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TECHNICAL REPORT

Canadian Droughts of 2001 and 2002 Water Resource Conditions in Ontario: Impacts and Adaptations

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Canadian Droughts of 2001 and 2002
Water Resource Conditions in Ontario: Impacts and Adaptations

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Executive Summary

Introduction and Methodology:

The country wide drought across Canada in 2001-2002 had severe impacts with Alberta and Saskatchewan suffering the greatest. Some examples of environmental damage from drought include loss of vegetation cover, soil erosion and worsening water quality, which compromises the long term sustainability of our agricultural activities and presents a threat to plants and animals as well as increase the risk of forest fires. The Ontario Low Water Response (OLWR) was a program developed in 1999 by the Ontario Ministry of Natural Resources in response to low water conditions. Drought conditions are indicated by three levels with increasing severity for each level; Level I (Conservation), Level II (Conservation, Restriction) and Level III (Conservation, Restriction, Regulation).

In this report, data from the Environment Canada web site and Conservation Authorities were used to provide a descriptive analysis of water supply trends for Ontario, with a focus on conditions in 2001-2002.

Rivers and Creeks

- A downward trend for all river and streams for the period of 1967-2003 signifying dwindling water resources
- Summer flows declined to almost zero or zero streamflow in 8 out of 10 stations in 2001 and 2002
- The Grand River at Brantford, the Thames River at Thamesville and the Saugeen River near Port Elgin were the three most impacted rivers in 2001 and 2002. The decline was especially dramatic in 2002 with the difference from average annual streamflow at $-11.82\text{m}^3/\text{s}$, $-31.46\text{m}^3/\text{s}$ and $-5.72\text{m}^3/\text{s}$ for the three rivers respectively
- In summer 2001, the Grand River at Brantford was $-36.5\text{m}^3/\text{s}$ below the average annual streamflow and in summer 2002 $-26.7\text{m}^3/\text{s}$ below the average annual streamflow
- Thames River at Thamesville was $-41.53\text{m}^3/\text{s}$ below the average annual streamflow in summer 2001, $-36.1\text{m}^3/\text{s}$ below in summer 2002, and reached its lowest point in the period 2000-2002 during fall 2002 when it was $-42.67\text{m}^3/\text{s}$ below average
- Saugeen River near Port Elgin was $-32.27\text{m}^3/\text{s}$ below the average annual streamflow in summer 2001 and $-38.5\text{m}^3/\text{s}$ in summer 2002 when it was the most severely impacted river followed by the Thames River in Thamesville

Lakes and Reservoirs

❖ Grand River Conservation Authority (GRCA):

- Flow augmentation through Kitchener reached near 100% and augmentation through Brantford reached 91% in 2001 while the amount of flow normally added to the Grand River at Brantford is between 40 to 55%

- Effects of the drought in 2002 were less visible in the main Grand River, lower Speed River and lower Conestogo where flows remained at near normal due to flow augmentation from the major reservoirs operated by the GRCA
- At times during summer 2002, over 80% of water in the Grand River through Kitchener was augmented by reservoirs

❖ **Quinte Conservation Authority (CA):**

- Quantitative analyses could not be done due to missing data

❖ **Rideau Conservation Authority (CA):**

- Only limited analyses were done to Bob's Lake, Christie Lake, Wolfe Lake, Big Rideau Lake and Upper Rideau Lake due to missing data
- There is an increasing trend in water levels for the five lakes except Bob's Lake
- Each lake has its own water level standards based on operating season (or navigation season) and fishery requirements (spawning needs)
- Notices were posted to inform boaters of possibility that 5 feet of draught may not be available as is normally the case
- Drawing water from the reservoirs is done equally based on their normal drawdown

❖ **Trent Severn Waterway:**

- Only limited analyses can be done to Lake Simcoe, Balsam Lake, Lake Scugog, Rice Lake and Mississauga Lake due to missing data. These lakes controlled by the Trent Severn Waterway and used to augment flows during drought conditions
- Lake Simcoe was the only lake with a "rule curve" where ideal water levels are maintained throughout the year
- Lake Simcoe and Lakes Scugog have no inflow other than their catchment areas
- Lake Scugog is drawdown in the winter to prepare for spring
- Balsam Lake is maintained by reservoirs within the Gull River system and is also drawdown in winter to prepare for spring
- Rice Lake is maintained by the reservoirs as well but is not drawdown
- Mississauga Lake is a reservoir for the Trent Severn Waterway to maintain navigation during the summer

Groundwater Levels

- The Ontario Ministry of the Environment (MOE) monitors specific wells for their own purposes and the data are not available to the public. No assessment can be made on groundwater resources in Ontario because MOE does not collect historic data for any wells.

Ontario Low Water Response Program (OLWR)

- Created by the provincial government due to recent dry conditions to ensure provincial preparedness, assist in coordination and support local response to drought

- Level I signifies existence of potential water supply problems
- Level II signifies that there might be major water supply issues and restrictions could be imposed in the form of the implementation of bylaws
- Level III is the most severe dry level condition where usual water demands are not met and where there are socioeconomic impacts
- These provincial standards cannot be applied to all watersheds as each watershed possesses unique characteristics. Therefore some Conservation Authorities have permission to set their own Level I or II standards for their particular watershed

❖ **Water Response Team (WRT):**

- Created as a result of the establishment of OLWR with the main focus in reacting and responding to low water conditions
- Each watershed has its own WRT consisting of local water users and local and provincial water managers
- Identifies severity of low water situations and implement water conservation strategies such as public awareness/communication and implementing drought management tools
- The Ministries of Natural Resources and Environment are responsible for monitoring low water conditions and confirm whether a watershed is in a Level I condition
- The WRT determines if a watershed is in a Level II situation based on the monitoring data network and make recommendation to the Ontario Water Directors Committee (OWDC) Low Water Committee in the case of a Level III situation

Adaptations Adopted by Conservation Authorities (CAs) and Regions for Water Conservation during the drought conditions in 2001 and 2002:

❖ Grand River Conservation Authority (GRCA):

- Municipalities of Centre Wellington and the City of Guelph implemented lawn-watering bans in 2001
- City of Guelph developed a comprehensive outdoor water use bylaw that helped reduce water demand by 20%-30% in 2002

❖ Long Point Region Conservation Authority:

- In 2002, various municipal watering bans were in effect such as restricting watering to only certain periods of time during the day due to Level I low water conditions

❖ York Region:

- In 2001, some golf courses were exceeding their permitted rates of water use and automated lawn watering systems continued to operate even though a lawn watering ban was in effect in the Toronto region
- A strict ban on outdoor water use was in place for July 2002 in Newmarket, which was not a normal situation

- ❖ **Cataraqui Region Conservation Authority:**
 - Participated in the Provincial Groundwater Monitoring Program in 2001 to acquire better knowledge about the status of groundwater levels
 - Level II status declared in a news release prompting MOE to release letters of reduction to Permit to take Water (PTTW) users in 2002.

- ❖ **Rideau Valley Conservation Authority:**
 - WRT recognized the Level III drought that occurred from late July through October 2001, which was based on a report documenting the social, environmental and economic impacts of the drought, including more than 50 completed questionnaires and interviews with water managers and users

- ❖ **South Nation Conservation Authority:**
 - In 2001, a hotline was established for residents to call and report drought impacts so the South Nation Conservation can identify locations of vulnerable groundwater sources. Water restrictions were imposed by individual municipalities such as watering on alternate days during certain hours and a ban on all sprinklers (except for hand held hoses).
 - Level II was declared by WRT in 2002. A press release was issued asking residents to conserve water and municipalities were asked to enforce water restriction bylaws. Drought signs were installed at various entry points to the SNC watershed with the following words: “Drought conditions in effect – please conserve water”

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Introduction and Methodology

Throughout most of human history, the world's freshwater supply was adequate to serve the needs of human activities while still maintaining biologically diverse ecosystems. However, as populations continue to grow, the demand for water has increased, causing water supplies to be stressed. Studies show that maximum flows are tending to decrease significantly across most of Canada (Environment Canada 2004). These hydrologic changes are expected to result in diverse economic, social, and political consequences.

A major drought occurred all across Canada in 2001-2002 with severe impacts especially for Western Canada (Alberta and Saskatchewan suffered the greatest). Agriculture suffered first and most severely but eventually the drought impacted diverse sectors of the economy. According to Wheaton et al. (2005) Alberta and Saskatchewan crop yields and harvested areas were below average in 2001 and 2002- Alberta producers lost \$413 million in 2001 and \$1.33 billion in 2002 due to lost crop production. Saskatchewan suffered a similar fate with a loss of \$925 million in 2001 and \$1.49 billion in 2002. Prince Edward Island potato farmers lost over 50% of the potato crop in 2001 (Koshida, 2005), a significant loss to the agricultural sector.

The risk of serious environmental damage, particularly through a loss of vegetation cover and soil erosion, has long term implications for the sustainability of our agricultural industries. Water quality suffers, plants and animals are threatened and forest fires also increase during droughts.

In light of the recent low water conditions, the Ontario Ministry of Natural Resources developed the Ontario Low Water Response (OLWR) in 1999 to deal with low water or drought conditions. Drought conditions are indicated by three levels; Level I (Conservation), Level II (Conservation, Restriction) and Level III (Conservation, Restriction, Regulation) with each level increasing in severity. Many Conservation Authorities declared Level I droughts in Southwestern Ontario in 2001, including Essex, Nottawasaga and St. Clair Region.

The report utilized secondary data from Environment Canada web site and Conservation Authorities. The objective of this report is to provide a descriptive analysis of water supply trends for Ontario, with a focus on 2001-2002 conditions.

Rivers and Creeks

Although Western Canada was hardest hit by the 2001-2002 droughts, Ontario suffered as well, causing grief for farmers, food producers and water resource managers. Rivers and creeks were examined to understand the impact of the drought.

Twelve hydrometric stations, with the common period of record 1967-2003, were chosen from southwestern and eastern Ontario. Monthly streamflow data was available on the Water Survey of Canada website (Environment Canada 2003). Referring to the graphs in the Appendix, there is a general downward trend for all rivers and creeks, signifying that water availability has decreased in recent years. Referring to the monthly graphs of 2001-2002 (Appendix), the normal “spike” in streamflow late winter/early spring occurs due to snowmelt entering the rivers. However, summer flows can decline to almost zero or zero streamflow. This has serious complications for farmers’ sources of water supply.

The difference from the average annual streamflow in 2000 and 2001 are all above average (Table 1). However in 2002 all values were negative, signifying below average streamflow. The two rivers that seem to have been impacted the most are Grand River at Brantford and Thames River at Thamesville. The difference from the average annual streamflow was $-11.82 \text{ m}^3/\text{s}$ and $-31.46 \text{ m}^3/\text{s}$, respectively.

When rivers and creeks were examined in more detail for 2000-2002 (Table 2), generally the difference from the average annual streamflow in the winter and spring were positive, thus no significant changes can be reported. However, the difference from the average annual streamflow in the summer and fall were negative. Three rivers which were considerably well below the average annual streamflow were, as mentioned, Grand River at Brantford, Thames River at Thamesville and Saugeen River near Port Elgin. The summers of 2001 and 2002 saw a dramatic decline for these rivers.

Grand River at Brantford was $-36.5 \text{ m}^3/\text{s}$ below the average annual streamflow for summer 2001 and $-26.7 \text{ m}^3/\text{s}$ for summer 2002. Figure 4 demonstrates the low water availability with discharge values close to zero.

Thames River at Thamesville was $-41.53 \text{ m}^3/\text{s}$ below the average annual streamflow in the summer of 2001 and $-36.16 \text{ m}^3/\text{s}$ in the summer of 2002. However, it

was in the fall of 2002 that the river hit its lowest point ever from 2000-2002; it was $-42.67 \text{ m}^3/\text{s}$ below the average, which is similar to summer 2001 (Table 2).

Saugeen River near Port Elgin was $-32.27 \text{ m}^3/\text{s}$ below the average annual streamflow in the summer of 2001 and $-38.5 \text{ m}^3/\text{s}$ in the summer of 2002. It was the most severely impacted river in the summer and fall of 2002 followed by Thames River at Thamesville. Although it showed a positive difference from the average annual streamflow (Table 1), further scrutinization revealed that it was in fact one of the hardest hit rivers during the drought in Southern Ontario. An exception must be made for the discharge value for 2001 which is approximately $80 \text{ m}^3/\text{s}$ (Figure 11). It is an unusually high value for a drought period - it is close to the discharge values in high flow years such as 1967 and 1997.

Lakes and Reservoirs

Grand River

River flow augmentation is the addition of stored water from reservoirs to low flow river systems. The GRCA (Grand River Conservation Authority) is one of the few Conservation Authorities that augment flows during drought conditions.

According to the Grand Actions Newsletter (2001), flow augmentation through Kitchener reached near 100% and augmentation through Brantford reached 91% in 2001. Normally, the amount of flow added to the Grand River at Brantford is between 40 to 55% (Boyd, 2001). This flow augmentation at Brantford reflects the dry conditions of 2001 – it is almost twice the amount of flow into the Grand River system.

The effects of the drought in 2002 were less visible in the main Grand River, lower Speed River and lower Conestogo due to flow augmentation from the major reservoirs operated by the GRCA (Boyd, 2002). Their flows all remained at near normal throughout 2002. At times during that summer, over 80% of the water in the Grand River through Kitchener was added from reservoirs (Boyd, 2002).

Quinte

Although data for reservoirs was sent by the Quinte Conservation Authority, there was a great deal of missing information. Quantitative analyses could not be done thus no conclusions can be made.

Rideau

Five lakes were analysed for the period of 1988-2005 based on daily data sent from the Rideau Valley Conservation Authority. Bobs Lake, Christie Lake and Wolfe Lake are non-navigation lakes but Big Rideau Lake and Upper Rideau Lake are navigation lakes. Unfortunately, limited analyses can be done due to missing data.

With the exception of Bob's Lake, there is an increasing trend in water levels. These lakes do not appear to have been severely affected by the 2001-2002 droughts (Figure 28) because the monthly water levels are fairly stable. The mean annual averages for each lake are very close to one another and only differ by centimeters.

Each lake has its own water level standard – the ideal water levels to be maintained throughout the whole year. It takes into consideration the operating season (or navigation season), and fishery requirements (spawning needs) particularly those lakes that support trout populations (McGonegal, pers. comm., 2006). In many cases when water levels fall below conservation levels, notices are posted to inform boaters there may not be 5ft of available draught that is normally advertised. Some lakes (mostly navigational) are more affected than others, meaning they are only provided with 4ft of water. Drawing water from the reservoirs is done equally based on their normal drawdown. One lake is not overly drawn from for the sake of another - everyone contributes the same percentage of their drawdown if needed (McGonegal, pers. comm., 2006).

Trent Severn Waterway

Five lakes were analyzed for the period of 1988-2005 based on daily data sent by the Trent Severn Waterway – Lake Simcoe, Balsam Lake, Lake Scugog, Rice Lake and Mississauga Lake. These lakes are controlled by the Trent Severn Waterway and are used

to augment flows during drought conditions, but for recreational purposes. Unfortunately, due to missing data, limited analyses can be done regarding lake levels.

All lake levels, except for Mississaugua Lake, are measured in metres above sea level because the Geodetic Survey of Canada (GSC) established elevations above sea level in 1978. Therefore, one must add 200 metres to the water level for lakes Simcoe, Scugog and Balsam (Table 22) and 100 metres for Rice Lake (Table 21). Mississaugua Lake, as well as the rest of the Haliburton Lakes, are not operated by relating their elevations to sea level, rather, their levels are referred to the sill of the respective dam (Ness, pers comm, 2006a). The GSC did not establish elevations throughout Haliburton to the extent that it would be easy to refer to (Ness, pers comm, 2006a).

Lake Simcoe is the only lake with a “rule curve” meaning ideal water levels to be maintained throughout the year.

When water levels go below the rule curve the outflow from the lake is reduced to a minimum of approximately 10 cms. Lake Simcoe and Lake Scugog have no inflow other than their own catchment areas. Lake Scugog is drawdown in the winter to prepare for spring. Balsam Lake is maintained by reservoirs within the Gull River system and is drawdown in the winter to prepare for spring. Rice Lake is also maintained by the reservoirs but is not drawdown in preparation for spring. Mississaugua Lake is a reservoir for the Trent Severn Waterway to maintain navigation during the summer (Ness, pers comm, 2006b).

Groundwater Levels

The Ontario Ministry of the Environment (MOE) monitors specific wells for their own purposes, which is not available to the public. They do not have historic data for any wells but do have very detailed well characteristics such as casing depth, drilling method, casing material, water use, well material, etc. No assessment can be made regarding groundwater resource supplies in Ontario.

Ontario Low Water Response Program (OLWR)

The OLWR was created in 2000 to respond to low water conditions throughout Ontario. Due to recent dry conditions in southwestern and eastern Ontario, the provincial government wanted to ensure provincial preparedness, assist in coordination and support local response in the event of a drought (Ontario Ministry of Natural Resources, 2002). The province has set up different drought conditions based on specific indicators. Level I (Conservation), Level II (Conservation, Restriction) and Level III (Conservation,

Restriction, Regulation) with each level increasing in severity. There are two indicators that are measured to declare a specific level: precipitation or streamflow.

Level I signifies that there are potential water supply problems. Precipitation is less than 80% long or midterm average. Streamflow is less than 70% lowest average summer month and there is a voluntary 10% reduction in water use (Ontario Ministry of Natural Resources, 2002).

Level II signifies that there might be major water supply issues and implementation of by laws could be an imposed restriction. The precipitation threshold is more than one week of no rain. The streamflow threshold is less than 50% lowest average summer month and there is a voluntary 20% reduction in water use (Ontario Ministry of Natural Resources, 2002).

Level III is the most severe dry level condition which fails to meet usual demand and there are socioeconomic impacts. Precipitation is less than 40% long, mid or short term average. Streamflow is less than 30% lowest average summer month and there is maximum reduction in water usage (Ontario Ministry of Natural Resources, 2002).

However, these provincial standards cannot be applied to all watersheds. Each watershed possesses unique characteristics that cannot always be generalized into the provincial standards. Many times a Level I or II drought would be falsely declared thus some CA's (Figure 34 and Figure 35) have been given permission to set their own Level I or II standards for their watershed such as York Region Low Water Response Team.

Water Response Team

With the creation of the OLWR, came the creation of Water Response Teams (WRT) whose main focus is reacting and responding to low water conditions. Each watershed has its own WRT consisting of local water users and local and provincial water managers. The WRT uses water data, provincial and local legislation, communication techniques and local tools to advocate conservation (Ontario Ministry of Natural Resources, 2002). They identify severity of low water situations and implement water conservation strategies. The WRT is responsible for public awareness during drought conditions, implementing drought management tools and communicating information with their respective sectors.

The Ministries of Natural Resources and Environment are responsible for monitoring low water conditions and they confirm whether a watershed is in a Level I situation. The WRT then determines if a watershed is in a Level II situation based on the monitoring data network and make recommendations to the Ontario Water Directors Committee (OWDC) Low Water Committee if it reaches a Level III situation.

Table 25 provides a summary of adaptations and impacts used during 2001-2005 per Conservation Authority, based on the WRT minutes.

Southwestern Ontario Water Response Teams

Essex Region Low Water Conditions Group

The Essex Region Low Water Conditions Group had only one meeting on August 22, 2001. At that meeting there was a strong consensus that there was no anticipated reason need to meet again - no issues anticipated or actions feasible (Taylor, pers. comm., 2006).

