. The practices of leaving stubble on fields, pressure reduction and using water or energy saving nozzles were most common in Alberta and the South Saskatchewan drainage region. Watering at night or in the morning was most common in British Columbia and the Fraser-Lower Mainland drainage region and wind breaks were most common in Ontario and the Great Lakes drainage region (Table 10-1, Table 10-2).

Not irrigating or stopping irrigation⁴

Over the 2010 growing season, a number of farms either did not irrigate or stopped irrigating at some point during the growing season because the crop did not require irrigation, because of water shortages, or for other reasons. In 2010, 4,985 farms did not irrigate or stopped irrigating, slightly up from 4,850 farms in 2007. The majority of these

3. The 2010 estimates include all farms that usually irrigate, regardless of whether any irrigation was done.

4. *Ibid.*

farms were in Alberta (1,845 farms) and British Columbia (1,425 farms). On the other hand, 3,875 farms did keep irrigating over the growing season (Table 11-1).

The number of farms that either did not irrigate or stopped irrigating during the growing season varied greatly by drainage region, from 20 farms in the Ottawa drainage region to 1,920 farms in the South Saskatchewan drainage region (Table 11-2).

The most common reason for not irrigating or stopping irrigation was that the crop did not need it; 3,540 farms stopped irrigating for this reason. 2,025 farms also stated other reasons for stopping irrigation such as a shortage of water or irrigation equipment failure, among others (Table 11-1).

Irrigation water sources⁵

Farms drew their water for irrigation from a variety of sources. In 2010, 3,260 farms obtained at least some of their water for irrigation from on-farm lakes and rivers while 1,555 drew at least some of their water from an underground well and 3,705 farms procured at least some of their irrigation water from off-farm sources⁶ (Table 12-1).

Alberta and British Columbia farms were the most common users of off-farm water. In Alberta, 2,005 farms obtained some of their water from off-farm sources and in British Columbia, 1,315 farms did the same. For all other provinces (except Saskatchewan), on-farm surface water⁷ was the major water source (Table 12-1).

Irrigation water sources also varied by drainage region. More farms in the Fraser-Lower Mainland drainage region utilized on-farm water – both surface water (760 farms) and groundwater (475 farms) – than in any other drainage region. Farms in the South Saskatchewan drainage region made the most use of off-farm water with 2,110 farms obtaining at least some of their water from off-farm sources (Table 12-2).

Sources of off-farm water ranged from tap water to provincial water sources such as irrigation districts.⁸ By far, the most common source of off-farm water was provincial sources. Of all the farms using off-farm water supplies, 2,860 of these farms received at least some of their water from provincial sources, 525 farms used at least some tap water for irrigation and 55 farms used at least some treated wastewater (Table 13).

The majority of farms using provincial water sources were in Alberta where 1,895 farms used this water source. Farms in British Columbia were the main users of tap water with 435 farms receiving at least some of their off-farm water from this source (Table 13). The most common reason for using off-farm water was that there was not enough water available on the farm (Table 14).

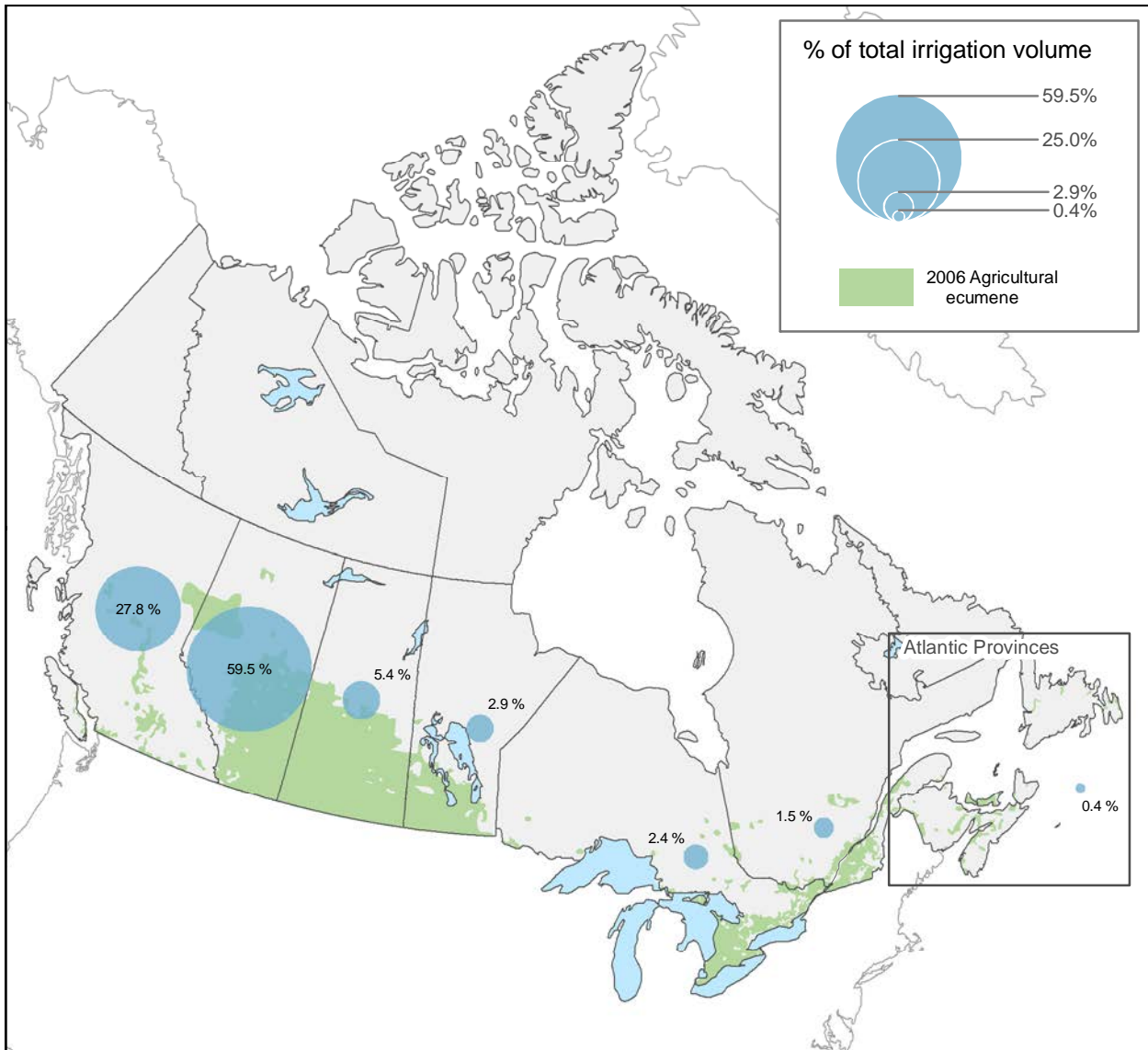
5. These estimates apply only to farms that irrigated in 2010.

6. Off-farm water sources includes water transported to the farm either via pipeline, canal system or vehicle (this includes municipal (potable) water).

7. On-farm surface water includes water from lakes, rivers, creeks, streams, ponds or dugouts.

8. An irrigation district is a corporation that constructs, maintains and operates waterworks in its district for the conveyance and delivery of water.