Although the Essex Region was officially declared as a Level I drought in 2001, much of the region experienced Level II drought conditions that year (Essex Region Low Water Conditions Group Minutes, 2001). Even so, it was noted that there continued to be a good supply of groundwater for agricultural irrigation and other use, and the drought conditions had little effect on these supplies (Essex Region Low Water Conditions Group Minutes, 2001). There were no conflicting demands for reduced supplies in natural systems, thus there was no need for short term actions in the Essex Region.

Grand River Low Water Response Team

The Grand River Low Water Response Team held a total of eleven meetings between May 15, 2003 to August 9, 2005 – six in 2003, two in 2004 and three in 2005. Minutes from 2001-2002 were unavailable at the time this report was written. However, the Grand Actions Newsletter, produced and used as a communication tool by the GRCA, mentioned several actions taken by the WRT in 2001 and 2002.

According to the Grand Actions Newsletter (2001), the municipalities of Centre Wellington and the City of Guelph implemented lawn-watering bans due to the heavy

demand placed on the groundwater system in 2001. Other municipalities implemented alternate lawn watering bylaws or requested residents to voluntarily reduce outdoor lawn watering (Boyd, 2001).

In 2002, the City of Guelph developed a comprehensive outdoor water use bylaw, which helped reduce water demand by 20%-30% (Boyd, 2002).

During the May 15, 2003 meeting the City of Brantford and the Regional Municipality of Waterloo passed an Outdoor Water Use Bylaw modeled after the City of Guelph's Outdoor Water Use Bylaw in an effort to preserve water and raise public awareness. The Brant Irrigation Advisory Committee was created this year, which was set up as a sub-committee of the Brant Federation of Agriculture. The committee was made up of 11 farmers from across Brant, representing a variety of groups: tobacco, ginseng, fruits and vegetables (Brant Water Wise, 2003). In 2003, the committee focused its efforts on the area around Whiteman's Creek (Brant Water Wise, 2003). Its purpose was to manage water use in the watershed

The entire Grand River and its tributaries were all declared Level I, while Mill Creek was declared Level II. Aggregate operators in the Mill Creek watershed increased the frequency of pond elevation monitoring, according to the July 3, 2003 minutes (Grand River Low Water Response Team Minutes, 2003).

During the March 31, 2004 meeting, it was documented that the Outdoor Water Use Bylaw (Guelph, Brantford) has been successful in reducing the summer use ratio. Offline ponds were constructed by the golf course industry to reduce their water withdrawals from Eramosa River because the entire Grand River Basin was in a Level I condition since July 3, 2003 (Grand River Low Water Response Team Minutes, 2004).

It was reported on the July 7, 2005 meeting that further restrictions were imposed on the Outdoor Water Use Bylaw for the County of Brant – watering restricted to odd/even days, based on the persons address, between 7am-9am or 7pm-9pm due to low water conditions (Grand River Low Water Response Team Minutes, 2005). The Brant/Oxford Irrigation Advisory Committee dissolved due to lack of sustainable funding and lack of recognizing the committee's usefulness.

Long Point Region Conservation Authority Joint Water Response Team

The Long Point Region Conservation Authority Joint Water Response Team held a total of seven meetings between July 15, 2002 and June 23, 2005 – three in 2002, one each in 2003 and 2004, two in 2005. No minutes were available for 2001.

During the July 15, 2002 meeting it was noted that just a few days ago (July 11) the Long Point Region Conservation Authority (LPRCA) declared a Level I low water advisory for the watershed and various municipal watering bans were in effect (Long Point Region Conservation Authority Joint Water Response Team Minutes, 2002a). For example, in Norfolk from May to October, watering times are from 9-11am and 7-10pm, odd days for odd number houses and even days for even number houses. There was even a drop in water consumption in Tillsonburg due to metering (Long Point Region Conservation Authority Joint Water Response Team Minutes, 2002a).

Municipalities in Oxford and Norfolk County had various watering bans in effect and also, certain municipalities such as Tillsonburg, Norwich, Aylmer had reached a Level II status, as reported in the August 8, 2002 meeting (Long Point Region Conservation Authority Joint Water Response Team Minutes, 2002b).

No definitive actions were taken from 2003-2004. The county of Oxford has created a new once-per-week water use ban (each residence can only water once per week and no watering occurs on weekends) in order to deal with water use spikes, according to the June 23, 2005 meeting (Long Point Region Conservation Authority Joint Water Response Team Minutes, 2005). In Norfolk County, a water pipeline was installed between Delhi and Courtland, resulting in the closing of some wells (Long Point Region Conservation Authority Joint Water Response Team Minutes, 2005). The county was also looking for another source of water for Delhi.

Upper Thames River Conservation Authority Water Response Team

The Upper Thames River Conservation Authority Water Response Team held a total of eight meetings from August 23, 2001 to July 2, 2003 – two held in 2001, three in 2002 and three in 2003. Summaries of the Upper Thames River Conservation Authority Low Water Response Activities were provided for 2004 and 2005 because no physical

meetings took place. Although Level I drought conditions were acknowledged both years, the WRT agreed that through informal communication (for example, email) they would be able to keep up to date and would call a meeting if conditions deteriorated.

No definitive actions were taken except for monitoring low flow related activities with the aid of a summer student in 2004/05 and also expanding their system network of gauges in support of the Low Water Response program. With the collection of the basic data, they hope to establish a water budget model which can help make informed decisions (Summary of Upper Thames River Conservation Authority Low Water Response Activities, 2004).

York Region Low Water Response Team

The York Region Low Water Response Team had a total of six meetings from October 30, 2001 to August 23, 2005 – one held in 2001, 2003-2005 and two held in 2002.

The first meeting held October 30, 2001 documented the fact that some golf courses were exceeding their permitted rates of water use and automated lawn watering systems continued to operate even though a lawn watering ban was in effect in the Toronto Region (York Region Low Water Response Team Minutes, 2001).

On June 24, 2003, the York Region Low Water Response Team set tentative triggers to establish Levels I or II drought conditions in York region. Level I would be more than two weeks with total rainfall of less than 7.6mm and Level II would be three weeks or more with total rainfall less than 7.6mm (York Region Low Water Response Team Minutes, 2003). Level III triggers would remain as per provincial standards.

Southeastern Ontario Water Response Teams

Cataraqui Region Water Response Team

The Cataraqui Region Water Response Team held a total of twelve meetings from June 11, 2001 to July 28, 2005 – three meetings held in 2001, three held in 2002, four held in 2003 and two held in 2005. No meetings were held in 2004 due to high water levels thus the WRT felt that no meetings were required (Shaw, pers. comm. 2006).

During the third meeting held on October 10, 2001, it was decided that the Cataraqui Region Conservation Authority (CRCA) participate in the Provincial Groundwater Monitoring Program, in order to acquire better knowledge about the groundwater systems (Cataraqui Region Water Response Team Minutes, 2001). Due to the low precipitation years of 1998 and 1999, the groundwater table had appeared to fall, causing concern for the member of the WRT, who were more interested about groundwater rather than surface water (Cataraqui Region Conservation Authority Memorandum, 2001).

It was noted during the September 11, 2002 meeting that the watershed was in a Level II status which would be declared in a news release, prompting MOE to release letters of reduction to Permit to take Water (PTTW) users (Cataraqui Region Water Response Team Minutes, 2002).

The CRCA has been participating in the Ministry of Natural Resources (MNR) project evaluating the effectiveness of Ontario streamflow indicators to identify drought conditions. Phase I had been completed and Phase II was underway during the summer of 2005 (Cataraqui Region Water Response Team Minutes, 2005). Phase I was the assessment of the indicators using existing historic streamflow data and Phase II was collecting new field data to evaluate the conditions seen in the streams against the conditions identified by the indicators (Cataraqui Region Water Response Team Minutes, 2005).

Rideau River Watershed Water Response Team

The Rideau River Watershed Water Response Team held a total of 4 meetings from August 21, 2001 to February 20, 2002 – three held in 2001 and one in 2002. Four news releases were released in 2001, issued by the WRT. The WRT was inactive from 2002 through 2004 and didn't meet again until September 2005. No minutes were prepared for the September 21st, 2005 meeting of the WRT, but three news releases issued by Rideau Valley Conservation Authority (RVCA) on behalf of the WRT indicate the activity that went on around the low water situation (Reid, pers.comm, 2006). The WRT agreed that instead of conventional meetings, they would make use of informal communication, such as email. The WRT members were involved in the drafting and

approval of the news releases issued by RVCA on behalf of the WRT in 2005 (Reid, pers. comm. 2006)

During the first meeting, held on August 21, 2001, the village of Merrickville-Wolford took a precautionary measure and restricted lawn watering to alternate days within areas serviced by that municipality's wells. There were also reports that dug wells, flowing wells and springs had dried up (Rideau River Watershed Water Response Team Minutes, 2001a). They also noted that crop failures and drought stressed crops were present in the region. Supplying water to crop irrigation systems was not an option because the infrastructure to transport water to the crops does not exist.

The Rideau River Watershed Water Response Team decided on September 5, 2001, that the Rideau Valley Conservation Authority would assign staff to collect information on the social, environmental and economic impacts of the Level II drought in order to prepare a drought response plan to be applied by the team in future low water events (Rideau River Watershed Water Response Team Minutes, 2001b). It was suggested a short questionnaire be distributed to better quantify the impacts of the drought. The water response team was considering a Level III drought but acknowledged that at this point, mandatory restrictions would probably have little effect (Rideau River Watershed Water Response Team Minutes, 2001b).

In a media release December 14, 2001, the WRT recognized the Level III drought that occurred from late July through October 2001 which had serious consequences for water users. This was based on a report documenting social, environmental and economic impacts of the drought, including more than 50 completed questionnaires by people who had experienced hardships or extra expenses due to the drought and interviews with water managers and water users (Rideau River Watershed Water Response Team Media Release, 2001c).

"Drought awareness" information has been made available to the public on the Rideau Valley Conservation Authority's website, according to the September 28, 2005 media release due to the persistent Level I drought conditions in the watershed (Rideau River Watershed Water Response Team Media Release, 2005).

South Nation Conservation Water Response Team

The South Nation Conservation Water Response Team had a total of seven meetings between August 24, 2001 to February 19, 2003 – four meetings held in 2001, two meetings in 2002 and one meeting in 2003. No meetings were held in 2004-2005.

During the August 24, 2001 meeting, it was noted that people were using water haulers and other sources to replenish their wells but were becoming frustrated with others who did not conserve water at all (South Nation Conservation Water Response Team Minutes, 2001). Although the South Nation River watershed had not reached Level I conditions, dry conditions persisted. A hotline was established for residents to call in and report drought impacts (dry wells, new wells being dug, etc) so South Nation Conservation (SNC) can identify the locations of vulnerable groundwater sources. Water restrictions were imposed by individual municipalities such as watering on alternate days during certain hours, a ban on all sprinklers (except for hand held hoses).

The WRT officially declared a Level II drought condition for the entire South Nation watershed September 6, 2002 and issued a press release asking people to conserve water due to recent dry conditions (South Nation Conservation Water Response Team Minutes, 2002a). Municipalities were asked to enforce water restriction by-laws and a request to the Ministry of the Environment was also made to ask water taking permit holders reduce water usage (South Nation Conservation Water Response Team Minutes, 2002b).

On Monday September 9, 2002, drought signs were installed at various entry points to the SNC watershed with the following words “*Drought conditions in effect – please conserve water*” (South Nation Conservation Water Response Team Minutes, 2002b).

Conclusions

The nation wide drought of 2001/02 had major impacts in Ontario. As noted, there was a significant shortage of water resources causing crops to wither and die, millions of dollars being lost and farmers to bear the long, hot, dry summer months. Farmers and food producers were not prepared for such a major loss and needed to

rethink their farming practices and techniques to use water more efficiently and carefully. Adaptations were certainly used, ranging from irrigating at night to planting drought tolerant crops. The OLWR had declared many Level I or II droughts, but the program does need to be revised and improved in terms of setting multiple standards for different watersheds. Many times a Level I or II drought would be unnecessarily declared. Innovative ideas to allocate water fairly in each community are necessary for farmers to successfully manage their crops.

Overall, surface waters were affected, many with streamflow or lake levels that were below average. The Water Response Teams handled drought conditions well, by calling meetings and taking appropriate actions such as water bans, erecting drought signs, establishing a drought hotline, etc.

Well monitoring is not done in Ontario, which speaks volumes. As a province which created the OLWR program, Ontario should at least consider monitoring groundwater levels in order to ensure adequate supplies and to reduce vulnerability in the event of a future drought.

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Appendix

Table 1 Comparison of the 2000, 2001 and 2002 Ontario River Flows to Average Annual Streamflow (Environment Canada, 2006)

| River | Average Annual Streamflow (m ³ /s) (period of record 1967-2003) | Difference from Average (m ³ /s) | | |
|---|---|--|-------|--------|
| | | 2000 | 2001 | 2002 |
| Bear Creek near Petrolia | 2.54 | 0.24 | 1.05 | -0.95 |
| Grand River at Brantford | 61.5 | 2.93 | -0.44 | -11.82 |
| Humber River at Elder Mills | 2.5 | 0 | -0.47 | -0.65 |
| Nith River at New Hamburg | 6.63 | -1.92 | 5.77 | -4.55 |
| North Thames River at St. Mary's | 14.5 | 2.4 | 1.8 | -0.95 |
| Saugeen River near Port Elgin | 60.3 | 1.64 | 19.13 | -5.72 |
| Saugeen River near Walkerton | 32.5 | 1.7 | 9.17 | -3.59 |
| South Nation River at Spencerville | 3.07 | 0.71 | -1.1 | -0.45 |
| Speed River below Guelph | 5.85 | -2.44 | 1.68 | -4.33 |
| Sydenham River near Alvinston | 7.4 | 0 | 1.4 | -2.61 |
| Thames River at Thamesville | 55.46 | -11.66 | 39.54 | -31.46 |
| Welland River below Caistor's Corner | 2.34 | -0.65 | -0.05 | -0.81 |

Table 2 Comparison of the Seasons of 2000, 2001 and 2002 Ontario River Flows to Average Annual Streamflow (Environment Canada, 2006)

| River | Average Annual Streamflow (m ³ /s) (period of record 1967-2003) | Difference from Average (m ³ /s) | | | | | | | | | | | | | |
|--------------------------------------|--|---|--------|--------|-------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|
| | | 2000 | | | | 2001 | | | | 2002 | | | | | |
| | | Winter | Spring | Summer | Fall | Winter | Spring | Summer | Fall | Winter | Spring | Summer | Fall | | |
| Bear Creek near Petrolia | 2.54 | 0.53 | 0.53 | 0.1 | -0.1 | 5.71 | -0.21 | -2.11 | 0.83 | 0.2 | 0.89 | -2.36 | -2.51 | | |
| Grand River at Brantford | 61.5 | -13.4 | 12.8 | 16.8 | - | 27.87 | 25.4 | 34.3 | -36.5 | -21.5 | -17.24 | 35.56 | -26.7 | -38.9 | |
| Humber River at Elder Mills | 2.5 | -0.46 | 0.61 | 0.84 | -0.97 | -0.53 | 1.09 | -1.34 | -1.09 | -0.77 | 0.75 | -1.26 | -1.31 | | |
| Nith River at New Hamburg | 6.63 | -0.93 | 2.52 | 1.26 | -2.99 | 5.78 | 4.5 | -5.15 | -3.01 | 0.68 | 3.14 | -4.54 | -5.79 | | |
| North Thames River at St. Mary's | 14.5 | -1.66 | -3.4 | 9.9 | -2.02 | 15.5 | 7.35 | -11.19 | -4.43 | 4.45 | 10.13 | -7.22 | - | 11.13 | |
| Saugeen River near Port Elgin | 60.3 | 8.7 | 32.9 | -13.37 | - | 21.67 | 44.6 | 63.06 | -32.27 | 1.13 | 7.36 | 57.03 | -38.5 | - | 48.76 |
| Saugeen River near Walkerton | 32.5 | -0.5 | 19.2 | -0.3 | - | 11.57 | 19.76 | 33 | -15.52 | -0.54 | -0.64 | 30.63 | -18.9 | -25.5 | |
| South Nation River at Spencerville | 3.07 | -0.52 | 6.43 | -1.22 | -1.85 | -1.01 | 2.48 | -2.97 | -2.87 | -1.29 | 3.45 | -1.04 | -2.92 | | |
| Speed River below Guelph | 5.85 | -2.63 | 1.06 | 1.82 | -2.81 | 0.15 | 2.54 | -3.37 | -2.78 | -2.49 | 4.81 | -2.67 | -3.61 | | |
| Sydenham River near Alvinston | 7.4 | 0.64 | 2 | 0.63 | -3.22 | 11.18 | 0.97 | -5.59 | -0.82 | 0.88 | 1.81 | -6.42 | -6.72 | | |
| Thames River at Thamesville | 55.46 | -13.83 | 5.7 | 25.97 | - | 21.03 | 45.4 | 16.2 | -41.53 | -23.88 | 6.31 | 28.94 | -36.16 | - | 42.67 |
| Welland River below Caistor's Corner | 2.34 | -0.19 | -0.12 | -0.13 | -2.15 | 3.09 | 0.59 | -2.17 | -1.73 | -0.08 | 1.2 | -2.21 | -2.14 | | |