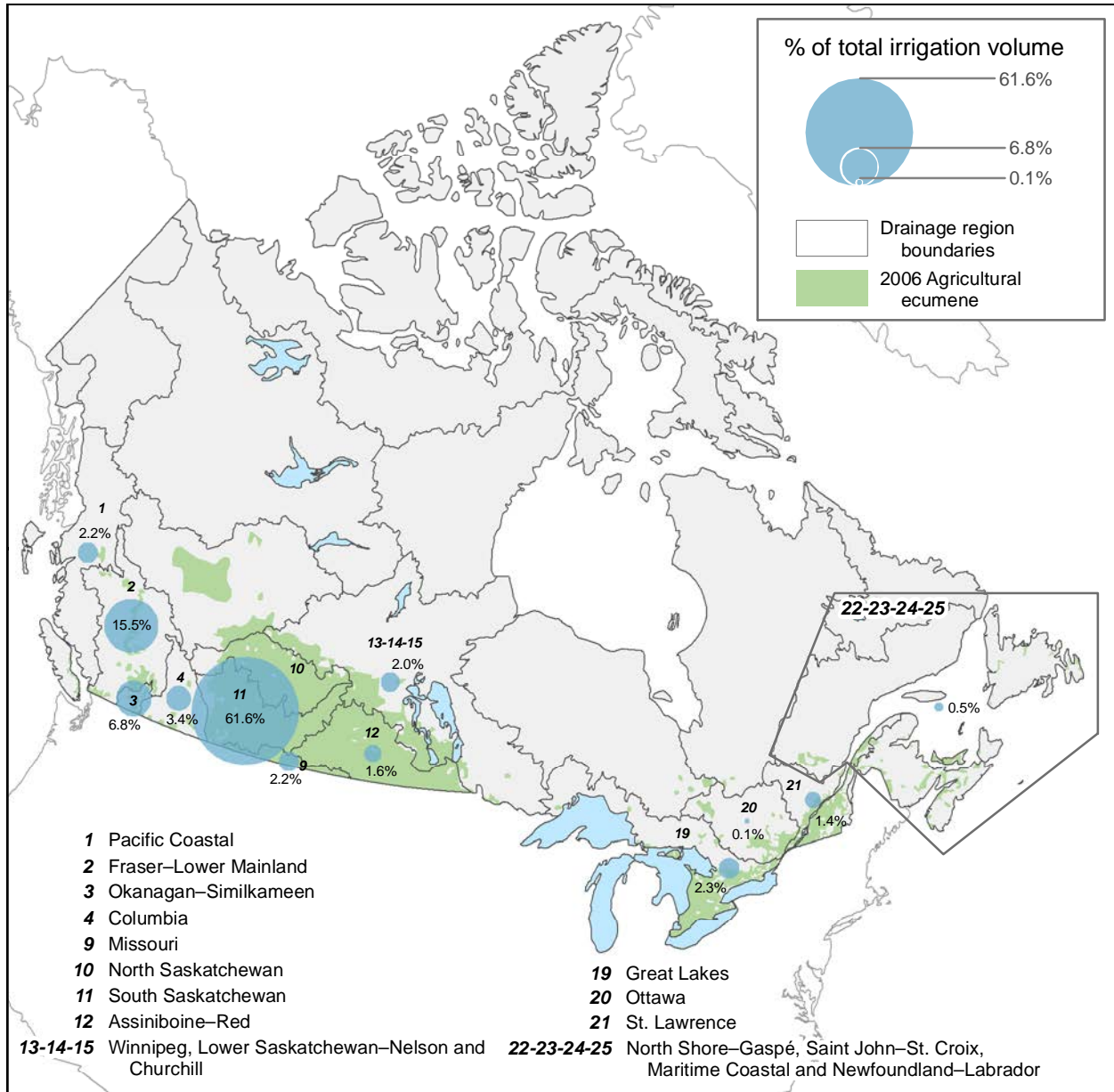
Map 1
Percentage of total irrigation volume, by province



Note(s): Excludes Yukon, Northwest Territories and Nunavut.
 Totals may not add up to 100% because of rounding.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

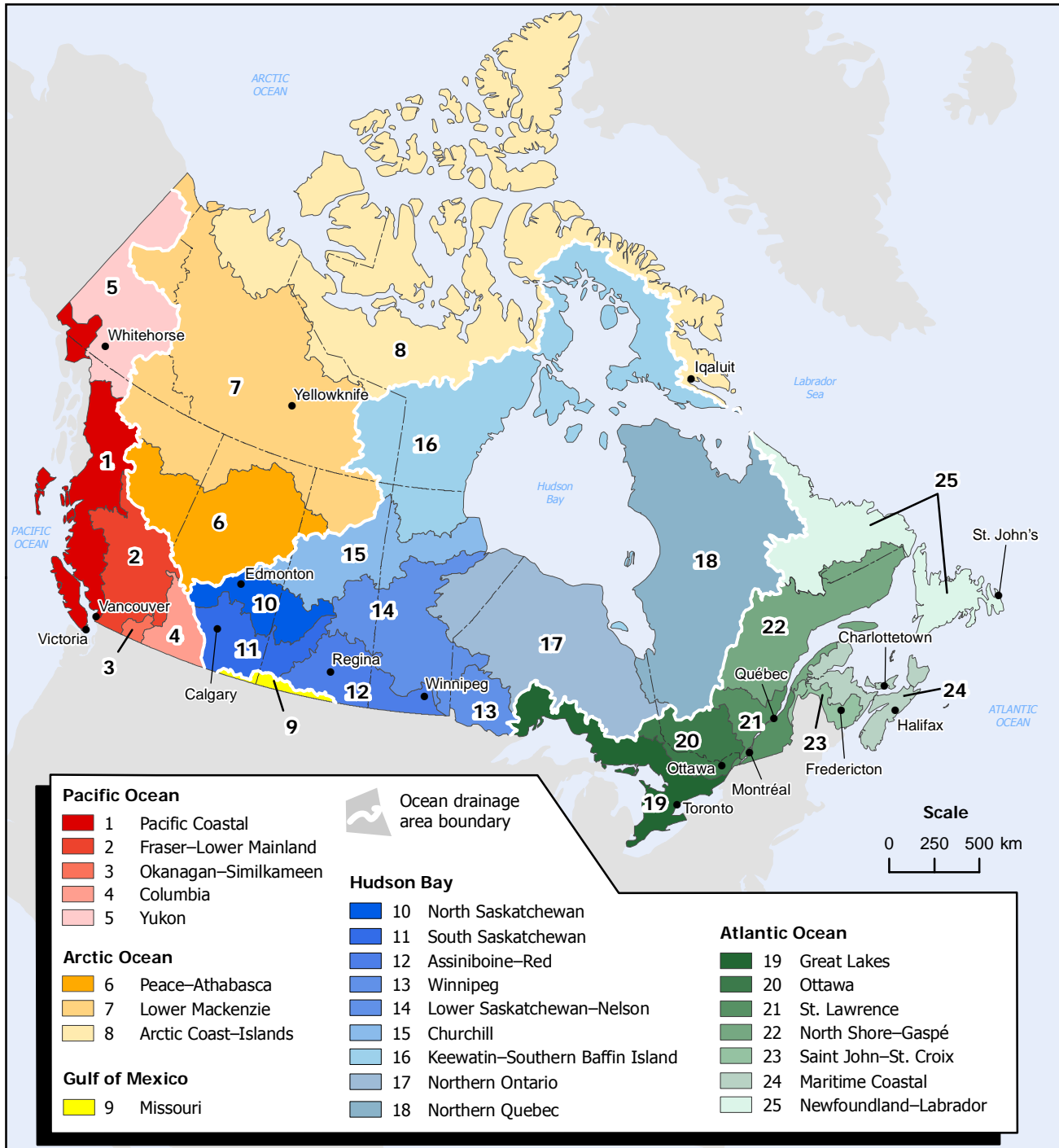
Map 2
Percentage of total irrigation volume, by drainage region



Note(s): Excludes Yukon (5), Peace–Athabasca (6), Lower Mackenzie (7), Arctic Coast–Islands (8), Keewatin–Southern Baffin Island (16), Northern Ontario (17) and Northern Quebec (18). Data for Peace–Athabasca (6) are not published due to a low number of respondents and data quality issues. Data for drainage region 10 are too unreliable to be published. Totals may not add up to 100% because of rounding.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Map 3
Ocean drainage areas and drainage regions



Note(s): The drainage region codes in this map are used in Tables 2-2, 4-2, 5-2, 6-2, 7-2, 8-2, 9-3, 10-2, 11-2, 12-2 and 15-2.

Source(s): Pearse, P.H., F. Bertrand and J.W. MacLaren, 1985, *Currents of Change: Final Report of the Inquiry on Federal Water Policy*, Environment Canada, Ottawa.
 Statistics Canada, Environment Accounts and Statistics Division, 2009, special tabulation.

Related products

Selected technical and analytical products from Statistics Canada

16-001-M2009007	The Water Yield for Canada As a Thirty-year Average (1971 to 2000): Concepts, Methodology and Initial Results
16-001-M2009008	Agricultural Water Use Survey 2007, Methodology Report
16-001-M2010014	Using a Trend-cycle Approach to Estimate Changes in Southern Canada's Water Yield from 1971 to 2004
16-201-X201000011295	Freshwater supply and demand in Canada

Selected CANSIM tables from Statistics Canada

153-0099	Farm irrigation status and irrigated crop area, by province
153-0100	Irrigation volume by month and by province

Selected surveys from Statistics Canada

5145	Agricultural Water Survey
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Statistical tables

Table 1
Number of farms with irrigated land by crop type, 2010

	Farms with irrigated land
	number
Field crops ¹	2,670
Fruit	2,255
Vegetable	1,195
Hay ²	2,870
Improved pasture ³	1,160

1. Includes annual field crops and tame forages, including barley and potatoes.

2. Includes any cultivated grass or legume crop which has been (or will be) cut and dried principally for hay or ensilage.

3. Includes land that has been altered from its natural state by seeding, draining, irrigating, fertilizing or brush- or weed-control measures.

Note(s): Excludes Yukon, the Northwest Territories and Nunavut. Figures may not add up to totals due to rounding. A farm may have more than one irrigated crop type. In total, there were 7,685 irrigated farms in Canada in 2010.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Table 2-1
Number of farms by irrigation status, 2010 — Province or region

	Farms that usually irrigate ¹	
	Irrigated in 2010	Did not irrigate in 2010
	number	
Canada ²	7,685	1,255
Atlantic region	165	30 ^E
Quebec	670	105 ^E
Ontario	995	400
Manitoba	100	45 ^E
Saskatchewan	370	145
Alberta	2,310	370
British Columbia	3,065	155 ^E

1. Farms that reported irrigating or owning irrigation equipment on the 2006 Census of Agriculture.

2. Excludes Yukon, the Northwest Territories and Nunavut.

Note(s): Figures may not add up to totals due to rounding.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Table 2-2
Number of farms by irrigation status, 2010 — Drainage region

	Drainage region code	Farms that usually irrigate ¹	
		Irrigated in 2010	Did not irrigate in 2010
		number	
Canada ²		7,685	1,255
Pacific Coastal	1	315	F
Fraser–Lower Mainland	2	1,360	110 E
Okanagan–Similkameen	3	1,115	0 ...
Columbia	4	275	F
Missouri	9	135	F
North Saskatchewan	10	35	70 E
South Saskatchewan	11	2,435	345
Assiniboine–Red	12	115	100
Winnipeg, Lower Saskatchewan–Nelson and Churchill	13, 14, 15	55	35 E
Great Lakes	19	950	400
Ottawa	20	80	F
St. Lawrence	21	585	90 E
North Shore–Gaspé, Saint John–St. Croix, Maritime Coastal and Newfoundland–Labrador	22, 23, 24, 25	215	45 E

1. Farms that reported irrigating or owning irrigation equipment on the 2006 Census of Agriculture.

2. Excludes Yukon (5), Peace–Athabasca (6), Lower Mackenzie (7), Arctic Coast–Islands (8), Keewatin–Southern Baffin Island (16), Northern Ontario (17) and Northern Quebec (18). Data for Peace–Athabasca (6) are not published due to a low number of respondents and data quality issues.

Note(s): Figures may not add up to totals due to rounding.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Table 3
Irrigation volume by crop type and month, 2010

	April and May	June	July	August	September and October	Total
	thousands of cubic metres					
All crops ¹	78,461	121,696	326,762	247,194	64,037	838,150
Field crops ²	20,069	53,909	205,899	130,688	28,136 E	438,701
Fruit	5,771	9,997	14,622	13,200	6,228	49,818
Vegetable	3,161	4,176	11,120	8,623	1,233 E	28,313
Hay ³	46,145	45,413	77,357	73,450	17,697	260,062
Improved pasture ⁴	3,316	8,202	17,763	21,232 E	10,744 E	61,256

1. Excludes Yukon, the Northwest Territories and Nunavut.

2. Includes annual field crops and tame forages, including barley and potatoes.

3. Includes any cultivated grass or legume crop which has been (or will be) cut and dried principally for hay or ensilage.

4. Includes land that has been altered from its natural state by seeding, draining, irrigating, fertilizing or brush- or weed-control measures.

Note(s): Figures may not add up to totals due to rounding.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Table 4-1
Irrigation volume per hectare by crop type, 2010 — Province or region

	Field crops ¹	Fruit	Vegetable	Hay ²	Improved pasture ³	All crops
cubic metres per hectare						
Canada ⁴	1,334	3,123	867	2,180	1,926	1,586
Atlantic region	999 ^E	3,254 ^E	1,046	...	...	1,682
Quebec	937	805 ^E	912	...	...	896
Ontario	725	1,921	741	...	...	914
Manitoba	1,535	787	1,495	...	...	1,521
Saskatchewan	832	37	1,008	1,678	798 ^E	1,113
Alberta	1,350	216	1,093	1,537	1,589	1,398
British Columbia	2,303	4,312	421	3,371	3,525	3,046

1. Includes annual field crops and tame forages, including barley and potatoes.
2. Includes any cultivated grass or legume crop which has been (or will be) cut and dried principally for hay or ensilage.
3. Includes land that has been altered from its natural state by seeding, draining, irrigating, fertilizing or brush- or weed-control measures.
4. Excludes Yukon, the Northwest Territories and Nunavut.

Note(s): Figures may not add up to totals due to rounding.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Table 4-2
Irrigation volume per hectare by crop type, 2010 — Drainage region

	Drainage region code	Field crops ¹	Fruit	Vegetable	Hay ²	Improved pasture ³	All crops
cubic metres per hectare							
Canada ⁴		1,334	3,123	867	2,180	1,926	1,586
Pacific Coastal	1	2,942	5,113 ^E	1,837	3,456	4,432 ^E	3,547
Fraser–Lower Mainland	2	2,105	2,434 ^E	315 ^E	3,420	3,150	2,684
Okanagan–Similkameen	3	2,382 ^E	5,786	F	3,251	2,891	3,864
Columbia	4	3,600 ^E	3,385	985 ^E	3,254	4,653	3,400
Missouri	9	988	...	...	1,770	F	1,630
North Saskatchewan	10	2,120 ^E	216	x	x	x	2,095
South Saskatchewan	11	1,301	...	1,094	1,530	1,576	1,358
Assiniboine–Red	12	1,298	559 ^E	1,942	x	x	1,438
Winnipeg, Lower Saskatchewan–Nelson and Churchill	13, 14, 15	1,643	x	x	...	...	1,527
Great Lakes	19	x	x	x	...	...	910
Ottawa	20	x	x	x	...	...	937 ^E
St. Lawrence	21	1,021	740 ^E	899	...	...	890
North Shore–Gaspé, Saint John–St. Croix, Maritime Coastal and Newfoundland–Labrador	22, 23, 24, 25	x	x	x	...	...	1,525

1. Includes annual field crops and tame forages, including barley and potatoes.
2. Includes any cultivated grass or legume crop which has been (or will be) cut and dried principally for hay or ensilage.
3. Includes land that has been altered from its natural state by seeding, draining, irrigating, fertilizing or brush- or weed-control measures.
4. Excludes Yukon (5), Peace–Athabasca (6), Lower Mackenzie (7), Arctic Coast–Islands (8), Keewatin–Southern Baffin Island (16), Northern Ontario (17) and Northern Quebec (18). Data for Peace–Athabasca (6) are not published due to a low number of respondents and data quality issues.