**Table 3 Monthly Flows at Bear Creek near Petrolia, Ontario (1967-2003)
 (Environment Canada 2003)**

| Year | Jan | Feb | Mar | Apr | May | June | July | Aug | Sep | Oct | Nov | Dec | mean |
|------|-------------|-------------|-------------|-------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|
| 1967 | 2.82 | 1.27 | 9.02 | 6.74 | 0.903 | 3.61 | 0.284 | 0.223 | 0.148 | 5.42 | 5.93 | 7.95 | 3.6932 |
| 1968 | 2.68 | 7.18 | 7.7 | 2.02 | 0.548 | 2.12 | 1.31 | 0.158 | 0.104 | 0.079 | 1.46 | 3.13 | 2.3741 |
| 1969 | 5.8 | 2.35 | 2.46 | 5.03 | 4.47 | 1.49 | 0.119 | 0.039 | 0.001 | 0.016 | 1.21 | 2 | 2.0821 |
| 1970 | 0.356 | 1.85 | 8.6 | 7.12 | 1.86 | 0.41 | 0.534 | 0.359 | 0.041 | 0.044 | 0.48 | 1.64 | 1.9412 |
| 1971 | 0.457 | 6.09 | 5.07 | 1.41 | 0.375 | 0.167 | 0.042 | 0.052 | 0.085 | 0.047 | 0.182 | 3.12 | 1.4248 |
| 1972 | 1.3 | 0.262 | 6.16 | 4.9 | 0.56 | 0.354 | 0.453 | 0.045 | 0.035 | 0.36 | 2.51 | 5.03 | 1.8308 |
| 1973 | 5.56 | 1.67 | 12.5 | 2.11 | 1.7 | 1.62 | 0.135 | 0.127 | 0.011 | 0.034 | 2.61 | 3.97 | 2.6706 |
| 1974 | 8.84 | 4.31 | 7.65 | 4.19 | 6.34 | 0.301 | 0.06 | 0.036 | 0.014 | 0.07 | 0.522 | 1.33 | 2.8053 |
| 1975 | 5.45 | 4.59 | 6.54 | 6.48 | 0.577 | 1.64 | 0.081 | 1.61 | 2.73 | 0.633 | 1.23 | 3.44 | 2.9168 |
| 1976 | 1.81 | 21.6 | 8.23 | 3.33 | 4.46 | 0.39 | 3.23 | 0.31 | 0.13 | 0.372 | 0.377 | 0.311 | 3.7125 |
| 1977 | 0.18 | 1.51 | 12.6 | 4.33 | 0.597 | 0.077 | 0.511 | 0.02 | 0.332 | 0.766 | 2.89 | 7.9 | 2.6428 |
| 1978 | 0.453 | 0.275 | 9.65 | 6.43 | 1.13 | 0.404 | 0.034 | 0.026 | 0.077 | 0.07 | 0.138 | 0.408 | 1.5913 |
| 1979 | 0.447 | 0.428 | 7.2 | 11.7 | 1.06 | 0.284 | 0.337 | 0.146 | 0.018 | 0.057 | 1.03 | 4.9 | 2.3006 |
| 1980 | 1.23 | 0.543 | 6.5 | 5.21 | 1.89 | 0.788 | 0.659 | 0.401 | 0.232 | 0.649 | 0.211 | 1.38 | 1.6411 |
| 1981 | 0.15 | 11.9 | 1.97 | 3.98 | 1.67 | 0.175 | 0.033 | 0.867 | 4.61 | 9.31 | 3.08 | 2.15 | 3.3246 |
| 1982 | 4.09 | 0.337 | 18.2 | 5.43 | 0.524 | 0.709 | 0.1 | 0.871 | 0.247 | 0.197 | 3.51 | 8.54 | 3.5629 |
| 1983 | 1.32 | 5.06 | 1.94 | 3.51 | 3.81 | 1.19 | 0.112 | 0.338 | 0.234 | 0.128 | 2.24 | 4.36 | 2.0202 |
| 1984 | 0.168 | 10.8 | 7.22 | 2.66 | 1.32 | 4.35 | 0.399 | 0.168 | 1.21 | 0.246 | 3.92 | 4.92 | 3.1151 |
| 1985 | 3.64 | 13.3 | 8.74 | 4.55 | 0.278 | 0.412 | 0.078 | 0.121 | 0.247 | 1.7 | 6.9 | 2.27 | 3.5197 |
| 1986 | 3.96 | 2.28 | 10.7 | 3.06 | 1.89 | 6.63 | 0.43 | 0.224 | 5.64 | 6.36 | 1.61 | 5.1 | 3.9903 |
| 1987 | 1.81 | 0.573 | 5.83 | 4 | 0.252 | 0.053 | 0.036 | 0.026 | 0.136 | 1.42 | 3.35 | 6.99 | 2.0397 |
| 1988 | 0.316 | 0.772 | 5.45 | 1.57 | 0.358 | 0.025 | 3.77 | 0.718 | 0.096 | 1.54 | 5.45 | 0.961 | 1.7522 |
| 1989 | 2.82 | 0.935 | 4.02 | 3.13 | 0.646 | 0.846 | 0.058 | 0.013 | 0.307 | 0.182 | 2.16 | 0.368 | 1.2904 |
| 1990 | 6.31 | 7.43 | 4.67 | 2.76 | 2.5 | 0.557 | 0.121 | 0.16 | 1.14 | 4.62 | 3.12 | 5.77 | 3.2632 |
| 1991 | 2.63 | 4.52 | 5.02 | 2.8 | 2.66 | 0.8 | 0.457 | 0.068 | 0.006 | 0.122 | 0.323 | 1.61 | 1.7513 |
| 1992 | 2.51 | 6.94 | 4.57 | 5.57 | 1.33 | 0.716 | 1.78 | 3.22 | 4.07 | 4.06 | 9.96 | 2.44 | 3.9305 |
| 1993 | 7.76 | 0.673 | 8.04 | 5.72 | 1.28 | 0.338 | 0.128 | 0.029 | 0.081 | 0.203 | 0.354 | 0.837 | 2.1203 |
| 1994 | 1.32 | 5.64 | 6.96 | 2.32 | 1.45 | 3.56 | 1.14 | 0.084 | 0.005 | 0.042 | 0.189 | 0.94 | 1.9708 |
| 1995 | 5.2 | 0.604 | 7.31 | 3.15 | 2.71 | 0.664 | 0.263 | 0.104 | 0 | 0.094 | 3.66 | 1.13 | 2.0741 |
| 1996 | 4.41 | 3.78 | 2.51 | 7.03 | 5.15 | 6.47 | 0.328 | 0.09 | 7.76 | 4.72 | 4.46 | 6.93 | 4.4698 |
| 1997 | 3.17 | 8.74 | 5.69 | 1.48 | 5.44 | 1.2 | 0.154 | 0.169 | 0.112 | 0.211 | 0.725 | 3.04 | 2.5109 |
| 1998 | 5.76 | 3.98 | 8.14 | 1.51 | 0.936 | 0.127 | 0.867 | 0.221 | 0.075 | 0.046 | 0.068 | 0.772 | 1.8752 |
| 1999 | 7.41 | 1.79 | 2.39 | 2.99 | 0.345 | 0.087 | 0.038 | 0.017 | 0 | 0.03 | 0.621 | 3.46 | 1.5982 |
| 2000 | 0.746 | 4.61 | 1.01 | 5.44 | 2.77 | 6.09 | 0.978 | 0.586 | 5.7 | 1.04 | 0.582 | 3.86 | 2.7843 |
| 2001 | 2.99 | 16.4 | 3.79 | 2.44 | 0.811 | 1.15 | 0.117 | 0.015 | 0.299 | 7.22 | 2.59 | 5.37 | 3.5993 |
| 2002 | 1.88 | 6.17 | 3.99 | 4.89 | 1.41 | 0.484 | 0.045 | 0.026 | 0 | 0.004 | 0.082 | 0.177 | 1.5965 |
| 2003 | 0.074 | 0.235 | 6.97 | 4.48 | 2.51 | 0.645 | 0.135 | 0.052 | 0.1 | 0.829 | 5.6 | 5.23 | 2.2383 |

**Table 4 Monthly Flows at Grand River at Brantford, Ontario (1967-2003)
 (Environment Canada 2003)**

| Year | Jan | Feb | Mar | Apr | May | June | July | Aug | Sep | Oct | Nov | Dec | mean |
|------|-------------|-------------|------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|
| 1967 | 58.9 | 55.5 | 93 | 170 | 40.7 | 84.3 | 68.2 | 26 | 29 | 64.6 | 98.8 | 129 | 76.5 |
| 1968 | 60.3 | 102 | 148 | 62 | 37.7 | 28.1 | 21.8 | 42.4 | 47.6 | 49.4 | 74.6 | 78.6 | 62.708 |
| 1969 | 61.8 | 75.3 | 111 | 202 | 87.5 | 31.7 | 27.2 | 26 | 20.5 | 19.9 | 34.8 | 21 | 59.892 |
| 1970 | 15.3 | 23.1 | 49 | 153 | 47.5 | 23.3 | 28.1 | 25.2 | 29.4 | 32.1 | 49.9 | 80.4 | 46.358 |
| 1971 | 35.6 | 37.1 | 81.3 | 194 | 33.6 | 28.8 | 26.3 | 27.4 | 21.5 | 20 | 15.9 | 34.6 | 46.342 |
| 1972 | 33.4 | 25.3 | 75.2 | 254 | 49 | 38 | 34.8 | 27.7 | 23.6 | 36.1 | 48.3 | 54.4 | 58.317 |
| 1973 | 79.7 | 56.4 | 224 | 90.7 | 65.2 | 37.8 | 24.5 | 25 | 20.7 | 19.9 | 44.8 | 45.1 | 61.15 |
| 1974 | 78.3 | 62 | 154 | 144 | 148 | 37.7 | 24.7 | 19.1 | 19.7 | 21.9 | 28.8 | 20.4 | 63.217 |
| 1975 | 36.5 | 58.9 | 116 | 187 | 42.1 | 36 | 20.9 | 41.2 | 33.3 | 25.9 | 37 | 66.7 | 58.458 |
| 1976 | 35.8 | 115 | 277 | 110 | 82.1 | 29.7 | 41.3 | 30.9 | 34 | 40.7 | 40.9 | 29.6 | 72.25 |
| 1977 | 19.4 | 18.2 | 199 | 87.4 | 28.6 | 20.1 | 22.8 | 26.8 | 63.3 | 108 | 76.5 | 103 | 64.425 |
| 1978 | 42.6 | 35.6 | 70.9 | 259 | 69.7 | 27.5 | 20.7 | 19.5 | 32.7 | 30.9 | 34.5 | 38.6 | 56.85 |
| 1979 | 48.5 | 23.3 | 216 | 209 | 62.1 | 32.1 | 21.9 | 25.7 | 23.1 | 25.9 | 60.3 | 106 | 71.158 |
| 1980 | 77.3 | 24 | 109 | 135 | 53.7 | 33.3 | 29.5 | 30 | 29 | 37.3 | 36.7 | 53 | 53.983 |
| 1981 | 28.6 | 153 | 57 | 60.5 | 45 | 26.5 | 23.8 | 26.1 | 69.1 | 83.9 | 64.1 | 58.3 | 57.992 |
| 1982 | 26.2 | 18.5 | 119 | 248 | 43.5 | 53.7 | 28.8 | 37.7 | 44.4 | 38.2 | 99.7 | 167 | 77.058 |
| 1983 | 63 | 63.4 | 68 | 105 | 123 | 42.2 | 23.6 | 36.6 | 31.8 | 41.3 | 48.9 | 84.1 | 60.908 |
| 1984 | 47.3 | 161 | 113 | 109 | 50.1 | 46.9 | 28.6 | 25.2 | 33.7 | 26.8 | 50.5 | 90.2 | 65.192 |
| 1985 | 62.3 | 96.8 | 240 | 217 | 36.5 | 34.2 | 31.6 | 35.3 | 54 | 48.3 | 134 | 90.6 | 90.05 |
| 1986 | 56.7 | 35.6 | 166 | 74.4 | 59.3 | 40.1 | 38 | 47.7 | 207 | 157 | 60.1 | 69.2 | 84.258 |
| 1987 | 52.1 | 35.2 | 130 | 130 | 34.9 | 28.8 | 39.6 | 34.6 | 27.6 | 32.9 | 51.1 | 105 | 58.483 |
| 1988 | 44.9 | 62.6 | 104 | 85.1 | 35.9 | 19.5 | 21.9 | 22.5 | 22.6 | 29.3 | 72.5 | 42.6 | 46.95 |
| 1989 | 56.1 | 34.6 | 92.8 | 91.3 | 33.8 | 56.7 | 20.9 | 18.8 | 18.2 | 23 | 54.6 | 32.5 | 44.442 |
| 1990 | 70.1 | 91.3 | 135 | 64.6 | 53.1 | 28.4 | 27.7 | 25.1 | 24.7 | 80.3 | 101 | 122 | 68.608 |
| 1991 | 60.9 | 61.6 | 188 | 165 | 42.8 | 26.9 | 33.2 | 25.2 | 21.2 | 25.7 | 26.3 | 45.8 | 60.217 |
| 1992 | 43.2 | 35.6 | 97.5 | 139 | 60.3 | 26.3 | 47.8 | 88.3 | 98.1 | 66.7 | 217 | 87.1 | 83.908 |
| 1993 | 147 | 29.2 | 70.5 | 163 | 36.9 | 57.2 | 35.3 | 25.4 | 31.3 | 36 | 40.3 | 49.6 | 60.142 |
| 1994 | 23.9 | 48.5 | 86.8 | 141 | 80 | 33.3 | 29.9 | 24.1 | 20.8 | 22.7 | 27.1 | 34 | 47.675 |
| 1995 | 107 | 22.9 | 93.6 | 78 | 50.2 | 42 | 25.3 | 27.8 | 20.1 | 27.9 | 108 | 50.1 | 54.408 |
| 1996 | 104 | 97.6 | 98.6 | 182 | 121 | 84.6 | 42.8 | 28.8 | 47.4 | 55.8 | 65.2 | 111 | 86.567 |
| 1997 | 86.2 | 164 | 174 | 115 | 80.1 | 34.9 | 34.8 | 25.4 | 26.7 | 26.6 | 49.9 | 40.6 | 71.517 |
| 1998 | 99.8 | 56.5 | 138 | 64.5 | 30.8 | 25.9 | 22.7 | 19.3 | 17 | 15.5 | 15.5 | 18.4 | 43.658 |
| 1999 | 22.1 | 51.3 | 47.5 | 40.8 | 23.6 | 30.2 | 23.2 | 23 | 34 | 30.8 | 70.2 | 77.9 | 39.55 |
| 2000 | 32.3 | 57.3 | 49.5 | 64.4 | 109 | 121 | 61.7 | 52.1 | 37.9 | 27.9 | 35.1 | 54.7 | 58.575 |
| 2001 | 31.2 | 141 | 102 | 137 | 48.4 | 35.1 | 20 | 19.9 | 20.8 | 48.2 | 51.1 | 88.6 | 61.942 |
| 2002 | 40.6 | 69.9 | 103 | 113 | 75.2 | 46.3 | 30.6 | 27.5 | 22.1 | 20.8 | 24.9 | 22.3 | 49.683 |
| 2003 | 18.3 | 16.3 | 94.7 | 74.8 | 64 | 32.3 | 23.1 | 32.6 | 24.3 | 39.9 | 118 | 98.4 | 53.058 |

Table 5 Monthly Flows at Humber River near Elder Mills, Ontario (1967-2003) (Environment Canada 2003)

| Year | Jan | Feb | Mar | Apr | May | June | July | Aug | Sep | Oct | Nov | Dec | Mean |
|------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|--------------|-------------|-------------|-------------|---------------|
| 1967 | 1.65 | 1.61 | 4.09 | 4.12 | 1.97 | 2.72 | 2.29 | 1.53 | 1.3 | 2.17 | 2.53 | 2.9 | 2.4067 |
| 1968 | 1.5 | 4.42 | 7.57 | 3.19 | 2.51 | 1.72 | 1.26 | 1.66 | 1.89 | 1.82 | 3.04 | 2.2 | 2.7317 |
| 1969 | 2.5 | 2.73 | 6.45 | 6.97 | 3.46 | 1.89 | 1.44 | 1.34 | 1.02 | 1.37 | 2.11 | 1.5 | 2.7317 |
| 1970 | 1.11 | 1.78 | 2.69 | 5.49 | 2.32 | 1.27 | 1.53 | 1.16 | 1.44 | 1.59 | 2.03 | 1.9 | 2.0258 |
| 1971 | 1.55 | 1.65 | 2.55 | 5.89 | 1.71 | 1.29 | 1.26 | 1.34 | 1.09 | 1.11 | 1.3 | 2.01 | 1.8958 |
| 1972 | 1.66 | 1.23 | 1.9 | 10.7 | 2.24 | 2.02 | 1.44 | 1.13 | 0.955 | 1.85 | 2.3 | 2.31 | 2.4779 |
| 1973 | 3.89 | 3.09 | 8.76 | 4.36 | 3.34 | 1.9 | 1.15 | 1.47 | 1.07 | 1.52 | 2.66 | 1.8 | 2.9175 |
| 1974 | 3.19 | 2.83 | 6.8 | 5.37 | 4.01 | 1.83 | 1.16 | 1.1 | 1.17 | 1.31 | 2.06 | 1.7 | 2.7108 |
| 1975 | 1.63 | 3.77 | 5.13 | 6.11 | 2.75 | 1.39 | 0.914 | 1.06 | 1.24 | 1.31 | 1.54 | 1.36 | 2.3503 |
| 1976 | 1.28 | 4.45 | 7.89 | 3.78 | 3.2 | 1.58 | 1.95 | 1.65 | 1.6 | 2.04 | 1.71 | 1.24 | 2.6975 |
| 1977 | 1.1 | 1.4 | 6.64 | 3.05 | 1.38 | 1.27 | 1.25 | 1.44 | 2.2 | 3.55 | 2.91 | 3.17 | 2.4467 |
| 1978 | 2.34 | 1.7 | 4.16 | 9.37 | 3.66 | 1.32 | 0.832 | 1.55 | 1.96 | 1.74 | 1.87 | 1.92 | 2.7018 |
| 1979 | 2.17 | 1.44 | 8.85 | 5.76 | 3.74 | 1.57 | 1.31 | 1.4 | 1.23 | 1.91 | 2.8 | 3.51 | 2.9742 |
| 1980 | 2.06 | 1.14 | 5.75 | 6.95 | 2.54 | 1.62 | 2.54 | 1.25 | 1.33 | 1.73 | 1.68 | 2.22 | 2.5675 |
| 1981 | 1.18 | 7.37 | 2.47 | 2.37 | 2.22 | 1.42 | 2.59 | 1.49 | 1.94 | 2.62 | 3.2 | 2.41 | 2.6067 |
| 1982 | 1.45 | 1.22 | 7.66 | 7.2 | 2.05 | 3.16 | 1.18 | 1.54 | 1.9 | 1.65 | 3.77 | 5.34 | 3.1767 |
| 1983 | 2.64 | 3.5 | 3.94 | 4.68 | 4.61 | 1.87 | 1.12 | 1.32 | 1.35 | 1.7 | 2.34 | 1.89 | 2.58 |
| 1984 | 1.53 | 8.44 | 4.88 | 5.15 | 2.96 | 1.73 | 1.36 | 1.15 | 1.65 | 1.51 | 2.16 | 2.51 | 2.9192 |
| 1985 | 1.42 | 5.02 | 7.53 | 6.65 | 2.05 | 1.92 | 1.47 | 1.66 | 1.9 | 1.65 | 4.05 | 2.41 | 3.1442 |
| 1986 | 2.17 | 1.85 | 6.73 | 3.14 | 2.81 | 1.96 | 1.61 | 3.27 | 6.05 | 3.57 | 1.95 | 2.4 | 3.1258 |
| 1987 | 1.63 | 1.12 | 5.95 | 5.65 | 1.79 | 1.49 | 1.71 | 1.21 | 1.46 | 1.69 | 2.02 | 3 | 2.3933 |
| 1988 | 1.99 | 2.41 | 4.75 | 3.39 | 2.04 | 1.02 | 0.772 | 0.839 | 1.25 | 1.42 | 2.07 | 1.44 | 1.9493 |
| 1989 | 2.07 | 1.52 | 4.87 | 2.79 | 2.61 | 2.11 | 0.78 | 0.988 | 1.02 | 1.33 | 2.26 | 0.998 | 1.9455 |
| 1990 | 2.97 | 3.57 | 7.17 | 2.74 | 2.33 | 1.25 | 0.952 | 0.995 | 0.988 | 2.24 | 2.08 | 3.03 | 2.5263 |
| 1991 | 1.73 | 3.08 | 5.62 | 6.77 | 2.15 | 1.07 | 1.1 | 0.884 | 0.89 | 1.26 | 1.23 | 1.58 | 2.2803 |
| 1992 | 1.67 | 2.18 | 3.24 | 4.95 | 2.65 | 1.19 | 1.65 | 3.08 | 1.74 | 2.04 | 6.48 | 3.06 | 2.8275 |
| 1993 | 4.31 | 1.4 | 5.04 | 6.84 | 2.19 | 3.02 | 1.29 | 1.08 | 1.21 | 1.44 | 1.77 | 1.63 | 2.6017 |
| 1994 | 0.983 | 4.66 | 4.12 | 3.93 | 2.71 | 1.27 | 0.907 | 0.72 | 0.858 | 0.926 | 1.44 | 1.44 | 1.997 |
| 1995 | 4.18 | 1.01 | 3.68 | 3.08 | 2.04 | 2.31 | 1.35 | 1.43 | 0.768 | 1.79 | 4.12 | 1.75 | 2.2923 |
| 1996 | 4.4 | 3.63 | 4.09 | 7.45 | 4.11 | 3.99 | 2.25 | 1.33 | 2.4 | 2.3 | 2.21 | 4.4 | 3.5467 |
| 1997 | 3.4 | 7.66 | 7.05 | 4.63 | 3.49 | 2.01 | 1.39 | 1.32 | 1.21 | 1.4 | 1.91 | 1.57 | 3.0867 |
| 1998 | 2.14 | 2.51 | 6.64 | 3.29 | 1.75 | 2.02 | 1.67 | 1.5 | 0.939 | 0.966 | 1.17 | 1.25 | 2.1538 |
| 1999 | 1.37 | 2.29 | 2.62 | 2.04 | 1.08 | 1.06 | 0.721 | 1.09 | 0.987 | 1.48 | 2.64 | 1.8 | 1.5982 |
| 2000 | 1.55 | 3.06 | 2.03 | 3.01 | 4.3 | 5.01 | 3.43 | 1.57 | 1.37 | 1.24 | 1.98 | 1.51 | 2.505 |
| 2001 | 1.37 | 2.62 | 3.81 | 5 | 1.95 | 1.56 | 1.12 | 0.791 | 0.876 | 1.76 | 1.58 | 1.91 | 2.0289 |
| 2002 | 1.36 | 2.53 | 2.54 | 3.71 | 3.51 | 1.84 | 1.07 | 0.821 | 0.895 | 1.1 | 1.56 | 1.29 | 1.8522 |
| 2003 | 0.928 | 0.964 | 4.18 | 3.05 | 2.78 | 1.79 | 0.803 | 0.929 | X | X | X | X | X |