Note(s): Figures may not add up to totals due to rounding.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Table 4-3
Irrigation volume per hectare by crop type, 2010 — Month

	April and May	June	July	August	September and October	Total
	cubic metres per hectare					
Field crops ¹	61	164	626	397	86 E	1,334
Fruit	362	627	917	827	390	3,123
Vegetable	97	128	340	264	38 E	867
Hay ²	387	381	649	616	148	2,180
Improved pasture ³	104 E	258	558	668	338 E	1,926

1. Includes annual field crops and tame forages, including barley and potatoes.
2. Includes any cultivated grass or legume crop which has been (or will be) cut and dried principally for hay or ensilage.
3. Includes land that has been altered from its natural state by seeding, draining, irrigating, fertilizing or brush- or weed-control measures.

Note(s): Excludes Yukon, the Northwest Territories and Nunavut. Figures may not add up to totals due to rounding.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Table 5-1
Irrigation volume by month, 2010 — Province or region

	April and May	June	July	August	September and October	Total
	thousands of cubic metres					
Canada ¹	78,461	121,696	326,762	247,194	64,037	838,150
Atlantic region	462 E	336 E	750 E	1,260	356 E	3,163
Quebec	2,709 E	2,777	3,908	2,759	697 E	12,851
Ontario	1,946	3,260	6,918	6,642	1,609 E	20,375
Manitoba	F	2,705	13,174	8,052	564 E	24,606
Saskatchewan	15,555 E	8,734 E	13,124 E	7,099 E	910 E	45,423
Alberta	21,490	54,281	219,190	162,773	40,762	498,497
British Columbia	36,188	49,603	69,697	58,609	19,138	233,235

1. Excludes Yukon, the Northwest Territories and Nunavut.

Note(s): Figures may not add up to totals due to rounding.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Table 5-2
Irrigation volume by month, 2010 — Drainage region

	Drainage region code	April and May	June	July	August	September and October	Total
thousands of cubic metres							
Canada ¹		78,461	121,696	326,762	247,194	64,037	838,150
Pacific Coastal	1	1,123 ^E	2,706	6,736	6,311	1,417 ^E	18,293
Fraser–Lower Mainland	2	23,111	29,882	37,099	32,045	7,923	130,061
Okanagan–Similkameen	3	7,298	11,877	17,008	12,996	7,504	56,683
Columbia	4	4,656	5,137	8,852	7,258	2,294	28,197
Missouri	9	9,648	x	F	3,435 ^E	F	18,572
North Saskatchewan	10	F	x	F	F	F	F
South Saskatchewan	11	25,267	58,521	227,382	164,182	40,915	516,267
Assiniboine–Red	12	1,863 ^E	x	6,373	3,511	F	13,494
Winnipeg, Lower Saskatchewan–Nelson and Churchill	13, 14, 15	F	1,562 ^E	9,328	5,506	479 ^E	16,876
Great Lakes	19	1,823 ^E	3,096	6,584	6,544	1,609 ^E	19,656
Ottawa	20	x	F	485 ^E	159 ^E	x	1,042 ^E
St. Lawrence	21	2,333 ^E	x	3,673	2,489 ^E	x	11,787
North Shore–Gaspé, Saint John–St. Croix, Maritime Coastal and Newfoundland–Labrador	22, 23, 24, 25	765 ^E	x	834	1,468	x	3,904

1. Excludes Yukon (5), Peace–Athabasca (6), Lower Mackenzie (7), Arctic Coast–Islands (8), Keewatin–Southern Baffin Island (16), Northern Ontario (17) and Northern Quebec (18). Data for Peace–Athabasca (6) are not published due to a low number of respondents and data quality issues.

Note(s): Figures may not add up to totals due to rounding.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Table 6-1
Average volume of irrigation per irrigated farm by crop type, 2010 — Province or region

	Field crops ¹	Fruit	Vegetable	Hay ²	Improved pasture ³	All crops
cubic metres per irrigated farm						
Canada ⁴	164,548	22,106	23,737	90,605	52,911	109,128
Atlantic region	38,009 ^E	14,697 ^E	F	...	...	18,986 ^E
Quebec	F	5,851	26,467 ^E	...	...	19,155
Ontario	23,838	15,232 ^E	18,760	...	...	20,421
Manitoba	292,483	F	212,907	...	...	245,092
Saskatchewan	146,899 ^E	F	20,462 ^E	81,409	12,162 ^E	123,141
Alberta	238,264	F	F	70,590	82,946 ^E	215,826
British Columbia	57,406	30,660	6,155 ^E	116,809	33,089	76,066

1. Includes annual field crops and tame forages, including barley and potatoes.

2. Includes any cultivated grass or legume crop which has been (or will be) cut and dried principally for hay or ensilage.

3. Includes land that has been altered from its natural state by seeding, draining, irrigating, fertilizing or brush- or weed-control measures.

4. Excludes Yukon, the Northwest Territories and Nunavut.

Note(s): Figures may not add up to totals due to rounding.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Table 6-2
Average volume of irrigation per irrigated farm by crop type, 2010 — Drainage region

	Drainage region code	Field crops ¹	Fruit	Vegetable	Hay ²	Improved pasture ³	All crops
cubic metres per irrigated farm							
Canada ⁴		164,548	22,106	23,737	90,605	52,911	109,128
Pacific Coastal	1	39,112 ^E	21,126 ^E	F	83,038 ^E	F	57,865
Fraser–Lower Mainland	2	51,424	26,408 ^E	12,290 ^E	137,568	29,353	95,762
Okanagan–Similkameen	3	146,557 ^E	35,878	F	75,419 ^E	22,402 ^E	50,697
Columbia	4	54,627 ^E	F	772	124,136	43,162 ^E	102,971
Missouri	9	84,406	...	...	126,442	F	134,808
North Saskatchewan	10	F	F	x	x	x	102,550 ^E
South Saskatchewan	11	234,528	...	F	67,988	79,063 ^E	211,862
Assiniboine–Red	12	145,992	F	136,081 ^E	x	x	118,123
Winnipeg, Lower Saskatchewan–Nelson and Churchill	13, 14, 15	372,391	F	x	...	...	291,876
Great Lakes	19	x	15,566 ^E	x	...	...	20,639
Ottawa	20	x	F	x	...	...	12,643 ^E
St. Lawrence	21	F	5,854	28,991 ^E	...	...	20,230
North Shore–Gaspé, Saint John–St. Croix, Maritime Coastal and Newfoundland–Labrador	22, 23, 24, 25	x	12,751 ^E	x	...	...	17,923

1. Includes annual field crops and tame forages, including barley and potatoes.

2. Includes any cultivated grass or legume crop which has been (or will be) cut and dried principally for hay or ensilage.