X=no data

**Table 6 Monthly Flows at Nith River at New Hamburg, Ontario (1967-2003)
 (Environment Canada 2003)**

| Year | Jan | Feb | Mar | Apr | May | June | July | Aug | Sep | Oct | Nov | Dec | mean |
|------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|--------------|--------------|--------------|-------------|-------------|---------------|
| 1967 | 9.8 | 3.44 | 18 | 23.1 | 2.8 | 8.86 | 4.71 | 1.09 | 0.801 | 8.75 | 13 | 16.6 | 9.2459 |
| 1968 | 2.28 | 16.5 | 21.5 | 4.53 | 1.52 | 0.6 | 0.641 | 5.07 | 6.15 | 4.89 | 11.2 | 7.33 | 6.8509 |
| 1969 | 7.62 | 7.07 | 22.1 | 25.3 | 8.64 | 1.18 | 0.725 | 0.94 | 0.484 | 0.807 | 4.64 | 1.84 | 6.7788 |
| 1970 | 1.07 | 1.87 | 6.94 | 24.4 | 5.14 | 0.942 | 1.04 | 0.456 | 1.21 | 3.07 | 7.28 | 8.7 | 5.1765 |
| 1971 | 3.2 | 3.25 | 12 | 30.4 | 1.62 | 1.67 | 0.751 | 0.811 | 0.509 | 0.621 | 0.738 | 6 | 5.1308 |
| 1972 | 5.4 | 1.39 | 10.7 | 37 | 2 | 1.54 | 1.85 | 0.543 | 0.495 | 3.55 | 5.48 | 8.94 | 6.574 |
| 1973 | 13.7 | 5.65 | 32.7 | 5.99 | 6.1 | 1.43 | 0.767 | 1.09 | 0.45 | 0.671 | 6.28 | 5.1 | 6.6607 |
| 1974 | 13.1 | 4.52 | 20.7 | 16.1 | 15.5 | 1.15 | 0.658 | 0.401 | 0.395 | 0.474 | 1.61 | 0.745 | 6.2794 |
| 1975 | 5.71 | 6.4 | 15.4 | 29.1 | 2.26 | 2.63 | 0.63 | 9.42 | 4.49 | 1.5 | 3.97 | 9.79 | 7.6083 |
| 1976 | 2.57 | 18.5 | 38.2 | 12.4 | 6.87 | 0.84 | 0.769 | 0.757 | 0.872 | 1.08 | 2.49 | 1.13 | 7.2065 |
| 1977 | 0.706 | 0.714 | 32 | 5.37 | 1.05 | 0.642 | 0.56 | 1.04 | 5.72 | 7.13 | 7.18 | 9.94 | 6.0043 |
| 1978 | 2.26 | 1.57 | 8.01 | 44.1 | 3.34 | 0.87 | 0.419 | 0.437 | 2.26 | 1.68 | 2.17 | 3.09 | 5.8505 |
| 1979 | 4.2 | 0.991 | 35.9 | 24.2 | 3.08 | 0.908 | 0.501 | 0.418 | 0.47 | 0.92 | 9.29 | 12.1 | 7.7482 |
| 1980 | 2.81 | 1.3 | 18.9 | 14.4 | 4.44 | 2.07 | 0.971 | 0.515 | 0.63 | 1.79 | 1.07 | 5.31 | 4.5172 |
| 1981 | 0.641 | 23.9 | 5.74 | 5.21 | 3.66 | 1.3 | 0.897 | 2.1 | 7.93 | 8.82 | 3.84 | 2.64 | 5.5565 |
| 1982 | 1.75 | 0.985 | 19.9 | 27.9 | 1.72 | 3.12 | 1.54 | 3.28 | 3.9 | 2.02 | 14.2 | 21.8 | 8.5096 |
| 1983 | 4.45 | 8.31 | 7.67 | 10.3 | 15.7 | 3.77 | 1.03 | 1.98 | 3.71 | 4.62 | 6.53 | 10.8 | 6.5725 |
| 1984 | 1.51 | 29 | 15.9 | 9.29 | 3.34 | 3.81 | 0.831 | 0.649 | 3.81 | 1.26 | 10.1 | 13.9 | 7.7833 |
| 1985 | 3.09 | 16.8 | 37.6 | 22 | 1.89 | 1.23 | 0.828 | 3.39 | 4.8 | 3.97 | 15.6 | 6.98 | 9.8482 |
| 1986 | 7.56 | 2.25 | 29 | 7.53 | 4.81 | 2.58 | 1.15 | 6.22 | 30.7 | 11.6 | 4.31 | 6.2 | 9.4925 |
| 1987 | 4.13 | 1.89 | 23.6 | 10.4 | 1.3 | 1.01 | 2.82 | 2.91 | 0.77 | 2.64 | 8.99 | 13.6 | 6.1717 |
| 1988 | 3.79 | 6.21 | 20 | 8.44 | 2.16 | 0.41 | 0.605 | 0.654 | 0.877 | 3.29 | 10.4 | 5.14 | 5.1647 |
| 1989 | 7.51 | 3.41 | 15.1 | 9.78 | 2.18 | X | X | X | X | X | X | X | X |
| 1990 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1991 | X | X | X | X | X | 0.712 | 2.93 | 0.802 | 0.532 | 1.24 | 2.4 | 7.35 | |
| 1992 | 5.93 | 5.12 | 18.3 | 16.4 | 3.15 | 1.02 | 5.11 | 9.63 | 10.2 | 4.4 | 24.2 | 7.83 | 9.2742 |
| 1993 | 14.5 | 1.38 | 10.7 | 17.4 | 1.88 | 7.06 | 1.73 | 0.914 | 2.1 | 2.9 | 4.84 | 4.26 | 5.8053 |
| 1994 | 2.16 | 8.79 | 16.1 | 19.5 | 6.27 | 1.37 | 2.24 | 0.579 | 0.494 | 0.611 | 2.08 | 3.22 | 5.2845 |
| 1995 | 12.7 | 1.14 | 14 | 8.81 | 4.28 | 1.61 | 0.759 | 2.08 | 0.33 | 1.82 | 16.4 | 4.47 | 5.6999 |
| 1996 | 11.7 | 14.4 | 8.66 | 23 | 14 | 7.81 | 1.58 | 0.592 | 3.14 | 4.78 | 5.81 | 14 | 9.1227 |
| 1997 | 10.9 | 21.1 | 23.5 | 6.63 | 10.1 | 1.48 | 4.04 | 1.08 | 1.79 | 1.62 | 6.58 | 3.69 | 7.7092 |
| 1998 | 15.7 | 8.39 | 17 | 3.75 | 0.857 | 0.423 | 0.407 | 0.425 | 0.232 | 0.202 | 0.361 | 0.681 | 4.0357 |
| 1999 | 3.6 | 9.57 | 5.5 | 4.6 | 0.921 | 1.03 | 0.751 | 0.343 | 0.438 | 0.575 | 2.54 | 5.67 | 2.9615 |
| 2000 | 3.25 | 9.15 | 5.01 | 7.95 | 14.5 | 11.8 | 6.03 | 5.85 | 3.83 | 1.45 | 5.63 | 4.71 | 6.5967 |
| 2001 | 2.23 | 22.6 | 12.2 | 15.5 | 5.69 | 2.15 | 0.532 | 0.286 | 0.514 | 4.42 | 5.92 | 12.4 | 7.0368 |
| 2002 | 5.65 | 14.2 | 11.1 | 11 | 7.21 | 3.41 | 1.19 | 1.66 | 0.501 | 0.591 | 1.43 | 2.08 | 5.0018 |
| 2003 | 1.44 | 1.27 | 17.7 | 8.16 | 9.2 | 1.66 | 0.843 | 2.71 | 0.739 | 3.32 | 15 | 13.2 | 6.2702 |

X=no data

Table 7 Monthly Flows at North Thames River at St. Mary's, Ontario (1967-2003) (Environment Canada 2003)

| Year | Jan | Feb | Mar | Apr | May | June | July | Aug | Sep | Oct | Nov | Dec | Mean |
|------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|
| 1967 | 25.3 | 9.06 | 38.2 | 43.4 | 6.53 | 16 | 8.05 | 8.33 | 5.98 | 23.1 | 34.5 | 33.5 | 20.996 |
| 1968 | 7.77 | 38.7 | 34.4 | 10.3 | 3.58 | 2.17 | 2.18 | 2.85 | 7.4 | 12.9 | 18.1 | 17.8 | 13.179 |
| 1969 | 21.9 | 18.2 | 40.3 | 42 | 16.8 | 3.56 | 2.11 | 2.46 | 2.57 | 2.48 | 8.4 | 5.83 | 13.884 |
| 1970 | 2.75 | 5.14 | 15.1 | 41.1 | 12.1 | 2.53 | 2.74 | 1.81 | 2.85 | 5.04 | 16.5 | 17.1 | 10.397 |
| 1971 | 7.24 | 9.34 | 38.2 | 48.6 | 5.1 | 2.78 | 1.73 | 2.35 | 1.96 | 1.92 | 1.95 | 7.74 | 10.743 |
| 1972 | 9.05 | 3.63 | 26 | 50.4 | 7.13 | 1.87 | 3.29 | 1.83 | 2.52 | 5.38 | 11.3 | 22.7 | 12.092 |
| 1973 | 31.1 | 11.6 | 54.1 | 12.1 | 13.2 | 4.68 | 2.35 | 2.12 | 2.4 | 2.74 | 14.8 | 13.2 | 13.699 |
| 1974 | 28.2 | 11.4 | 37.2 | 25.9 | 34.6 | 3.53 | 2.49 | 2.24 | 2.22 | 1.96 | 4.23 | 2.41 | 13.032 |
| 1975 | 18 | 14.8 | 32.1 | 50.9 | 4.53 | 4.46 | 7.1 | 2.68 | 5.61 | 2.13 | 6.42 | 17.8 | 13.878 |
| 1976 | 8.51 | 48.8 | 70 | 20.7 | 14 | 2.32 | 3.84 | 5.08 | 3.71 | 4.5 | 9.75 | 4.51 | 16.31 |
| 1977 | 2.51 | 1.98 | 80 | 14.6 | 3.87 | 1.96 | 2.45 | 2.67 | 12.2 | 16.4 | 17 | 24.2 | 14.987 |
| 1978 | 5.84 | 3.55 | 17.1 | 85.6 | 8.51 | 3.02 | 2.64 | 2 | 9.2 | 10.3 | 7.53 | 10.2 | 13.791 |
| 1979 | 12.2 | 3.36 | 61.9 | 45.8 | 7.82 | 3.29 | 2.13 | 2.44 | 2.22 | 5.55 | 27.7 | 32.3 | 17.226 |
| 1980 | 10.6 | 2.18 | 37 | 29.6 | 10.7 | 5.59 | 3.47 | 3.07 | 2.84 | 5.2 | 4.83 | 10.8 | 10.49 |
| 1981 | 1.43 | 51.2 | 17.2 | 12.3 | 10.6 | 3.31 | 2.18 | 3.11 | 16.5 | 29.4 | 12.8 | 6.94 | 13.914 |
| 1982 | 3.94 | 2.2 | 50.4 | 61.2 | 4.41 | 5.62 | 3.13 | 4.28 | 11.1 | 6.31 | 33.4 | 46.2 | 19.349 |
| 1983 | 11.4 | 16.8 | 10 | 16 | 29.2 | 11.7 | 11.1 | 12.3 | 9 | 8.02 | 16 | 25.7 | 14.768 |
| 1984 | 4.61 | 64.8 | 29.2 | 13.4 | 6.68 | 8.94 | 3.48 | 2.13 | 7.48 | 4.25 | 13.5 | 24.3 | 15.231 |
| 1985 | 8.88 | 33.2 | 80.4 | 36.6 | 3.85 | 4.1 | 3.82 | 5.86 | 9.53 | 11.5 | 34 | 14.4 | 20.512 |
| 1986 | 16.4 | 6.01 | 61.1 | 12.4 | 7.52 | 6.96 | 3.82 | 6.54 | 49.7 | 35.4 | 11.2 | 14.1 | 19.263 |
| 1987 | 8.55 | 4.76 | 41 | 21.7 | 3.25 | 2.49 | 3.06 | 2 | 1.75 | 3.22 | 13.6 | 27.2 | 11.048 |
| 1988 | 8.39 | 12.1 | 40.3 | 14.6 | 6.83 | 1.86 | 1.46 | 1.32 | 1.83 | 10.3 | 24.8 | 13.2 | 11.416 |
| 1989 | 15 | 7.29 | 25.1 | 21.7 | 4.24 | 7.65 | 1.8 | 1.41 | 2.11 | 3.1 | 10.2 | 3.23 | 8.5692 |
| 1990 | 26.3 | 24.3 | 28.7 | 12.6 | 7.1 | 3.38 | 7.86 | 5.06 | 6.7 | 33.5 | 34.1 | 34.9 | 18.708 |
| 1991 | 9.5 | 19.9 | 49.9 | 27.3 | 6.9 | 2.94 | 6.92 | 3.42 | 2.4 | 4.33 | 7.4 | 16.7 | 13.134 |
| 1992 | 16.1 | 16.6 | 43 | 33.6 | 9.56 | 3.78 | 10.5 | 17.1 | 24.8 | 13.9 | 59 | 22 | 22.495 |
| 1993 | 40.8 | 5.15 | 23.9 | 34.2 | 5.02 | 13 | 3.51 | 2 | 3.85 | 7.61 | 8.71 | 10.2 | 13.163 |
| 1994 | 8.21 | 18.5 | 36.3 | 32.3 | 15.9 | 5.1 | 5.98 | 2.78 | 2.51 | 2.91 | 3.72 | 8.4 | 11.884 |
| 1995 | 29 | 4.34 | 33.6 | 20.1 | 11.3 | 5.58 | 2.75 | 4.48 | 2.15 | 4.34 | 45.3 | 11.9 | 14.57 |
| 1996 | 24.9 | 24.6 | 16.3 | 37.8 | 27 | 15.8 | 4.48 | 2.42 | 23.6 | 19.3 | 19.8 | 34.5 | 20.875 |
| 1997 | 29.4 | 51.5 | 42.9 | 10.5 | 18.6 | 3.91 | 4.93 | 4.43 | 4.99 | 7.45 | 14.1 | 9.89 | 16.883 |
| 1998 | 35.1 | 14.1 | 30.1 | 10.1 | 3.32 | 1.51 | 2 | 1.89 | 1.27 | 1.79 | 1.47 | 2.34 | 8.7492 |
| 1999 | 14.2 | 24 | 10.7 | 7.8 | 2.87 | 2.64 | 1.42 | 0.812 | 0.692 | 0.938 | 3.46 | 11.8 | 6.7777 |
| 2000 | 9.02 | 16.9 | 9.33 | 14.9 | 29.6 | 23.1 | 31.9 | 18.2 | 16 | 5.46 | 16 | 12.6 | 16.918 |
| 2001 | 9.34 | 56.3 | 28.3 | 30.3 | 6.97 | 6.12 | 1.98 | 1.84 | 2.02 | 12.8 | 15.4 | 24.4 | 16.314 |
| 2002 | 13.7 | 34.1 | 25.7 | 29.5 | 18.7 | 10.3 | 7.55 | 3.98 | 2.29 | 2.05 | 5.76 | 9.05 | 13.557 |
| 2003 | 4.41 | 3.69 | 35.1 | 18.6 | 21.3 | 5.73 | 2.37 | 3.47 | 2.32 | 10.8 | 36.3 | 31 | 14.591 |