3. Includes land that has been altered from its natural state by seeding, draining, irrigating, fertilizing or brush- or weed-control measures.

4. Excludes Yukon (5), Peace–Athabasca (6), Lower Mackenzie (7), Arctic Coast–Islands (8), Keewatin–Southern Baffin Island (16), Northern Ontario (17) and Northern Quebec (18). Data for Peace–Athabasca (6) are not published due to a low number of respondents and data quality issues.

Note(s): Figures may not add up to totals due to rounding.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Table 6-3
Average volume of irrigation per irrigated farm by crop type, 2010 — Month

	April and May	June	July	August	September and October	Total
cubic metres per irrigated farm						
Field crops ¹	7,528	20,220	77,229	49,019	10,553 ^E	164,548
Fruit	2,561	4,436	6,488	5,857	2,763	22,106
Vegetable	2,650	3,501	9,323	7,229	1,033 ^E	23,737
Hay ²	16,077	15,822	26,951	25,590	6,166	90,605
Improved pasture ³	2,864	7,084	15,343	18,339	9,280 ^E	52,911

1. Includes annual field crops and tame forages, including barley and potatoes.

2. Includes any cultivated grass or legume crop which has been (or will be) cut and dried principally for hay or ensilage.

3. Includes land that has been altered from its natural state by seeding, draining, irrigating, fertilizing or brush- or weed-control measures.

Note(s): Excludes Yukon, the Northwest Territories and Nunavut. Figures may not add up to totals due to rounding.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Table 7-1
Total irrigated area by crop type, 2010 — Province or region

	Field crops ¹	Fruit	Vegetable	Hay ²	Improved pasture ³	All crops
hectares						
Canada ⁴	328,870	15,950	32,670	119,270	31,810	528,570
Atlantic region	680 ^E	560 ^E	640 ^E	0 ...	0 ...	1,880
Quebec	2,810	2,820	8,710	0 ...	0 ...	14,340
Ontario	9,820	3,390	9,080	0 ...	0 ...	22,290
Manitoba	11,820	F	4,300 ^E	0 ...	0 ...	16,170
Saskatchewan	26,230 ^E	F	F	13,570	780 ^E	40,810 ^E
Alberta	263,110	F	3,330 ^E	64,890	25,160 ^E	356,500
British Columbia	14,400	9,080	6,420 ^E	40,810	5,860	76,570

1. Includes annual field crops and tame forages, including barley and potatoes.
2. Includes any cultivated grass or legume crop which has been (or will be) cut and dried principally for hay or ensilage.
3. Includes land that has been altered from its natural state by seeding, draining, irrigating, fertilizing or brush- or weed-control measures.
4. Excludes Yukon, the Northwest Territories and Nunavut.

Note(s): Figures may not add up to totals due to rounding.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Table 7-2
Total irrigated area by crop type, 2010 — Drainage region

	Drainage region code	Field crops ¹	Fruit	Vegetable	Hay ²	Improved pasture ³	All crops
hectares							
Canada ⁴		328,870	15,950	32,670	119,270	31,810	528,570
Pacific Coastal	1	820 ^E	340 ^E	F	2,550	1,030 ^E	5,160
Fraser–Lower Mainland	2	10,020	3,880	5,730 ^E	25,710	3,110	48,450
Okanagan–Similkameen	3	F	4,800	F	6,120	970 ^E	14,670
Columbia	4	970 ^E	F	80 ^E	6,430	750	8,290
Missouri	9	1,690 ^E	0 ...	0 ...	9,340	370 ^E	11,400
North Saskatchewan	10	1,210 ^E	F	F	F	F	1,580 ^E
South Saskatchewan	11	283,680	0 ...	3,330 ^E	67,660	25,400 ^E	380,070
Assiniboine–Red	12	6,270	90 ^E	1,750 ^E	x	F	9,380
Winnipeg, Lower Saskatchewan–Nelson and Churchill	13, 14, 15	8,310	F	x	0 ...	0 ...	11,050
Great Lakes	19	x	x	x	0 ...	0 ...	21,600
Ottawa	20	x	x	F	0 ...	0 ...	1,110 ^E
St. Lawrence	21	2,270	2,490 ^E	8,480	0 ...	0 ...	13,250
North Shore–Gaspé, Saint John–St. Croix, Maritime Coastal and Newfoundland–Labrador	22, 23, 24, 25	940 ^E	x	x	0 ...	0 ...	2,560

1. Includes annual field crops and tame forages, including barley and potatoes.
2. Includes any cultivated grass or legume crop which has been (or will be) cut and dried principally for hay or ensilage.
3. Includes land that has been altered from its natural state by seeding, draining, irrigating, fertilizing or brush- or weed-control measures.
4. Excludes Yukon (5), Peace–Athabasca (6), Lower Mackenzie (7), Arctic Coast–Islands (8), Keewatin–Southern Baffin Island (16), Northern Ontario (17) and Northern Quebec (18). Data for Peace–Athabasca (6) are not published due to a low number of respondents and data quality issues.

Note(s): Figures may not add up to totals due to rounding.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Table 8-1
Average irrigated area per irrigated farm by crop type, 2010 — Province or region

	Field crops ¹	Fruit	Vegetable	Hay ²	Improved pasture ³	All crops
	hectares					
Canada ⁴	123	7	27	42	27	69
Atlantic region	38	5 ^E	21 ^E	...	...	11
Quebec	40 ^E	7	29	...	...	21
Ontario	33	8	25	...	...	22
Manitoba	191	4 ^E	142	...	...	161
Saskatchewan	177 ^E	F	20 ^E	49	15	111
Alberta	177	0 ^{SE}	135 ^E	46	52	154
British Columbia	25	7	15 ^E	35	9	25

1. Includes annual field crops and tame forages, including barley and potatoes.
2. Includes any cultivated grass or legume crop which has been (or will be) cut and dried principally for hay or ensilage.
3. Includes land that has been altered from its natural state by seeding, draining, irrigating, fertilizing or brush- or weed-control measures.
4. Excludes Yukon, the Northwest Territories and Nunavut.

Note(s): Figures may not add up to totals due to rounding.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Table 8-2
Average irrigated area per irrigated farm by crop type, 2010 — Drainage region

	Drainage region code	Field crops ¹	Fruit	Vegetable	Hay ²	Improved pasture ³	All crops
		hectares					
Canada ⁴		123	7	27	42	27	69
Pacific Coastal	1	13 ^E	4 ^E	F	24	12 ^E	16
Fraser–Lower Mainland	2	24	11	39 ^E	40	9	36
Okanagan–Similkameen	3	62 ^E	6	F	23	8	13
Columbia	4	15 ^E	1 ^E	1 ^E	38	9	30
Missouri	9	85	...	...	71	27	83
North Saskatchewan	10	79 ^E	0 ^{SE}	x	x	x	49 ^E
South Saskatchewan	11	180	...	156 ^E	44	50	156
Assiniboine–Red	12	112	4 ^E	70 ^E	x	x	82
Winnipeg, Lower Saskatchewan–Nelson and Churchill	13, 14, 15	227	x	x	...	...	191
Great Lakes	19	x	x	x	...	...	23
Ottawa	20	x	x	2 ^E	...	...	13 ^E
St. Lawrence	21	F	8	32	...	...	23
North Shore–Gaspé, Saint John–St. Croix, Maritime Coastal and Newfoundland–Labrador	22, 23, 24, 25	41	x	x	...	...	12

1. Includes annual field crops and tame forages, including barley and potatoes.
2. Includes any cultivated grass or legume crop which has been (or will be) cut and dried principally for hay or ensilage.
3. Includes land that has been altered from its natural state by seeding, draining, irrigating, fertilizing or brush- or weed-control measures.
4. Excludes Yukon (5), Peace–Athabasca (6), Lower Mackenzie (7), Arctic Coast–Islands (8), Keewatin–Southern Baffin Island (16), Northern Ontario (17) and Northern Quebec (18). Data for Peace–Athabasca (6) are not published due to a low number of respondents and data quality issues.

Note(s): Figures may not add up to totals due to rounding.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Table 9-1
Number of farms by irrigation method, 2010 — Crop type

	Sprinkler ¹	Micro ²	Surface ³
	number		
All crops ⁴	6,035	1,480	1,540
Field crops ⁵	2,480	160 ^E	295
Fruit	1,265	1,200	295 ^E
Vegetable	930	200 ^E	220 ^E
Hay ⁶	2,455	0 ...	570
Improved pasture ⁷	905	F	335

1. Includes: hand move; solid or permanent set; side roll, wheel line, wheel move or wheel roll; traveller, volume gun, travelling gun, walker, overhead or circular; linear move; and centre pivot.

2. Includes: surface drip, sub-surface drip, micro-sprinkler, bubblers, microjet, and hand watering.

3. Includes: down rows, furrows, corrugations, border dyke, level basins, uncontrolled flooding, and back flooding.

4. Excludes Yukon, the Northwest Territories and Nunavut.

5. Includes annual field crops and tame forages, including barley and potatoes.

6. Includes any cultivated grass or legume crop which has been (or will be) cut and dried principally for hay or ensilage.

7. Includes land that has been altered from its natural state by seeding, draining, irrigating, fertilizing or brush- or weed-control measures.

Note(s): A farm may have more than one irrigated crop type or method per crop type.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Table 9-2
Number of farms by irrigation method, 2010 — Province or region

	Sprinkler ¹	Micro ²	Surface ³
	number		
Canada ⁴	6,035	1,480	1,540
Atlantic region	110 ^E	F	F
Quebec	440	265	80 ^E
Ontario	670	270 ^E	240 ^E
Manitoba	85	F	15 ^E
Saskatchewan	195 ^E	F	175
Alberta	1,985	90 ^E	660
British Columbia	2,545	815	330

1. Includes: hand move; solid or permanent set; side roll, wheel line, wheel move or wheel roll; traveller, volume gun, travelling gun, walker, overhead or circular; linear move; and centre pivot.

2. Includes: surface drip, sub-surface drip, micro-sprinkler, bubblers, microjet, and hand watering.

3. Includes: down rows, furrows, corrugations, border dyke, level basins, uncontrolled flooding, and back flooding.

4. Excludes Yukon, the Northwest Territories and Nunavut.

Note(s): Figures may not add up to totals due to rounding. A farm may have more than one irrigation method.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Table 9-3
Number of farms by irrigation method, 2010 — Drainage region

	Drainage region code	Sprinkler ¹	Micro ²	Surface ³
		number		
Canada ⁴		6,035	1,480	1,540
Pacific Coastal	1	255	70 ^E	F
Fraser–Lower Mainland	2	1,060	250	175
Okanagan–Similkameen	3	960	485	F
Columbia	4	265	F	F
Missouri	9	40 ^E	0...	110
North Saskatchewan	10	15 ^E	10 ^E	F
South Saskatchewan	11	2,075	F	700
Assiniboine–Red	12	85	F	30 ^E
Winnipeg, Lower Saskatchewan–Nelson and Churchill	13, 14, 15	55	0...	F
Great Lakes	19	645	245 ^E	240 ^E
Ottawa	20	65 ^E	45 ^E	0...
St. Lawrence	21	370	230	65 ^E
North Shore–Gaspé, Saint John–St. Croix, Maritime Coastal and Newfoundland–Labrador	22, 23, 24, 25	140 ^E	50 ^E	50 ^E

1. Includes: hand move; solid or permanent set; side roll, wheel line, wheel move or wheel roll; traveller, volume gun, travelling gun, walker, overhead or circular; linear move; and centre pivot.

2. Includes: surface drip, sub-surface drip, micro-sprinkler, bubblers, microjet, and hand watering.

3. Includes: down rows, furrows, corrugations, border dyke, level basins, uncontrolled flooding, and back flooding.

4. Excludes Yukon (5), Peace–Athabasca (6), Lower Mackenzie (7), Arctic Coast–Islands (8), Keewatin–Southern Baffin Island (16), Northern Ontario (17) and Northern Quebec (18). Data for Peace–Athabasca (6) are not published due to a low number of respondents and data quality issues.

Note(s): Figures may not add up to totals due to rounding. A farm may have more than one irrigation method.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Table 10-1
Number of farms by water and energy conservation practice, 2010 — Province or region

	Wind breaks	Leaving stubble on fields	Watering at night or in the morning	Pressure reduction	Water or energy saving nozzles	Other energy saving methods or devices	No practices
		number					
Canada ¹	1,675	2,455	3,695	2,490	2,685	870	1,955
Atlantic region	30 ^E	20 ^E	125 ^E	F	60 ^E	5 ^E	45 ^E
Quebec	375	115 ^E	510	225	160 ^E	55 ^E	105 ^E
Ontario	560	535	720	240	240 ^E	165 ^E	270 ^E
Manitoba	55 ^E	65	55	45	50	15 ^E	20 ^E
Saskatchewan	100 ^E	180 ^E	80 ^E	115 ^E	115 ^E	F	195
Alberta	230 ^E	945	515	1,025	1,175	170 ^E	605
British Columbia	325	595	1,695	795	885	430	715

1. Excludes Yukon, the Northwest Territories and Nunavut.

Note(s): Figures may not add up to totals due to rounding. A farm may use more than one practice.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Table 10-2
Number of farms by water and energy conservation practice, 2010 — Drainage region

	Drainage region code	Wind breaks	Leaving stubble on fields	Watering at night or in the morning	Pressure reduction	Water or energy saving nozzles	Other methods or devices	No practices
		number						
Canada ¹		1,675	2,455	3,695	2,490	2,685	870	1,955
Pacific Coastal	1	115 ^E	40 ^E	185	85 ^E	60 ^E	70 ^E	80 ^E
Fraser–Lower Mainland	2	115 ^E	305	805	255	200	185 ^E	345
Okanagan–Similkameen	3	F	175 ^E	555	415	570	140 ^E	190 ^E
Columbia	4	25 ^E	70 ^E	150	45 ^E	45 ^E	35 ^E	105
Missouri	9	20 ^E	20 ^E	F	F	F	30 ^E	75
North Saskatchewan	10	45 ^E	F	x	20 ^E	x	F	30 ^E
South Saskatchewan	11	240 ^E	1,040	550	1,085	1,255	160 ^E	630
Assiniboine–Red	12	35	65	40	40	45	5 ^E	80
Winnipeg, Lower Saskatchewan–Nelson and Churchill	13, 14, 15	35 ^E	30 ^E	35	20 ^E	25	10 ^E	10 ^E
Great Lakes	19	540	530	685	240 ^E	230 ^E	160 ^E	270 ^E
Ottawa	20	40 ^E	F	70 ^E	F	35 ^E	F	F
St. Lawrence	21	325	95 ^E	440	200 ^E	135 ^E	F	F
North Shore–Gaspé, Saint John–St. Croix, Maritime Coastal and Newfoundland–Labrador	22, 23, 24, 25	65 ^E	20 ^E	160 ^E	F	60 ^E	10 ^E	70 ^E

1. Excludes Yukon (5), Peace–Athabasca (6), Lower Mackenzie (7), Arctic Coast–Islands (8), Keewatin–Southern Baffin Island (16), Northern Ontario (17) and Northern Quebec (18). Data for Peace–Athabasca (6) are not published due to a low number of respondents and data quality issues.