**Table 8 Monthly Flows at Saugeen River near Port Elgin, Ontario (1967-2003)
 (Environment Canada 2003)**

| Year | Jan | Feb | Mar | Apr | May | June | July | Aug | Sep | Oct | Nov | Dec | Mean |
|------|-------------|------------|------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|
| 1967 | 68.8 | 49.3 | 90.5 | 187 | 41.5 | 84.1 | 55.4 | 29.5 | 26.5 | 64.1 | 141 | 117 | 79.558 |
| 1968 | 55.1 | 134 | 142 | 92.5 | 49.8 | 27.7 | 18.6 | 26.3 | 22.5 | 26.4 | 51 | 92.1 | 61.5 |
| 1969 | 61.3 | 68.6 | 93.8 | 227 | 117 | 46 | 28.9 | 17.5 | 12.6 | 21.3 | 52.7 | 34.6 | 65.108 |
| 1970 | 26.8 | 35.8 | 46.5 | 223 | 49.2 | 21.8 | 31 | 16.6 | 30.1 | 41.7 | 45.2 | 58.9 | 52.217 |
| 1971 | 36.1 | 45.9 | 105 | 232 | 50.2 | 29.3 | 23.6 | 16.5 | 15.5 | 14 | 20.2 | 48.5 | 53.067 |
| 1972 | 38.5 | 30.2 | 44.8 | 249 | 64.2 | 36.3 | 36.8 | 20.5 | 14.7 | 27.3 | 39.6 | 68.3 | 55.85 |
| 1973 | 130 | 54.5 | 166 | 89.3 | 58.7 | 37.7 | 17.7 | 14.6 | 9.68 | 13.4 | 37.2 | 43.6 | 56.032 |
| 1974 | 77.5 | 44.1 | 138 | 144 | 98.8 | 32.9 | 19.4 | 16.1 | 12.9 | 20.9 | 50.1 | 33.8 | 57.375 |
| 1975 | 64.3 | 55.2 | 113 | 203 | 65.2 | 27.3 | 17.4 | 22.4 | 34.8 | 24.2 | 31.3 | 77.6 | 61.308 |
| 1976 | 32.9 | 96 | 293 | 104 | 63.8 | 27 | 38.6 | 18 | 24.2 | 30.4 | 56.8 | 36.2 | 68.408 |
| 1977 | 27 | 30.9 | 266 | 104 | 27.6 | 18.2 | 16.9 | 39.6 | 54.4 | 86.7 | 83 | 73.3 | 68.967 |
| 1978 | 38.2 | 28.9 | 50.2 | 195 | 60.1 | 32.6 | 15.5 | 15.4 | 36.5 | 35.4 | 33.3 | 39.1 | 48.35 |
| 1979 | 43.5 | 26.8 | 197 | 210 | 72.6 | 26.5 | 17.1 | 18.8 | 13.9 | 38.8 | 66.9 | 102 | 69.492 |
| 1980 | 44 | 27.7 | 123 | 170 | 48.8 | 32.4 | 41.9 | 26.5 | 29.2 | 51.2 | 49.2 | 76.5 | 60.033 |
| 1981 | 32.5 | 191 | 106 | 81 | 59.8 | 30.1 | 18 | 17.8 | 41.7 | 49.6 | 51.4 | 54 | 61.075 |
| 1982 | 34.9 | 24.5 | 99.7 | 237 | 42.5 | 70 | 22.9 | 26.3 | 22.5 | 22 | 75.3 | 128 | 67.133 |
| 1983 | 65.2 | 76.2 | 75.7 | 82.3 | 80 | 35.7 | 15.2 | 16.1 | 25.8 | 33.1 | 44.2 | 55.2 | 50.392 |
| 1984 | 34.6 | 186 | 105 | 96.4 | 50.9 | 34.3 | 20.1 | 12.5 | 23.5 | 19.4 | 57.5 | 77.4 | 59.8 |
| 1985 | 50.1 | 91 | 227 | 246 | 52.8 | 32 | 17.3 | 16.3 | 25.9 | 31.4 | 76.1 | 46.3 | 76.017 |
| 1986 | 49.8 | 34.6 | 190 | 104 | 53.6 | 33.1 | 24.3 | 22.7 | 162 | 131 | 51.3 | 59.2 | 76.3 |
| 1987 | 37 | 27.5 | 118 | 86.5 | 28.4 | 22 | 19.3 | 15.6 | 14.1 | 33.1 | 64.6 | 88.1 | 46.183 |
| 1988 | 53.5 | 82.2 | 119 | 89.4 | 40.2 | 17.7 | 10.9 | 12.2 | 13.7 | 36 | 75.2 | 53.6 | 50.3 |
| 1989 | 49.2 | 29.6 | 117 | 94.2 | 43.9 | 41 | 14.9 | 11.2 | 11.8 | 16.1 | 42.3 | 24.8 | 41.333 |
| 1990 | 84.7 | 71.3 | 168 | 80.1 | 52.3 | 25.7 | 17.8 | 15.6 | 14.5 | 53.2 | 105 | 101 | 65.767 |
| 1991 | 70.9 | 67.8 | 180 | 151 | 49.2 | 23.5 | 27.2 | 15.4 | 12.3 | 22.2 | 33.8 | 70.6 | 60.325 |
| 1992 | 59.4 | 39.7 | 135 | 140 | 41.8 | 20.7 | 18.5 | 29.7 | 46.6 | 42.4 | 153 | 72.6 | 66.617 |
| 1993 | 133 | 41.4 | 62.6 | 183 | 43.9 | 56.7 | 21.3 | 12.7 | 21.7 | 32 | 31 | 37.6 | 56.408 |
| 1994 | 19.8 | 60.5 | 89.7 | 148 | 85.2 | 37.5 | 25.4 | 18.5 | 18.1 | 23.1 | 55.6 | 57 | 53.2 |
| 1995 | 100 | 28.1 | 136 | 75.7 | 49.9 | 28.9 | 16.4 | 17.4 | 11 | 21.4 | 105 | 55.1 | 53.742 |
| 1996 | 124 | 82.9 | 94.1 | 180 | 91.1 | 48.1 | 32 | 25 | 24.4 | 43.1 | 102 | 109 | 79.642 |
| 1997 | 139 | 160 | 177 | 145 | 82.8 | 32.7 | 22.5 | 25.6 | 19.6 | 25.9 | 50.6 | 40.2 | 76.742 |
| 1998 | 119 | 65.3 | 144 | 81.8 | 30.1 | 20 | 11.9 | 10.4 | 9.79 | 10 | 12.1 | 18.8 | 44.433 |
| 1999 | 47.1 | 72.1 | 43 | 50.6 | 21.6 | 25.1 | 16.7 | 10.2 | 8.16 | 13.9 | 39.1 | 51.7 | 33.272 |
| 2000 | 69.4 | 72.2 | 70.8 | 66.8 | 142 | 66.1 | 46.4 | 28.3 | 33.9 | 23.7 | 58.3 | 65.4 | 61.942 |
| 2001 | 54.8 | 172 | 111 | 207 | 52.1 | 48.6 | 20.4 | 15.1 | 27.2 | 84.9 | 72.2 | 87.9 | 79.433 |
| 2002 | 80.1 | 101 | 160 | 129 | 63 | 37.8 | 15.3 | 12.3 | 9.21 | 11.2 | 14.2 | 21.9 | 54.584 |
| 2003 | 18.3 | 16.7 | 129 | 90.7 | 62.6 | 43 | 21.5 | 25.4 | 18.5 | 53 | 112 | 107 | 58.142 |

Table 9 Monthly Flows at Saugeen River near Walkerton, Ontario (1967-2003) (Environment Canada 2003)

| Year | Jan | Feb | Mar | Apr | May | June | July | Aug | Sep | Oct | Nov | Dec | Mean |
|------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|
| 1967 | 36.3 | 24.2 | 39.6 | 97.5 | 24.1 | 51.8 | 33.4 | 18.6 | 16.6 | 33.2 | 63.2 | 61.5 | 41.667 |
| 1968 | 26 | 56.2 | 70.7 | 52.1 | 28.7 | 16.8 | 10.7 | 15 | 15.2 | 16.7 | 33.7 | 46.6 | 32.367 |
| 1969 | 35.3 | 39.3 | 47.6 | 119 | 67 | 25.4 | 16.5 | 10.4 | 7.79 | 13 | 23.6 | 16.3 | 35.099 |
| 1970 | 11.2 | 16.5 | 19.9 | 110 | 30.2 | 13.1 | 20.5 | 8.86 | 16.1 | 23.2 | 26.4 | 29.5 | 27.122 |
| 1971 | 15.2 | 19.4 | 41 | 123 | 29.4 | 18.8 | 13.6 | 9.7 | 9.47 | 8.68 | 11.5 | 26 | 27.146 |
| 1972 | 22 | 17.3 | 21.4 | 125 | 37 | 21.7 | 17.5 | 10.5 | 8.33 | 16.2 | 21 | 30.5 | 29.036 |
| 1973 | 59.4 | 30.5 | 95.4 | 50.9 | 35.1 | 24.1 | 11.5 | 9.07 | 6.57 | 8.54 | 22.1 | 23.2 | 31.365 |
| 1974 | 31.1 | 24.2 | 75.3 | 83.9 | 61.8 | 19 | 12.7 | 9.58 | 7.99 | 11.4 | 23.7 | 16.1 | 31.398 |
| 1975 | 30.2 | 26.1 | 51 | 125 | 39.6 | 16.5 | 11.3 | 12.2 | 19.1 | 12.8 | 15.8 | 39 | 33.217 |
| 1976 | 15.6 | 40.2 | 150 | 61 | 35.6 | 16.9 | 23.6 | 11.2 | 16.2 | 19.8 | 29.5 | 19 | 36.55 |
| 1977 | 13.6 | 15.3 | 118 | 52.7 | 15.3 | 11 | 10.7 | 27.4 | 32.2 | 47.2 | 42.6 | 35.5 | 35.125 |
| 1978 | 20.3 | 17.3 | 25.9 | 105 | 37.7 | 19.9 | 9.58 | 10.2 | 20.5 | 20.4 | 19.1 | 20 | 27.157 |
| 1979 | 22.3 | 13.8 | 103 | 117 | 41.4 | 16.5 | 10.7 | 12.9 | 10.4 | 23.3 | 38.7 | 50.5 | 38.375 |
| 1980 | 22.3 | 11.2 | 58.7 | 87.1 | 25.4 | 17.7 | 26.5 | 16.7 | 19.2 | 30.4 | 26.8 | 38.1 | 31.675 |
| 1981 | 14.1 | 90.2 | 46.3 | 41.9 | 29.6 | 18.3 | 10.9 | 12.4 | 23 | 32.4 | 30.3 | 24.8 | 31.183 |
| 1982 | 18.3 | 12.2 | 42.3 | 136 | 24.2 | 35.2 | 13.7 | 19.7 | 14 | 13.4 | 44 | 67.1 | 36.675 |
| 1983 | 35.5 | 34.1 | 48 | 49.4 | 48.7 | 23.7 | 11.4 | 12 | 18.8 | 23.3 | 31.7 | 30.2 | 30.567 |
| 1984 | 17.9 | 90.3 | 56.5 | 60.6 | 29 | 21.8 | 13.7 | 9.35 | 16.1 | 12.4 | 32 | 46.8 | 33.871 |
| 1985 | 24.7 | 44.8 | 107 | 140 | 34.8 | 20 | 11 | 10.9 | 15.7 | 20.7 | 50.1 | 28.6 | 42.358 |
| 1986 | 27.2 | 20 | 97.4 | 58 | 33.2 | 22 | 17.2 | 17.2 | 94.5 | 76.7 | 32.3 | 32.5 | 44.017 |
| 1987 | 22.9 | 16.4 | 67.6 | 56.5 | 17.1 | 14.2 | 13.2 | 10.7 | 8.76 | 14 | 29.3 | 44.7 | 26.28 |
| 1988 | 29.4 | 44.4 | 62 | 55.3 | 25.3 | 10.2 | 6.56 | 7.34 | 7.84 | 17 | 39.6 | 23.5 | 27.37 |
| 1989 | 30.7 | 16.9 | 71.7 | 56.5 | 31 | 25.8 | 8.89 | 7.44 | 8.28 | 11.9 | 29.8 | 13.9 | 26.068 |
| 1990 | 37.9 | 39.8 | 94.3 | 47.4 | 32.5 | 17.5 | 11.2 | 9.59 | 8.97 | 34.9 | 61.8 | 57.8 | 37.805 |
| 1991 | 37.3 | 32.2 | 95.3 | 90.6 | 29.4 | 13.3 | 15.2 | 9.14 | 7.33 | 12.5 | 15.9 | 34.8 | 32.748 |
| 1992 | 29.6 | 20.4 | 65.1 | 77 | 24 | 11.7 | 11.2 | 20.2 | 29.5 | 27 | 87.8 | 38.7 | 36.85 |
| 1993 | 65.2 | 22.7 | 30.2 | 101 | 26.1 | 34.5 | 12.5 | 7.95 | 12.9 | 16.2 | 17.6 | 20.8 | 30.638 |
| 1994 | 9.03 | 22.8 | 38.8 | 73.4 | 47.1 | 21.1 | 14.7 | 11.3 | 10.9 | 12.4 | 26.1 | 27.6 | 26.269 |
| 1995 | 48.5 | 16.3 | 61.1 | 44.5 | 27.9 | 17.4 | 10.4 | 10.7 | 7.02 | 14.3 | 54.3 | 26.7 | 28.26 |
| 1996 | 55.5 | 37.3 | 43.5 | 103 | 50.8 | 26 | 18.2 | 13 | 12.2 | 20.3 | 43.5 | 44.5 | 38.983 |
| 1997 | 58.9 | 72.1 | 83.4 | 81.9 | 48.5 | 20.5 | 14 | 16.9 | 12.5 | 15.6 | 29.3 | 19.4 | 39.417 |
| 1998 | 55.8 | 27 | 71.6 | 43.1 | 17.6 | 12.6 | 7.11 | 6.46 | 5.83 | 5.92 | 7.1 | 10.3 | 22.535 |
| 1999 | 21.8 | 32 | 23.1 | 29.1 | 11.6 | 17.5 | 9.97 | 6.32 | 5.39 | 8.56 | 25.5 | 28 | 18.237 |
| 2000 | 31.2 | 35.1 | 39.1 | 36.6 | 79.4 | 48.4 | 31.9 | 16.3 | 20.2 | 13.2 | 29.4 | 29.7 | 34.208 |
| 2001 | 23.6 | 86.4 | 53.4 | 113 | 30.1 | 29.9 | 11.9 | 9.14 | 12.9 | 42.3 | 40.7 | 46.8 | 41.678 |
| 2002 | 36.5 | 49.4 | 80.7 | 69.4 | 39.3 | 24 | 9.3 | 7.55 | 5.85 | 6.76 | 8.41 | 9.69 | 28.905 |
| 2003 | 9.25 | 9.61 | 58.4 | 43.4 | 31.8 | 18.9 | 12.5 | 18.3 | 9.63 | 28.9 | 57.9 | 52.1 | 29.224 |

Table 10 Monthly Flows at South Nation River at Spencerville, Ontario (1967-2003) (Environment Canada 2003)

| Year | Jan | Feb | Mar | Apr | May | June | July | Aug | Sep | Oct | Nov | Dec | Mean |
|------|-------------|-------------|-------------|-------------|--------------|-------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|
| 1967 | 1.64 | 1.69 | 3.04 | 8.51 | 2.22 | 1.35 | 0.293 | 0.148 | 0.004 | 0.261 | 4.01 | 2.81 | 2.1647 |
| 1968 | 0.476 | 1.46 | 11.7 | 5.79 | 1.41 | 2.18 | 1.75 | 0.156 | 0.211 | 0.155 | 3.6 | 4.4 | 2.774 |
| 1969 | 1.61 | 2.41 | 7.04 | 13.4 | 4.3 | 4.52 | 0.984 | 0.539 | 0.271 | 0.272 | 2.04 | 3.16 | 3.3788 |
| 1970 | 0.495 | 1.35 | 5.3 | 19.5 | 2.21 | 0.432 | 2.05 | 0.649 | 0.395 | 1.18 | 5.32 | 2.52 | 3.4501 |
| 1971 | 2.04 | 1.74 | 5.17 | 26 | 3.68 | 0.377 | 0.191 | 0.085 | 0.076 | 0.08 | 0.118 | 1.45 | 3.4173 |
| 1972 | 1.36 | 0.711 | 1.23 | 22.2 | 4.11 | 3.96 | 3.19 | 0.821 | 0.105 | 1.41 | 6.06 | 3.7 | 4.0714 |
| 1973 | 5.92 | 4.14 | 16.1 | 6.95 | 5.5 | 1.86 | 0.259 | 0.071 | 0.037 | 0.097 | 0.518 | 2.06 | 3.626 |
| 1974 | 4.97 | 3.11 | 8.06 | 14.3 | 5.57 | 0.895 | 0.299 | 0.064 | 0.025 | 0.038 | 0.786 | 2.57 | 3.3906 |
| 1975 | 3.33 | 0.949 | 8.68 | 10.9 | 0.992 | 0.199 | 0.01 | 0.009 | 0.358 | 1.61 | 4.17 | 4.21 | 2.9514 |
| 1976 | 0.75 | 6.44 | 19.5 | 6.31 | 6.82 | 1.02 | 1.34 | 0.905 | 1.18 | 3.45 | 2.51 | 1.08 | 4.2754 |
| 1977 | 0.486 | 0.492 | 18.7 | 6.28 | 1.21 | 0.087 | 0.022 | 0.037 | 0.125 | 3.47 | 4.04 | 6.03 | 3.4149 |
| 1978 | 6.62 | 3.34 | 6.3 | 20.1 | 1.54 | 0.199 | 0.035 | 0.044 | 0.023 | 0.045 | 0.205 | 0.6 | 3.2543 |
| 1979 | 1.33 | 0.934 | 13.1 | 7.97 | 1.67 | 0.564 | 0.069 | 0.016 | 1.66 | 1.71 | 4.02 | 4.64 | 3.1403 |
| 1980 | 2.27 | 0.207 | 9.5 | 9.6 | 2.77 | 0.377 | 0.068 | 0.052 | 0.162 | 1.13 | 3.13 | 4.3 | 2.7972 |
| 1981 | 0.508 | 13.4 | 3.61 | 3.1 | 2.62 | 1.79 | 0.483 | 0.774 | 3.16 | 5.13 | 5.35 | 1.64 | 3.4638 |
| 1982 | 1.88 | 0.76 | 7.99 | 15.3 | 1.81 | 2.38 | 0.362 | 0.135 | 0.305 | 0.302 | 2.55 | 5.14 | 3.2428 |
| 1983 | 1.99 | 2.56 | 7.04 | 10.8 | 6.46 | 0.724 | 0.043 | 0.017 | 0.004 | 0.05 | 3.29 | 6.51 | 3.2907 |
| 1984 | 1.03 | 7.56 | 4.39 | 15.8 | 3.91 | 0.947 | 0.037 | 0.009 | 0.005 | 0.01 | 0.052 | 0.144 | 2.8245 |
| 1985 | 0.318 | 1.45 | 9.5 | 5.26 | 0.905 | 0.872 | 0.405 | 0.033 | 0.108 | 0.434 | 3.53 | 1.74 | 2.0463 |
| 1986 | 2.96 | 1.01 | 8.43 | 4.21 | 1.94 | 2.14 | 2.67 | 6.69 | 2.43 | 6.13 | 4.59 | 4.84 | 4.0033 |
| 1987 | 1.68 | 0.918 | 10.4 | 5.05 | 0.937 | 0.437 | 0.086 | 0.018 | 0.026 | 0.264 | 1.46 | 6.98 | 2.3547 |
| 1988 | 0.588 | 1.47 | 6.51 | 5.68 | 2.95 | 0.217 | 0.008 | 0.05 | 0.041 | 1.4 | 5.89 | 0.983 | 2.1489 |
| 1989 | 0.788 | 0.841 | 6 | 6.47 | 5.23 | 2.9 | 0.751 | 0.105 | 0.073 | 0.523 | 3.85 | 1.05 | 2.3818 |
| 1990 | 2.47 | 4.68 | 9.73 | 9.73 | 4.66 | 1.52 | 0.744 | 0.263 | 0.028 | 1.32 | 2.02 | 7.91 | 3.7563 |
| 1991 | 3.11 | 3.52 | 10.1 | 12.6 | 1.89 | 0.205 | 0.022 | 0.014 | 0.022 | 0.131 | 0.245 | 0.717 | 2.7147 |
| 1992 | 0.736 | 0.348 | 6.76 | 11.6 | 1.76 | 0.632 | 0.085 | 0.145 | 0.22 | 0.508 | 4.23 | 2.18 | 2.4337 |
| 1993 | 3.93 | 1.24 | 2.1 | 22.6 | 2.09 | 2.8 | 0.281 | 0.024 | 0.045 | 0.276 | 1.97 | 3.43 | 3.3988 |
| 1994 | 0.76 | 1.94 | 4.3 | 18.9 | 3.18 | 1.23 | 0.394 | 0.073 | 0.032 | 0.029 | 1.13 | 2.1 | 2.839 |
| 1995 | 6.73 | 0.697 | 5.91 | 2.15 | 1.46 | 0.405 | 0.013 | 0.039 | 0.004 | 1.95 | 3.77 | 1.72 | 2.0707 |
| 1996 | 7.8 | 7.42 | 4.88 | 8.51 | 6.09 | 0.935 | 0.139 | 0.06 | 0.258 | 1.52 | 5.01 | 6.28 | 4.0752 |
| 1997 | 2.35 | 3.31 | 7.14 | 14.4 | 4.65 | 0.653 | 0.813 | 0.383 | 0.334 | 1.02 | 3.86 | 2.18 | 3.4244 |
| 1998 | 3.6 | 1.78 | 15.5 | 7.71 | 0.48 | 1.43 | 0.902 | 0.226 | 0.45 | 1.21 | 1.38 | 1.54 | 3.0173 |
| 1999 | 3.35 | 3.69 | 9.04 | 11.3 | 0.528 | 0.151 | 0.052 | 0.009 | 0.013 | 0.221 | 0.952 | 2.11 | 2.618 |
| 2000 | 1.72 | 3.15 | 7.84 | 13.2 | 7.48 | 3.18 | 1.64 | 0.747 | 1 | 0.716 | 1.95 | 2.78 | 3.7836 |
| 2001 | 1.34 | 2.5 | 3.96 | 12.2 | 0.503 | 0.28 | 0.011 | 0.005 | 0.005 | 0.11 | 0.496 | 2.33 | 1.9783 |
| 2002 | 2.02 | 2.81 | 6.02 | 8.26 | 5.29 | 5.75 | 0.327 | 0.008 | 0.004 | 0.024 | 0.433 | 0.516 | 2.6218 |
| 2003 | 0.275 | 0.27 | 7.98 | 4.53 | 4.48 | 2.73 | 0.205 | 1.65 | 0.054 | 1.82 | 6.17 | 6.13 | 3.0245 |