Note(s): Figures may not add up to totals due to rounding. A farm may use more than one practice.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Table 11-1
Number of farms that stopped irrigating or did not irrigate by reason, 2010 — Province or region

	Stopped irrigating or did not irrigate		Reason for stopping or not irrigating	
	No	Yes	Crop did not require irrigation	Other reasons
number				
Canada ¹	3,875	4,985	3,540	2,025
Atlantic region	95 ^E	100 ^E	80 ^E	40 ^E
Quebec	465	290	200 ^E	90 ^E
Ontario	560	835	630	170 ^E
Manitoba	35	105	95	40 ^E
Saskatchewan	140 ^E	370	250	135 ^E
Alberta	800	1,845	1,510	680
British Columbia	1,780	1,425	775	870

1. Excludes Yukon, the Northwest Territories and Nunavut.

Note(s): Figures may not add up to totals due to rounding. A farm may report more than one reason.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Table 11-2
Number of farms that stopped irrigating or did not irrigate by reason, 2010 — Drainage region

Drainage region code	Stopped irrigating or did not irrigate		Reason for stopping or not irrigating	
	No	Yes	Crop did not require irrigation	Other reasons
	number			
Canada ¹	3,875	4,985	3,540	2,025
Pacific Coastal	180	170	70 ^E	115 ^E
Fraser–Lower Mainland	720	740	360	510
Okanagan–Similkameen	745	370	250 ^E	175 ^E
Columbia	140	145	95 ^E	75 ^E
Missouri	70	70	50 ^E	35 ^E
North Saskatchewan	5 ^E	90	80 ^E	10 ^E
South Saskatchewan	835	1,920	1,515	745
Assiniboine–Red	35 ^E	180	155	35
Winnipeg, Lower Saskatchewan–Nelson and Churchill	13, 14, 15	25	65	F
Great Lakes	19	535	615	165 ^E
Ottawa	20	65 ^E	25 ^E	0...
St. Lawrence	21	380	270	F
North Shore–Gaspé, Saint John–St. Croix, Maritime Coastal and Newfoundland–Labrador	22, 23, 24, 25	145 ^E	120	80 ^E
			60 ^E	

1. Excludes Yukon (5), Peace–Athabasca (6), Lower Mackenzie (7), Arctic Coast–Islands (8), Keewatin–Southern Baffin Island (16), Northern Ontario (17) and Northern Quebec (18). Data for Peace–Athabasca (6) are not published due to a low number of respondents and data quality issues.

Note(s): Figures may not add up to totals due to rounding. A farm may report more than one reason.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Table 12-1
Number of farms by irrigation water source, 2010 — Province or region

	On-farm underground water or well water	On-farm surface water	Off-farm water	Other sources
	number			
Canada ¹	1,555	3,260	3,705	170^E
Atlantic region	40 ^E	130 ^E	F	0...
Quebec	255	500	F	0...
Ontario	310	775	115 ^E	F
Manitoba	45	60	15 ^E	0...
Saskatchewan	F	125 ^E	215 ^E	F
Alberta	F	460	2,005	15 ^E
British Columbia	840	1,210	1,315	F

1. Excludes Yukon, the Northwest Territories and Nunavut.

Note(s): Figures may not add up to totals due to rounding. A farm may use more than one source.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Table 12-2
Number of farms by irrigation water source, 2010 — Drainage region

	Drainage region code	On-farm underground water or well water	On-farm surface water	Off-farm water	Other sources
number					
Canada ¹		1,555	3,260	3,705	170 ^E
Pacific Coastal	1	160	175	55 ^E	F
Fraser–Lower Mainland	2	475	760	235	F
Okanagan–Similkameen	3	125 ^E	140 ^E	925	F
Columbia	4	85 ^E	145	100	F
Missouri	9	F	50 ^E	75	0...
North Saskatchewan	10	F	25 ^E	F	F
South Saskatchewan	11	F	485	2,110	10 ^E
Assiniboine–Red	12	5 ^E	65	40	0...
Winnipeg, Lower Saskatchewan–Nelson and Churchill	13, 14, 15	40	25 ^E	10 ^E	0...
Great Lakes	19	290	750	115 ^E	F
Ottawa	20	35 ^E	60 ^E	0...	0...
St. Lawrence	21	240 ^E	415	F	0...
North Shore–Gaspé, Saint John–St. Croix, Maritime Coastal and Newfoundland–Labrador	22, 23, 24, 25	45 ^E	180	F	0...

1. Excludes Yukon (5), Peace–Athabasca (6), Lower Mackenzie (7), Arctic Coast–Islands (8), Keewatin–Southern Baffin Island (16), Northern Ontario (17) and Northern Quebec (18). Data for Peace–Athabasca (6) are not published due to a low number of respondents and data quality issues.

Note(s): Figures may not add up to totals due to rounding. A farm may use more than one source.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Table 13
Number of farms by off-farm irrigation water source and province or region, 2010

	Tap water (drinking water or municipal water)	Treated wastewater	Provincial sources	Private sources	Other sources
number					
Canada ¹	525	55 ^E	2,860	105 ^E	240 ^E
Atlantic region	0...	0...	0...	0...	F
Quebec	0...	0...	0...	F	5 ^E
Ontario	F	0...	F	F	F
Manitoba	0...	F	10 ^E	5 ^E	0...
Saskatchewan	0...	5 ^E	185 ^E	0...	F
Alberta	F	F	1,895	F	F
British Columbia	435	F	745	55 ^E	80 ^E

1. Excludes Yukon, the Northwest Territories and Nunavut.

Note(s): Figures may not add up to totals due to rounding. A farm may use more than one source.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Table 14
Number of farms by reason for using an off-farm irrigation water source and province or region, 2010

	No water or not enough water on the farm	Poor quality of on-farm water	Other reasons
	number		
Canada 1	2,945	F	650
Atlantic region	F	0 ...	0 ...
Quebec	F	0 ...	F
Ontario	80 E	0 ...	F
Manitoba	15 E	0 ...	F
Saskatchewan	155 E	F	60 E
Alberta	1,730	F	175 E
British Columbia	940	F	365 E

1. Excludes Yukon, the Northwest Territories and Nunavut.

Note(s): Figures may not add up to totals due to rounding. A farm may report more than one reason.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Table 15-1
Number of farms by treatment of irrigation water, 2010 — Province or region

	Treated irrigation water	
	Yes	No
	number	
Canada 1	560	7,040
Atlantic region	F	130 E
Quebec	F	630
Ontario	130 E	870
Manitoba	0 ...	100
Saskatchewan	F	355
Alberta	100 E	2,185
British Columbia	255 E	2,770

1. Excludes Yukon, the Northwest Territories and Nunavut.

Note(s): Figures may not add up to totals due to rounding.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Table 15-2
Number of farms by treatment of irrigation water, 2010 — Drainage region

	Drainage region code	Treated irrigation water	
		Yes	No
		number	
Canada 1		560	7,040
Pacific Coastal	1	F	305
Fraser–Lower Mainland	2	100 E	1,225
Okanagan–Similkameen	3	135 E	975
Columbia	4	F	265
Missouri	9	0 ...	135
North Saskatchewan	10	0 ...	30
South Saskatchewan	11	95 E	2,310
Assiniboine–Red	12	F	100
Winnipeg, Lower Saskatchewan–Nelson and Churchill	13, 14, 15	0 ...	60
Great Lakes	19	135 E	820
Ottawa	20	0 ...	85
St. Lawrence	21	F	550
North Shore–Gaspé, Saint John–St. Croix, Maritime Coastal and Newfoundland–Labrador	22, 23, 24, 25	F	180

1. Excludes Yukon (5), Peace–Athabasca (6), Lower Mackenzie (7), Arctic Coast–Islands (8), Keewatin–Southern Baffin Island (16), Northern Ontario (17) and Northern Quebec (18). Data for Peace–Athabasca (6) are not published due to a low number of respondents and data quality issues.