Table 11 Monthly Flows at Speed River below Guelph, Ontario (1967-2003)
(Environment Canada 2003)

| Year | Jan | Feb | Mar | Apr | May | June | July | Aug | Sep | Oct | Nov | Dec | Mean |
|------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|
| 1967 | 4.58 | 3.96 | 8.97 | 21.2 | 5.47 | 9.79 | 7.4 | 2.68 | 1.98 | 4.55 | 5.91 | 8.25 | 7.0617 |
| 1968 | 3.19 | 10.3 | 17.2 | 8.05 | 4.8 | 2.73 | 2.75 | 6.65 | 6.14 | 4.24 | 7.65 | 7.1 | 6.7333 |
| 1969 | 6.65 | 7.36 | 14.4 | 21.3 | 8.81 | 3.06 | 2.07 | 1.79 | 1.05 | 1.83 | 4.75 | 2.73 | 6.3167 |
| 1970 | 1.82 | 2.57 | 4.62 | 16 | 5.41 | 1.87 | 2.4 | 1.77 | 2.71 | 3.57 | 5.62 | 7.31 | 4.6392 |
| 1971 | 4.11 | 4.31 | 7.43 | 21.5 | 4.55 | X | X | X | X | X | X | 4.66 | X |
| 1972 | 5.08 | 2.98 | 5.18 | 31.5 | 6.2 | 5.97 | 3.83 | 1.47 | 1.32 | 3.89 | 5.46 | 6.12 | 6.5833 |
| 1973 | 7.61 | 6.82 | 26.2 | 11.8 | 8.59 | 3.99 | 1.43 | 1.73 | 1.05 | 1.61 | 5.24 | 3.84 | 6.6592 |
| 1974 | 6.02 | 5.29 | 18.9 | 14.8 | 15.6 | 4.41 | 1.76 | 1.06 | 0.937 | 1.32 | 3.07 | 2.01 | 6.2648 |
| 1975 | 2.74 | 4.85 | 11.7 | 17.1 | 5.32 | 3.69 | 1.53 | 1.81 | 2.52 | 2.14 | 3.39 | 4.25 | 5.0867 |
| 1976 | 3.55 | 7.23 | 23.8 | 15.3 | 9.96 | 3.9 | 3.34 | 2.77 | 4.12 | 5.93 | 4.93 | 2.63 | 7.2883 |
| 1977 | 1.65 | 1.73 | 13.7 | 9.76 | 2.89 | 1.89 | 1.92 | 2.5 | 5.27 | 9.45 | 8.39 | 9.52 | 5.7225 |
| 1978 | 4.77 | 5.33 | 6.34 | 21 | 8.93 | 2.67 | 1.93 | 1.61 | 2.8 | 3.08 | 3.83 | 5.55 | 5.6533 |
| 1979 | 4.45 | 2.25 | 16.1 | 21.6 | 8.54 | 3.41 | 2.09 | 2.42 | 2.31 | 2.86 | 5.23 | 9.05 | 6.6925 |
| 1980 | 6 | 3.72 | 11.3 | 15.1 | 7.04 | 3.98 | 3.81 | 2.21 | 2.69 | 3.32 | 2.98 | 4.27 | 5.535 |
| 1981 | 2.24 | 8.42 | 4.08 | 5.76 | 3.08 | 1.49 | 2.58 | 2.09 | 3.55 | 6.38 | 6.3 | 4.32 | 4.1908 |
| 1982 | 3.16 | 2.49 | 8.7 | 25.4 | 4.55 | 7.55 | 2.66 | 2.01 | 3.18 | 5.42 | 9.27 | 14.8 | 7.4325 |
| 1983 | 6.74 | 5.62 | 6.98 | 12.5 | 13.9 | 4.67 | 1.96 | 2.13 | 2.03 | 2.43 | 3.17 | 4.67 | 5.5667 |
| 1984 | 2.77 | 11.4 | 12 | 14.2 | 5.3 | 3.67 | 1.93 | 1.49 | 2.27 | 2.09 | 3.38 | 4.12 | 5.385 |
| 1985 | 6.13 | 6.55 | 21.2 | 25 | 4.73 | 3.26 | 3.42 | 3.76 | 5.32 | 4.9 | 12.3 | 9.81 | 8.865 |
| 1986 | 4.14 | 4.65 | 12.7 | 8.32 | 5.74 | 4.52 | 5.16 | 7.4 | 27.3 | 18 | 7.94 | 8.16 | 9.5025 |
| 1987 | 6.76 | 4.44 | 11.5 | 16.7 | 3.31 | 2.56 | 2.91 | 2.37 | 2.29 | 2.34 | 2.82 | 7.02 | 5.4183 |
| 1988 | 3.89 | 5 | 8.5 | 10.3 | 4.06 | 1.98 | 2 | 1.86 | 2 | 1.99 | 5.15 | 2.82 | 4.1292 |
| 1989 | 4.27 | 2.96 | 6.76 | 8.89 | 6.02 | 7.83 | 2.16 | 1.8 | 1.39 | 1.77 | 4.03 | 2.26 | 4.1783 |
| 1990 | 4.32 | 7.79 | 11.6 | 7.01 | 5.53 | 2.66 | 2.42 | 2.32 | 1.91 | 5.52 | 6.65 | 9.91 | 5.6367 |
| 1991 | 7.09 | 5.32 | 15.4 | 21 | 7.23 | 2.76 | 2.69 | 2.32 | 1.62 | 2.08 | 2.12 | 3.21 | 6.07 |
| 1992 | 4.07 | 2.46 | 4.32 | 14.9 | 8.42 | 3.21 | 4.06 | 7.87 | 7.5 | 7.63 | 19.3 | 8.81 | 7.7125 |
| 1993 | 15.4 | 4.35 | 5.94 | 17.9 | 5.18 | 6.94 | 3.16 | 2.15 | 2.98 | 3.37 | 4.02 | 4.24 | 6.3025 |
| 1994 | 1.43 | 2.02 | 5.31 | 14.9 | 8.46 | 3.46 | 2.24 | 1.68 | 1.54 | 1.85 | 2.4 | 2.5 | 3.9825 |
| 1995 | 9.82 | 3.41 | 6.96 | 8.55 | 6.63 | 4.64 | 2.78 | 3.12 | 1.92 | 2.8 | 8.5 | 5.75 | 5.4067 |
| 1996 | 7.61 | 6.64 | 7.8 | 19.2 | 13.4 | 8.53 | 3.88 | 2.8 | 4.65 | 5.84 | 4.03 | 9.38 | 7.8133 |
| 1997 | 9.62 | 13.5 | 16.7 | 14.6 | 9.07 | 3.43 | 2.16 | 1.91 | 2.09 | 1.96 | 3.14 | 3.71 | 6.8242 |
| 1998 | 5.44 | 3.54 | 10.4 | 8.6 | 5.34 | 2.9 | 2.4 | 2.05 | 1.88 | 1.93 | 1.41 | 2.06 | 3.9958 |
| 1999 | 3.08 | 2.86 | 2.89 | 2.72 | 1.77 | 2.17 | 2 | 1.62 | 2.46 | 2.41 | 5.97 | 4.83 | 2.8983 |
| 2000 | 2.08 | 4.18 | 4.62 | 6.62 | 9.49 | 11 | 5.49 | 6.52 | 3.08 | 3.42 | 2.62 | 3.41 | 5.2108 |
| 2001 | 1.84 | 8.64 | 7.31 | 13.4 | 4.47 | 3.7 | 2.04 | 1.7 | 1.73 | 3.42 | 4.06 | 7.53 | 4.9867 |
| 2002 | 3.4 | 5.16 | 10.2 | 12.6 | 9.17 | 4.95 | 2.51 | 2.09 | 2.49 | 2.16 | 2.06 | 1.52 | 4.8592 |
| 2003 | 1.31 | 1.37 | 5.06 | 6.57 | 6.56 | 3.63 | 1.93 | 1.99 | 2.3 | 2.49 | 8.02 | 7.68 | 4.0758 |

X=no data

Table 12 Monthly Flows at Sydenham River near Alvinston, Ontario (1967-2003) (Environment Canada 2003)

| Year | Jan | Feb | Mar | Apr | May | June | July | Aug | Sep | Oct | Nov | Dec | Mean |
|------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|--------------|--------------|--------------|-------------|-------------|---------------|
| 1967 | 7.56 | 4.93 | 16.4 | 20.3 | 6.66 | 7.02 | 3.03 | 1.71 | 1.32 | 11.6 | 15.5 | 16.7 | 9.3942 |
| 1968 | 11.6 | 31.1 | 22.4 | 8.16 | 2.92 | 9.79 | 5.27 | 2.39 | 2.12 | 2.49 | 7.15 | 12.3 | 9.8075 |
| 1969 | 13.1 | 10.8 | 8.29 | 14.9 | 12.2 | 5.75 | 1.8 | 0.948 | 0.771 | 0.97 | 3.58 | 6.01 | 6.5933 |
| 1970 | 3.01 | 7.06 | 19.4 | 17.1 | 4.78 | 1.51 | 1.78 | 0.799 | 0.855 | 0.998 | 4.15 | 8.47 | 5.826 |
| 1971 | 2.96 | 17.7 | 22.5 | 7.13 | 2.13 | 1.21 | 0.631 | 0.66 | 0.783 | 0.729 | 1.03 | 8.16 | 5.4686 |
| 1972 | 5.63 | 1.74 | 17.6 | 20 | 4.37 | 1.61 | 1.79 | 1.97 | 0.783 | 2.57 | 9.56 | 16.2 | 6.9853 |
| 1973 | 16.9 | 6.01 | 36.6 | 8.08 | 7.3 | 4.26 | 1.22 | 1.08 | 0.722 | 0.896 | 8.03 | 11.6 | 8.5582 |
| 1974 | 17.7 | 12.1 | 19.1 | 12.3 | 15.4 | 2.57 | 1.41 | 0.782 | 0.771 | 0.904 | 2.18 | 2.87 | 7.3406 |
| 1975 | 13.5 | 13.7 | 20.3 | 15.8 | 3.29 | 4.48 | 1.54 | 2.58 | 5.86 | 1.97 | 3.27 | 8.5 | 7.8992 |
| 1976 | 5.98 | 30.6 | 24.1 | 10.3 | 12.1 | 2.68 | 9.87 | 5.36 | 2.91 | 3 | 4.43 | 3.06 | 9.5325 |
| 1977 | 1.8 | 4.39 | 36.9 | 12.8 | 2.79 | 1.4 | 1.26 | 0.926 | 4.02 | 4.96 | 7.71 | 21.9 | 8.4047 |
| 1978 | 3.1 | 1.72 | 18.8 | 23 | 5.12 | 2.17 | 1.07 | 0.898 | 0.97 | 1.39 | 1.66 | 3.21 | 5.259 |
| 1979 | 4.11 | 1.9 | 24.5 | 29.8 | 5.6 | 2.55 | 1.17 | 0.741 | 0.797 | 1.32 | 5.62 | 14.5 | 7.7173 |
| 1980 | 5.57 | 2.71 | 17.7 | 14 | 3.91 | 2.56 | 1.96 | 1.65 | 1.68 | 2.7 | 1.83 | 5.55 | 5.1517 |
| 1981 | 1.16 | 27.8 | 7.19 | 11.3 | 5.17 | 1.93 | 0.882 | 1.77 | 7.37 | 17.7 | 8.92 | 8.29 | 8.2902 |
| 1982 | 9.82 | 1.96 | 46.5 | 20.1 | 3.32 | 3.36 | 1.12 | 1.9 | 2.2 | 2.56 | 14.8 | 21.5 | 10.762 |
| 1983 | 6.56 | 12.5 | 6.32 | 11 | 18.7 | 4.8 | 1.34 | 3.39 | 1.43 | 1.34 | 6.17 | 15.1 | 7.3875 |
| 1984 | 1.47 | 25.6 | 20.8 | 8.13 | 5.41 | 11.2 | 3.91 | 1.68 | 4.21 | 2.05 | 9.47 | 12.8 | 8.8942 |
| 1985 | 11 | 30.8 | 29.2 | 15.2 | 2.49 | 1.8 | 1.15 | 1.67 | 1.85 | 6.02 | 20.5 | 9.25 | 10.911 |
| 1986 | 13.5 | 8.7 | 25.5 | 8.38 | 4.12 | 5.54 | 2.45 | 1.71 | 4.71 | 16.4 | 5.75 | 14.4 | 9.2633 |
| 1987 | 7.01 | 2.81 | 17.6 | 11.6 | 1.89 | 1.4 | 0.616 | 0.692 | 0.821 | 1.63 | 6 | 17.5 | 5.7974 |
| 1988 | 2.31 | 5.04 | 10.5 | 5.4 | 2.27 | 0.84 | 1.39 | 0.772 | 0.717 | 3.17 | 9.87 | 4.55 | 3.9024 |
| 1989 | 6.63 | 3.32 | 7.88 | 8.7 | 2.53 | 3.12 | 1.15 | 0.649 | 0.925 | 0.972 | 4.8 | 2 | 3.5563 |
| 1990 | 17 | 20.3 | 15.6 | 9.56 | 6.8 | 2.39 | 1.53 | 2 | 3.58 | 9.21 | 9.57 | 16.6 | 9.5117 |
| 1991 | 10.4 | 12.3 | 16.7 | 9.64 | 4.08 | 2.12 | 1.3 | 0.924 | 0.635 | 0.823 | 1.4 | 3.92 | 5.3535 |
| 1992 | 6.24 | 17.7 | 12.1 | 13.9 | 4.19 | 2.51 | 5.8 | 5.48 | 15.1 | 12.8 | 26.4 | 8.95 | 10.931 |
| 1993 | 22.7 | 3.25 | 17.2 | 15.6 | 3.44 | 1.98 | 1.27 | 0.897 | 1.15 | 1.61 | 2.42 | 4.09 | 6.3006 |
| 1994 | 8.03 | 18.5 | 18.1 | 8.48 | 6.02 | 7.13 | 3.11 | 1.37 | 0.902 | 1.15 | 1.43 | 3.7 | 6.4935 |
| 1995 | 13 | 2.25 | 17.5 | 10 | 6.77 | 2.88 | 1.19 | 2.05 | 0.682 | 1.21 | 9.91 | 5.44 | 6.0735 |
| 1996 | 9.95 | 12.1 | 6.56 | 17.9 | 14.7 | 6.16 | 1.72 | 1.1 | 10.6 | 11.2 | 8.49 | 20.2 | 10.057 |
| 1997 | 14.6 | 30.7 | 19.1 | 5.8 | 12.2 | 4.4 | 2.47 | 1.61 | 1.4 | 1.52 | 3.26 | 7.67 | 8.7275 |
| 1998 | 16.9 | 12.3 | 21.9 | 6.89 | 3.32 | 1.39 | 4.16 | 1.54 | 0.657 | 0.777 | 0.99 | 1.79 | 6.0512 |
| 1999 | 15.9 | 6.9 | 8.31 | 6.4 | 1.99 | 1.57 | 0.819 | 0.473 | 0.599 | 1.1 | 3.03 | 9.64 | 4.7276 |
| 2000 | 3.67 | 11.2 | 5.14 | 14 | 9.05 | 16.1 | 4.58 | 3.4 | 6.13 | 3 | 3.4 | 9.24 | 7.4092 |
| 2001 | 6.54 | 35 | 13.3 | 8.54 | 3.28 | 3.5 | 1.19 | 0.748 | 1.07 | 10.4 | 8.27 | 14.2 | 8.8365 |
| 2002 | 6.37 | 17.3 | 8.85 | 13.6 | 5.18 | 1.87 | 0.617 | 0.442 | 0.418 | 0.554 | 1.07 | 1.18 | 4.7876 |
| 2003 | 0.794 | 0.996 | 15.3 | 10.8 | 6.52 | 3.16 | 1.05 | 0.701 | 0.8 | 2.15 | 11.9 | 15 | 5.7643 |

Table 13 Monthly Flows at Thames River at Thamesville, Ontario (1967-2003)
(Environment Canada 2003)

| Year | Jan | Feb | Mar | Apr | May | June | July | Aug | Sep | Oct | Nov | Dec | Mean |
|------|-------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|
| 1967 | 62.6 | 40.5 | 99 | 149 | 43.5 | 40.6 | 28.4 | 24.6 | 13.2 | 55.6 | 99.1 | 113 | 64.092 |
| 1968 | 47.4 | 164 | 125 | 51 | 22.9 | 33.4 | 17.3 | 12.5 | 18.1 | 29.4 | 38.7 | 83 | 53.558 |
| 1969 | 83.3 | 140 | 101 | 133 | 73.9 | 29.2 | 12 | 8.49 | 7.98 | 9.28 | 28.5 | 33.8 | 55.038 |
| 1970 | 15.5 | 29.8 | 71.7 | 118 | 34 | 12.5 | 12.5 | 6.72 | 7.41 | 11.9 | 34.1 | 73.1 | 35.603 |
| 1971 | 33.7 | 57.9 | 146 | 114 | 17.1 | 9.31 | 6.39 | 7.99 | 7.33 | 7.73 | 11.2 | 23.7 | 36.863 |
| 1972 | 35.2 | 19.5 | 132 | 148 | 42 | 16.4 | 20.1 | 18.1 | 9.53 | 20.5 | 59.7 | 73.2 | 49.519 |
| 1973 | 120 | 47.1 | 229 | 71 | 46.2 | 23.4 | 11.2 | 9.77 | 7.58 | 10.4 | 44.3 | 66.7 | 57.221 |
| 1974 | 134 | 90.2 | 144 | 95.5 | 102 | 23.9 | 17.3 | 10.3 | 9.48 | 10.8 | 23.6 | 28.1 | 57.432 |
| 1975 | 79.2 | 91.7 | 146 | 135 | 28.2 | 28.1 | 12.3 | 19.9 | 41.7 | 18.6 | 20 | 52 | 56.058 |
| 1976 | 36.5 | 177 | 263 | 82.2 | 72 | 17.2 | 38.5 | 37.6 | 19.2 | 22.9 | 38.4 | 24.5 | 69.083 |
| 1977 | 11.3 | 18.3 | 292 | 95.6 | 24.4 | 11.1 | 15.4 | 12 | 52.3 | 70.8 | 66.8 | 159 | 69.083 |
| 1978 | 29.8 | 27.4 | 129 | 265 | 49.2 | 17.2 | 9.31 | 8.72 | 20.6 | 24.4 | 22.7 | 39.8 | 53.594 |
| 1979 | 54 | 20.2 | 198 | 219 | 47 | 19.3 | 11 | 12.4 | 11.3 | 18.4 | 79 | 114 | 66.967 |
| 1980 | 69.2 | 19.4 | 132 | 121 | 39.1 | 25.2 | 23.4 | 20.6 | 20.2 | 25.2 | 18.7 | 41.2 | 46.267 |
| 1981 | 13.3 | 187 | 68.1 | 72.9 | 43.5 | 22.4 | 12 | 13.8 | 51.7 | 86.3 | 53.8 | 44.3 | 55.758 |
| 1982 | 45.8 | 15.9 | 189 | 214 | 26.8 | 45.7 | 18.3 | 16.3 | 25.7 | 28.5 | 110 | 173 | 75.75 |
| 1983 | 56 | 74.6 | 51.6 | 84.9 | 112 | 45.4 | 23.2 | 68.2 | 23.9 | 24.6 | 48.9 | 123 | 61.358 |
| 1984 | 17.5 | 223 | 130 | 78.5 | 41.1 | 71.3 | 31.4 | 16.3 | 47.3 | 21.8 | 54 | 74 | 67.183 |
| 1985 | 77.6 | 129 | 289 | 155 | 21.1 | 20.5 | 16.5 | 20.3 | 32.8 | 50 | 146 | 73.6 | 85.95 |
| 1986 | 72.7 | 51.6 | 193 | 64.4 | 36.5 | 36.4 | 20.7 | 18.2 | 66 | 130 | 43.7 | 85.6 | 68.233 |
| 1987 | 47.5 | 21.9 | 109 | 103 | 17.5 | 17.9 | 12.5 | 11.6 | 11.9 | 13.9 | 43.3 | 109 | 43.25 |
| 1988 | 29.8 | 46.1 | 101 | 56.7 | 24.7 | 8.68 | 8.63 | 10.2 | 9.22 | 31.3 | 75.5 | 45.1 | 37.244 |
| 1989 | 49.3 | 35.5 | 59.3 | 84.5 | 25.5 | 39.3 | 10.9 | 8.19 | 9.13 | 11.4 | 28.9 | 18.5 | 31.702 |
| 1990 | 93.9 | 127 | 110 | 61.8 | 46.3 | 22.9 | 30.6 | 29.1 | 42 | 87.2 | 92.9 | 114 | 71.475 |
| 1991 | 90.9 | 77.7 | 141 | 96.2 | 33.7 | 19.7 | 15.1 | 12.8 | 8.59 | 12.8 | 21.6 | 45.1 | 47.933 |
| 1992 | 50.1 | 76.3 | 120 | 101 | 36.9 | 17.1 | 48 | 47.5 | 115 | 64.3 | 200 | 70.5 | 78.892 |
| 1993 | 183 | 28.1 | 65.7 | 157 | 31.4 | 29.4 | 15.2 | 9.5 | 13.8 | 20.8 | 24.3 | 39 | 51.433 |
| 1994 | 24.8 | 62 | 125 | 92.7 | 54.1 | 36.9 | 41.1 | 16.8 | 10.4 | 13.1 | 17.4 | 38.4 | 44.392 |
| 1995 | 108 | 26.4 | 117 | 67.7 | 50.5 | 27.7 | 15.7 | 16.1 | 8.89 | 15.7 | 100 | 53.5 | 50.599 |
| 1996 | 95.6 | 116 | 75.2 | 150 | 97.9 | 51.1 | 28.1 | 12.8 | 80.2 | 80 | 65.6 | 116 | 80.708 |
| 1997 | 107 | 160 | 158 | 58.7 | 81.7 | 43.1 | 22.3 | 17.5 | 17.8 | 17.9 | 36.5 | 43.8 | 63.692 |
| 1998 | 115 | 75.1 | 120 | 54.3 | 20.8 | 11.3 | 15.4 | 10.1 | 7.7 | 8.59 | 10.2 | 11.9 | 38.366 |
| 1999 | 60.7 | 62.7 | 44.5 | 36 | 13.6 | 12.8 | 9.75 | 6.34 | 5.79 | 9.41 | 18.5 | 44.6 | 27.058 |
| 2000 | 30.5 | 50.6 | 48.7 | 75.8 | 59 | 89.7 | 94.7 | 59.9 | 45.8 | 26 | 31.5 | 43.8 | 54.667 |
| 2001 | 29.6 | 178 | 106 | 79.8 | 29.2 | 25.2 | 9.42 | 7.18 | 7.73 | 44.8 | 42.2 | 95 | 54.511 |
| 2002 | 47.8 | 113 | 86.5 | 110 | 56.7 | 29.3 | 14.3 | 14.3 | 8.68 | 9.1 | 20.6 | 24.5 | 44.565 |
| 2003 | 19.1 | 17.4 | 109 | 80.9 | 64 | 25.8 | 12.3 | 12.3 | 10.2 | 23.5 | 90.9 | 97.7 | 46.925 |

Table 14 Monthly Flows at Welland River below Caistor's Corner, Ontario (1967-2003) (Environment Canada 2003)

| Year | Jan | Feb | Mar | Apr | May | June | July | Aug | Sep | Oct | Nov | Dec | Mean |
|------|--------------|-------------|-------------|-------------|-------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|
| 1967 | 2.41 | 1.7 | 5.86 | 3.66 | 2.63 | 0.088 | 0.012 | 0.001 | 0.003 | 0.151 | 0.732 | 3.82 | 1.7556 |
| 1968 | 1.08 | 6.61 | 5.45 | 0.885 | 0.401 | 2.67 | 0.19 | 0.008 | 0.402 | 0.083 | 5.35 | 2.8 | 2.1608 |
| 1969 | 5.35 | 3.45 | 3.26 | 7.62 | 3.77 | 0.24 | 0.027 | 0.04 | 0 | 0 | 0.159 | 1.21 | 2.0938 |
| 1970 | 0.155 | 2.07 | 5.46 | 2.93 | 0.263 | 0.03 | 0.106 | 0.027 | 0.053 | 0.351 | 2.65 | 4.55 | 1.5538 |
| 1971 | 0.565 | 4.01 | 8.57 | 1.84 | 0.114 | 0.265 | 0.002 | 0 | 0 | 0.006 | 0.009 | 1.36 | 1.3951 |
| 1972 | 3.5 | 0.092 | 14.1 | 7.22 | 1.68 | 0.354 | 0.153 | 1.12 | 0.107 | 0.44 | 3.77 | 8.88 | 3.4513 |
| 1973 | 4.81 | 2.22 | 11.1 | 3.12 | 0.911 | 0.196 | 0.138 | 0.133 | 0.192 | 0.438 | 6.31 | 6.83 | 3.0332 |
| 1974 | 8.13 | 5.65 | 5.64 | 3.83 | 6.23 | 0.744 | 0.083 | 0.073 | 0.191 | 0.241 | 0.657 | 1.88 | 2.7791 |
| 1975 | 2.65 | 4.62 | 6.06 | 1.73 | 0.383 | 0.787 | 0.038 | 0.238 | 1.6 | 0.755 | 1.61 | 3.76 | 2.0193 |
| 1976 | 2.98 | 12.2 | 9.86 | 5.99 | 4.19 | 0.289 | 0.328 | 0.229 | 0.091 | 0.254 | 0.463 | 0.473 | 3.1123 |
| 1977 | 0.152 | 0.754 | 8.75 | 2.48 | 0.061 | 0.178 | 0.647 | 0.463 | 7.71 | 3.56 | 1.73 | 12.8 | 3.2738 |
| 1978 | 1.92 | 1.89 | 10.8 | 5.67 | 0.566 | 0.131 | 0.436 | 0.512 | 0.693 | 2.55 | 0.764 | 2.37 | 2.3585 |
| 1979 | 4.39 | 2.14 | 7.11 | 8.25 | 0.524 | 0.068 | 0.064 | 0.081 | 0.349 | 0.583 | 2.28 | 6.18 | 2.6683 |
| 1980 | 0.885 | 0.535 | 5.41 | 6.4 | 0.686 | 0.252 | 0.391 | 0.307 | 0.676 | 1.32 | 0.631 | 1.99 | 1.6236 |
| 1981 | 0.076 | 11.5 | 0.872 | 1.18 | 0.73 | 0.875 | 0.648 | 1.94 | 4.1 | 3.22 | 2.34 | 2.91 | 2.5326 |
| 1982 | 3.47 | 0.135 | 12 | 5.72 | 0.211 | 2.09 | 0.086 | 0.145 | 0.611 | 0.622 | 5.51 | 8.27 | 3.2392 |
| 1983 | 1.99 | 3.93 | 4.41 | 4.43 | 3.86 | 0.604 | 0.509 | 1.89 | 0.622 | 0.906 | 3.45 | 6.78 | 2.7818 |
| 1984 | 0.632 | 9.4 | 9.05 | 9.26 | 2.12 | 4.66 | 0.133 | 0.099 | 1.85 | 0.643 | 1.8 | 4.35 | 3.6664 |
| 1985 | 1.97 | 6.53 | 8.8 | 4.08 | 0.122 | 0.118 | 0.048 | 0.219 | 0.19 | 1.8 | 13.7 | 3.72 | 3.4414 |
| 1986 | 1.25 | 0.921 | 10 | 3.63 | 2.45 | 0.429 | 0.701 | 0.308 | 1.21 | 2.78 | 3.97 | 6.24 | 2.8241 |
| 1987 | 2.11 | 0.374 | 4.13 | 7.37 | 0.161 | 0.128 | 0.646 | 1.18 | 0.901 | 1.01 | 3.11 | 5.2 | 2.1933 |
| 1988 | 1.36 | 4.09 | 2.36 | 1.11 | 0.305 | 0.022 | 1.01 | 0.314 | 0.334 | 1.04 | 3.31 | 1.35 | 1.3838 |
| 1989 | 1.48 | 0.755 | 3.91 | 2.45 | 2.64 | 0.654 | 0.212 | 0.156 | 0.56 | 0.897 | 2.59 | 0.417 | 1.3934 |
| 1990 | 7.56 | 8.8 | 5.73 | 2.71 | 2.75 | 0.084 | 0.058 | 0.121 | 0.574 | 1.31 | 0.987 | 10.3 | 3.4153 |
| 1991 | 2.88 | 2.76 | 8.06 | 5.42 | 0.319 | 0.04 | 0.084 | 0.07 | 0.56 | 0.43 | 0.097 | 1.16 | 1.8233 |
| 1992 | 2.79 | 5.16 | 2.07 | 5.87 | 1.19 | 0.078 | 1.97 | 0.591 | 3.23 | 2.27 | 8.08 | 6.82 | 3.3433 |
| 1993 | 7.01 | 0.117 | 8.3 | 5.19 | 0.255 | 1.12 | 0.336 | 0.041 | 0.65 | 0.283 | 0.492 | 0.613 | 2.0339 |
| 1994 | 0.19 | 2.03 | 7.07 | 3.95 | 1.37 | 1.15 | 1.37 | 0.141 | 0.045 | 0.07 | 0.692 | 2.65 | 1.7273 |
| 1995 | 6.77 | 0.175 | 1.9 | 0.552 | 0.12 | 0.029 | 0.021 | 0.295 | 0.414 | 1.36 | 9.49 | 1.28 | 1.8672 |
| 1996 | 4.19 | 1.76 | 3.22 | 7.69 | 6.48 | 0.937 | 0.145 | 0.174 | 2.26 | 2.83 | 0.566 | 4.38 | 2.886 |
| 1997 | 2.78 | 7.89 | 5.67 | 1.16 | 1.35 | 1.05 | 0.09 | 0.082 | 0.529 | 0.113 | 0.713 | 1.62 | 1.9206 |
| 1998 | 4.85 | 4.54 | 7.53 | 2.26 | 0.194 | 0.122 | 1.16 | 0.017 | 0.019 | 0.041 | 0.047 | 0.036 | 1.7347 |
| 1999 | 2.25 | 3.32 | 1.78 | 1.52 | 0.379 | 0.163 | 0.041 | 0.042 | 0.009 | 0.566 | 3.22 | 1.41 | 1.225 |
| 2000 | 1.21 | 4.58 | 1.29 | 4.15 | 1.23 | 5.13 | 0.921 | 0.572 | 0.174 | 0.081 | 0.319 | 0.667 | 1.6937 |
| 2001 | 0.557 | 11.8 | 4.45 | 1.9 | 2.44 | 0.421 | 0.06 | 0.017 | 0.03 | 0.768 | 1.04 | 3.96 | 2.2869 |
| 2002 | 1.57 | 4.51 | 3.08 | 4.86 | 2.69 | 0.117 | 0.118 | 0.162 | 0.017 | 0.058 | 0.538 | 0.709 | 1.5358 |
| 2003 | 0.543 | 0.103 | 6.83 | 4.13 | 2.36 | 1.23 | 0.044 | 0.684 | 0.39 | 0.719 | 6.41 | 2.72 | 2.1803 |

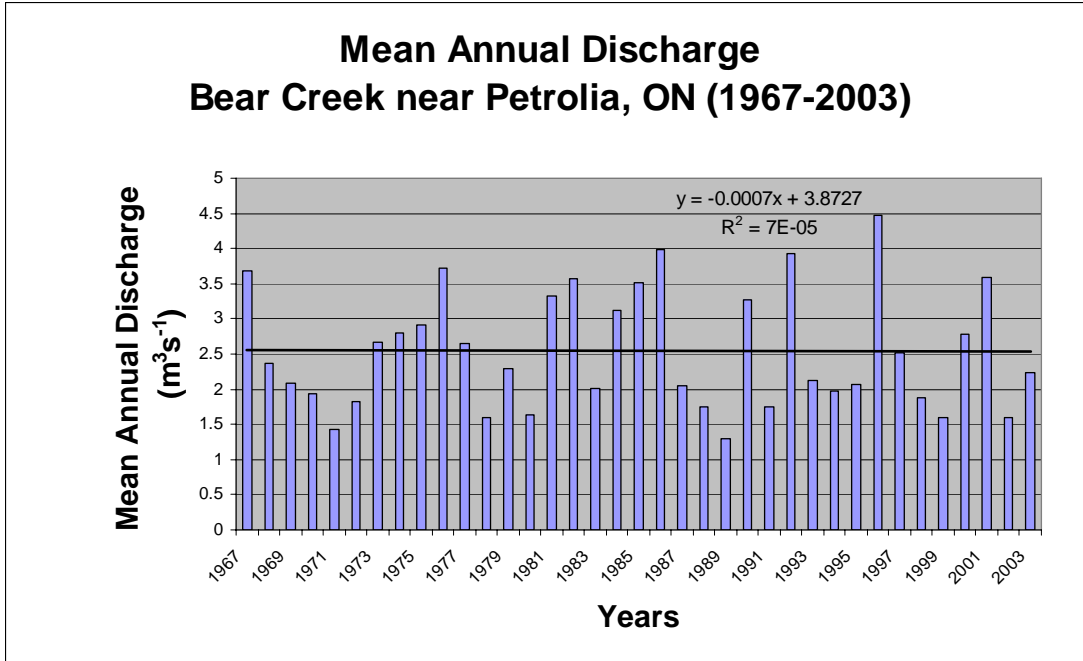


Figure 1 Mean Annual Discharge at Bear Creek near Petrolia, Ontario (1967-2003) (Environment Canada 2006)

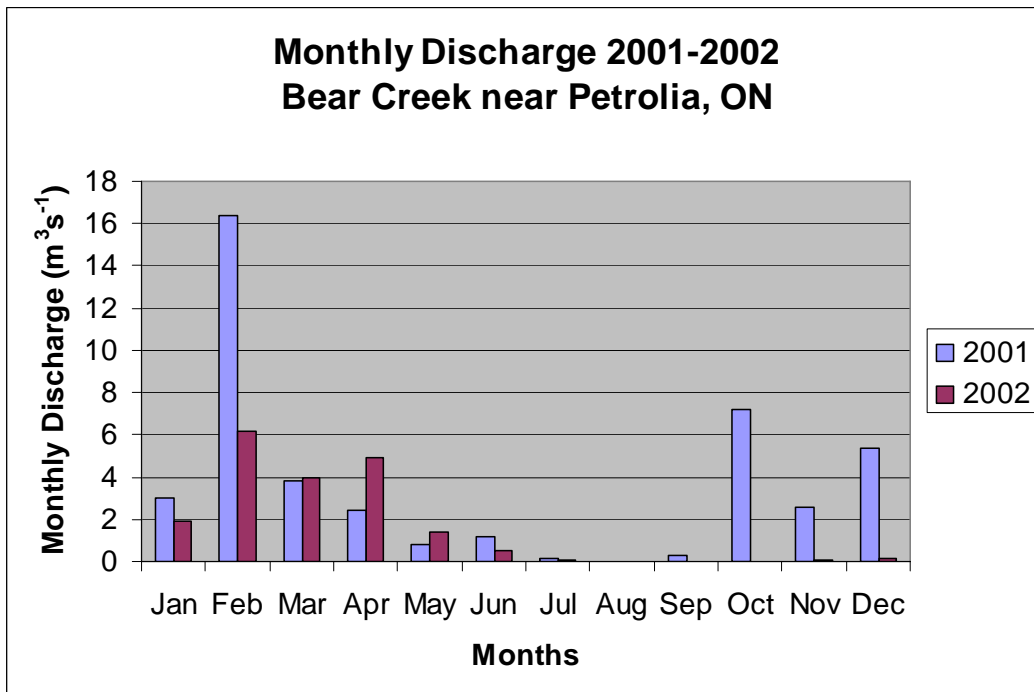


Figure 2 Monthly Discharge at Bear Creek near Petrolia, Ontario (2001-2002) (Environment Canada 2006)