Note(s): Figures may not add up to totals due to rounding.

Source(s): Statistics Canada, 2011, Environment Accounts and Statistics Division, Agricultural Water Survey (survey number 5145).

Reference period

The information contained in this report reflects water use and irrigation methods and practices that took place during the 2010 growing season.

Survey frame and coverage

The target population for this survey is the Canadian farm operations that irrigate. The survey frame was created using information collected as part of the 2006 Census of Agriculture. The statistical unit was the agricultural operation. Any unit which reported sales of \$10,000 or more and reported either irrigating in 2005 or owning irrigation equipment was considered to be part of the initial survey frame.

A number of groups were removed from the initial survey frame.

- All institutional farms (for example, government, university and prison farms), Indian reserve farms, community pastures, pure hatcheries and farms producing only Christmas trees.
- All units which were in the target population for Statistics Canada's Greenhouse, Sod and Nursery survey.
- All units that belong to Statistics Canada's Large Agricultural Operations Statistics program. These very large and complex units have special collection agreements with Statistics Canada concerning the surveys for which they will provide data.
- All units in the six most northern of Canada's 25 drainage regions (DRs).

The remaining 15,390 units comprised the survey frame. It is acknowledged that due to the vintage of the information used to develop the frame and the exclusions listed above, the frame will not reflect the entire population.

Sample selection

A stratified sample design was used. Geographic strata were defined at the DR level or, when there were small populations within an individual DR, groups of DRs. This resulted in 14 geographic strata. Within each of these strata, the population was divided into four sub-strata based on their predicted water use for irrigation. This predicted value was derived from a model which used data from the 2006 Census of Agriculture and the 2007 Agricultural Water Use Survey. Units were categorized into one of four sub-strata of zero, low, medium and high predicted water use. The thresholds for these sub-strata varied from one geographic stratum to the next.

The sample was allocated to minimize coefficient of variation targets at the geographic stratum (DR group) level while at the same time not exceeding a maximum sample size of 2,000 units. The targets were not consistent from one DR group to the next. In those DR groups where greater irrigation was anticipated, the targets were lower than those used in other areas. The total sample size was 1,981 units.

In order to reduce the response burden on those farmers who had been selected for recent Statistics Canada surveys, a sample coordination method known as the microstratum approach was used. Within a geographic/size stratum, the units which had recently been least burdened by other Statistics Canada agriculture surveys were more likely to be selected for the Agricultural Water Survey (AWS).

Data collection

The AWS was a voluntary survey. Respondents were mailed out a questionnaire and were asked to mail back their responses. A telephone follow-up took place for non-responding units.

An initial letter was sent to the selected units in the spring of 2010. This letter introduced the survey and informed the operator that its primary purpose was to collect information on water used during the 2010 growing season for irrigation purposes. It also asked the operator to keep track of the farm's water use for irrigation in order to report it later in the 2010 growing season.

The survey questionnaires were mailed out to the selected units in late August. Respondents were given 30 days to complete it and return it by mail. Those that did not respond within that time period were contacted by Statistics Canada interviewers. A Computer Assisted Telephone Interviewing (CATI) questionnaire allowed the operator to complete the survey over the telephone rather than mailing in the questionnaire.

Data entry, editing and imputation

The paper questionnaires were captured into an electronic format at Statistics Canada's Head Office. The responses from the CATI interviews were downloaded directly to this format. An initial set of important edits was run against the data to identify inconsistencies in the data. Statistical methods were also used to identify units which appeared to have questionable reported values. When important inconsistencies were identified, Statistics Canada personnel attempted to contact the respondent by telephone for clarification and correction if necessary.

In cases where this follow-up was not successful or the inconsistencies were not important enough to warrant a follow-up, a combination of manual and automated editing and imputation took place. A set of edits and predetermined actions was used to impute a value when enough information was available to reasonably deduce the response of a missing or inconsistent field. If this information did not exist, then the action depended upon the field. For those fields related to irrigated area or irrigation volume, the missing or inconsistent data was imputed in an automated manner using a nearest neighbour imputation approach. The imputation was done in such a way to minimize the number of changes to the original data. For all other fields, the response was set to the "don't know" value.

Estimation

Because the AWS was a sample survey, sampling weights were applied to individual respondents to represent the number of units in the population that they represent. The initial or design weights were calculated as the probability of the unit being selected for the sample. As with all surveys, there was non-response. An adjustment was made to the weights of the respondents to account for the non-responding units. In order to estimate a characteristic for the entire population, this final weight is multiplied by the response value and summed up over the entire population.

Data quality, sampling and non-sampling errors

The statistics contained in this publication are estimates derived from a random sample of Canadian farms and, as such, are subject to sampling and non-sampling errors. The quality of the estimates thus depends on the combined effect of these types of errors.

Sampling errors

These errors arise because observations are made only on a sample and not on the entire population. The sampling error depends on such factors as the size of the sample, the variability of the characteristic of interest in the population, the sampling design and the method of estimation. For example, for a given sample size, the sampling error will depend on the stratification procedure employed, allocation of the sample, choice of the sampling units and method of selection. In sample surveys, since inference is made about the entire population covered by the survey on the basis of data obtained from only a part of the population, the results are likely to be different than if a complete census was taken under the same general survey conditions. The most important feature of probability sampling is that the sampling error can be measured from the sample itself.

Typically the sampling error is measured by the expected variability of the estimate from the true value, expressed as a percentage of the estimate. This measure is expressed as the coefficient of variation (CV). Coefficients of variation of the final estimates were computed for the Agricultural Water Survey and are indicated on the statistical tables. The quality of the estimates was classified as follows:

A. Excellent	CV is 0.00% to 4.99%
B. Very good	CV is 5.00% to 9.99%
C. Good	CV is 10.00% to 14.99%
D. Acceptable	CV is 15.00% to 24.99%
E. Use caution	CV is 25.00% to 49.99%
F. Unreliable	CV is > 49.99% (data are suppressed)

Non-sampling errors

These errors are present whether a sample or a complete census of the population is taken. Non-sampling errors may be introduced at various stages of data collection (non-response, differences in the interpretation of questions, incorrect information from respondents) and data processing (such as coding, data entry, editing, weighting, tabulation, etc.). All efforts are undertaken to minimize non-sampling errors through extensive edits, quality control steps and data analysis, but some of these errors are outside the control of Statistics Canada.

After performing the editing and imputation steps and excluding the out-of-scope units, the resulting response rate was 56.8%.

Data confidentiality

Data confidentiality is ensured under the *Statistics Act*, which prohibits the divulging of individual or aggregated data where individuals or businesses might be identified. In the case of the AWS this is ensured by a process known as tabular data suppression. Individual cells in a published table which are at risk of providing identifiable information about a respondent are suppressed and replaced with an x. In some cases additional or secondary cells may need to be suppressed to maintain the confidentiality of the originally suppressed cell.

Other methods were also used to preserve confidentiality. Any tabular cell had to have at least three non-zero contributors in order for it to be published. As well, a random rounding approach was used. Estimates for totals were randomly rounded up or down to a multiple of five. This means that the equality of rounded values with rounded marginal totals may not be maintained.

Data for the Peace-Athabasca (6) drainage region were not published or included in the estimates due to a low number of respondents and resulting data quality and confidentiality issues.