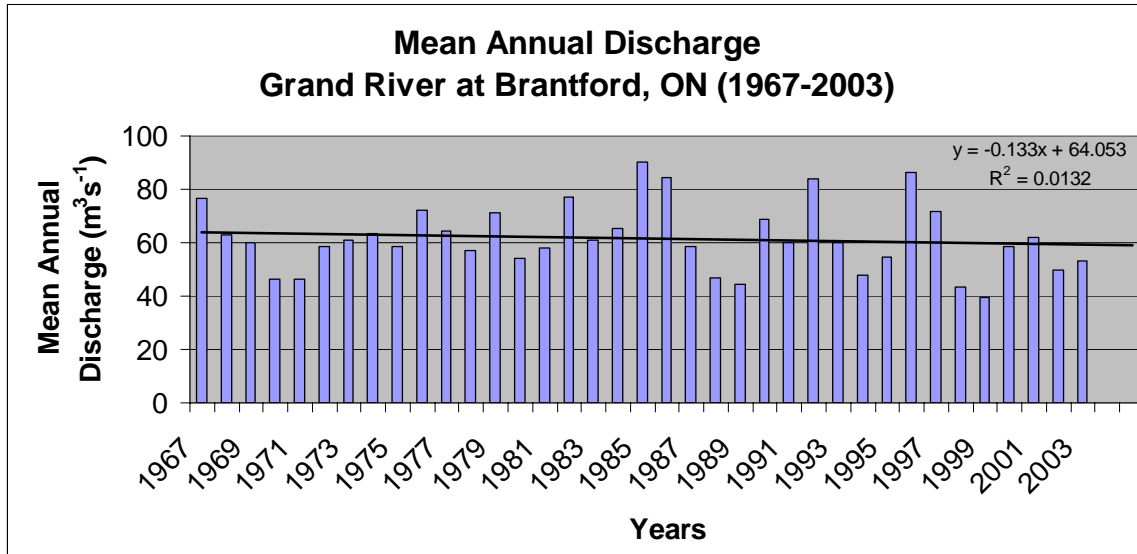


Figure 3 Mean Annual Discharge at Grand River at Brantford, Ontario (1967-2003) (Environment Canada 2006)

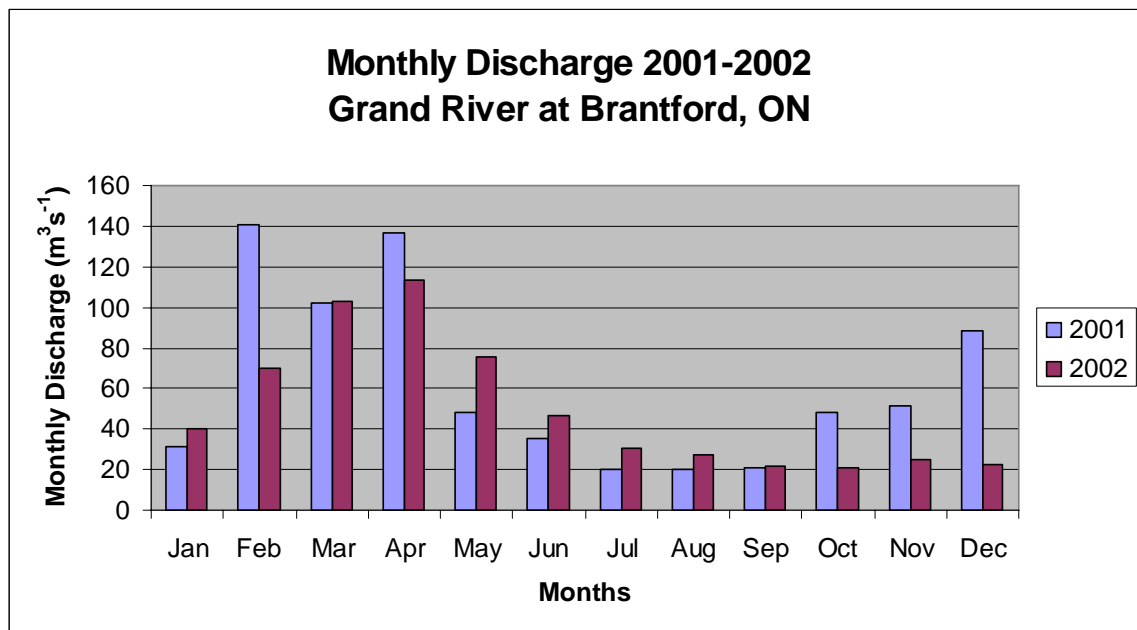


Figure 4 Monthly Discharge at Grand River at Brantford, Ontario (2001-2002) (Environment Canada 2006)

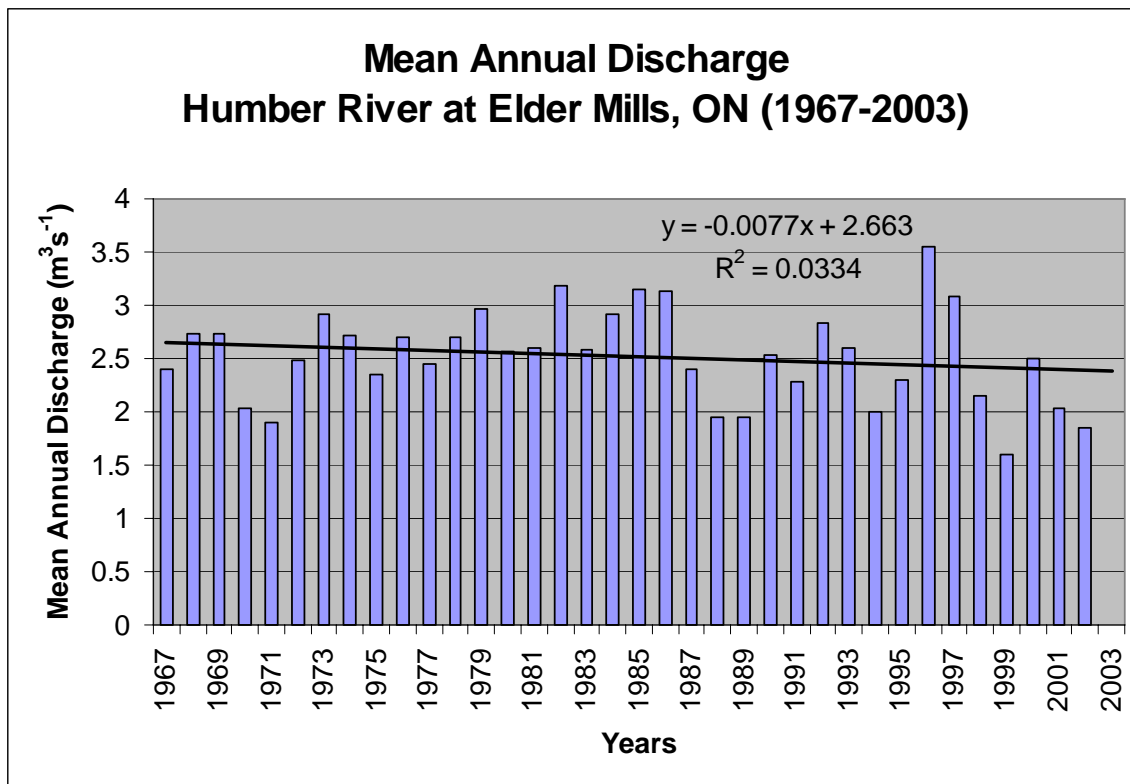


Figure 5 Mean Annual Discharge at Humber River at Elder Mills, Ontario (1967-2003) (Environment Canada 2006)

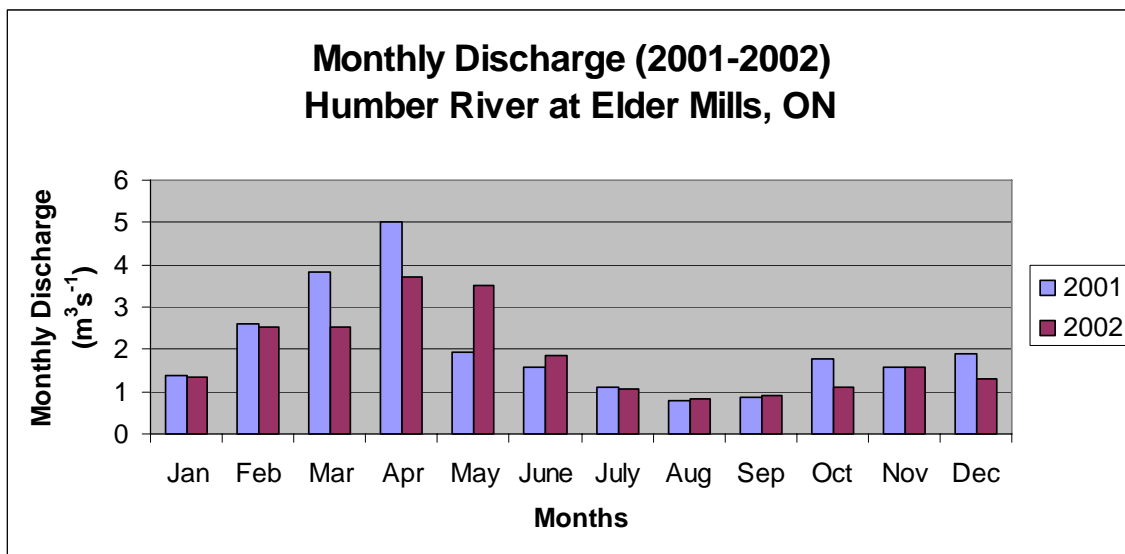


Figure 6 Monthly Discharge at Humber River at Elder Mills, Ontario (2001-2002) (Environment Canada 2006)

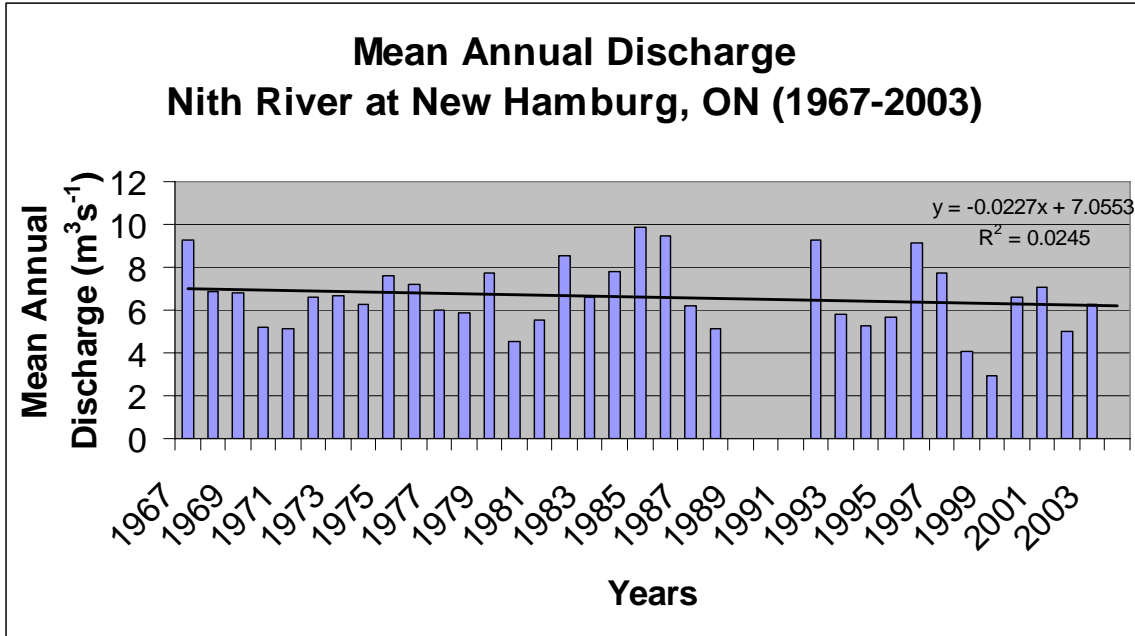


Figure 7 Mean Annual Discharge at Nith River at New Hamburg, Ontario (1967-2003) (Environment Canada 2006)

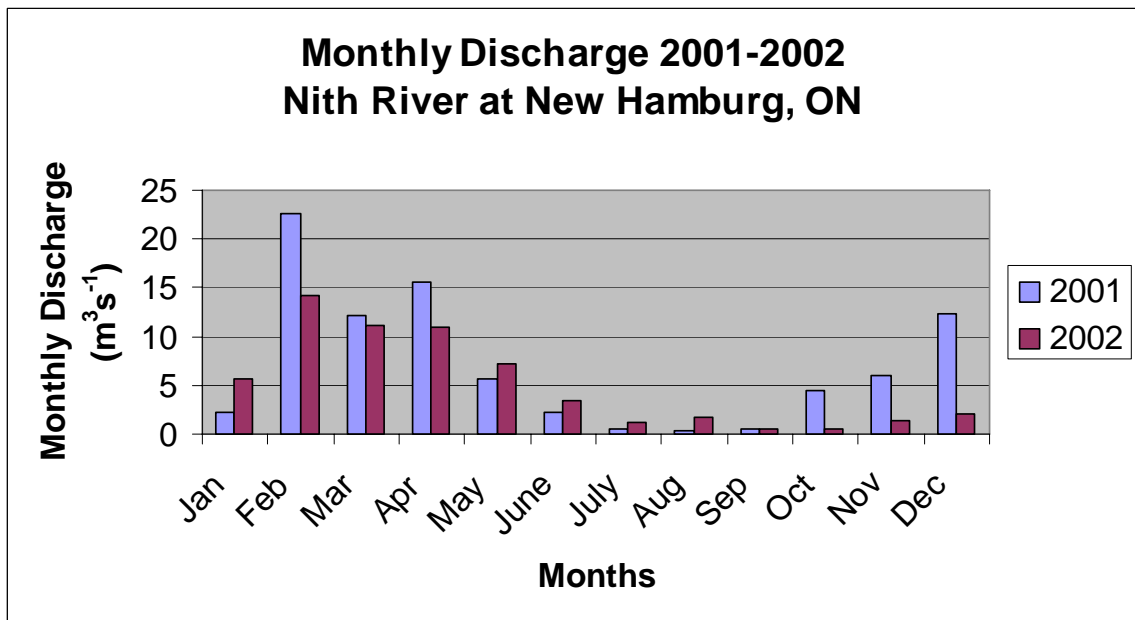


Figure 8 Monthly Discharge at Nith River at New Hamburg (2001-2002) (Environment Canada 2006)

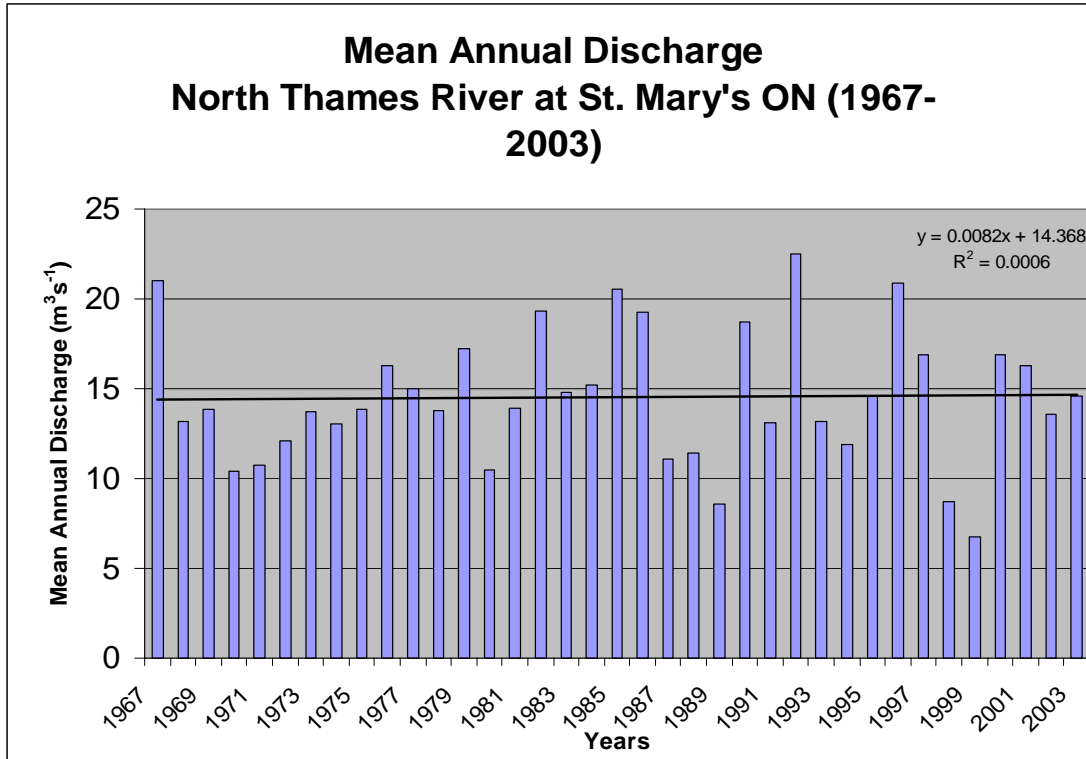


Figure 9 Mean Annual Discharge at North Thames River at St. Mary's, Ontario (1967-2003) (Environment Canada 2006)

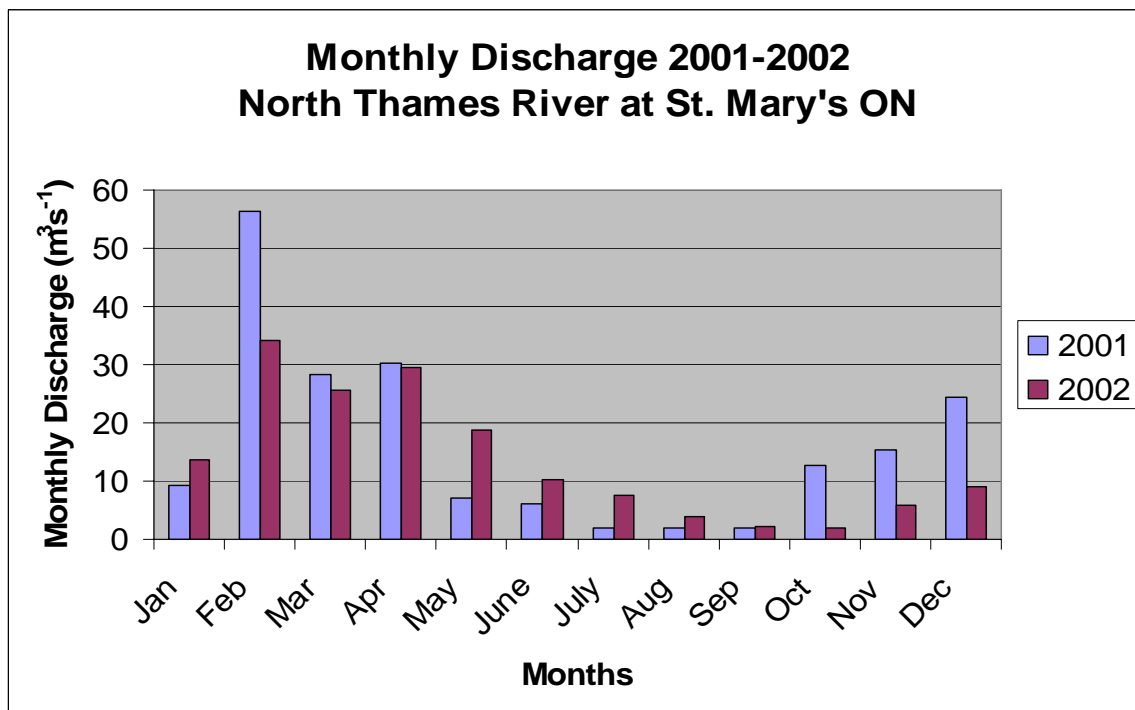


Figure 10 Monthly Discharge at North Thames River at St. Mary's, Ontario (2001-2002) (Environment Canada 2006)

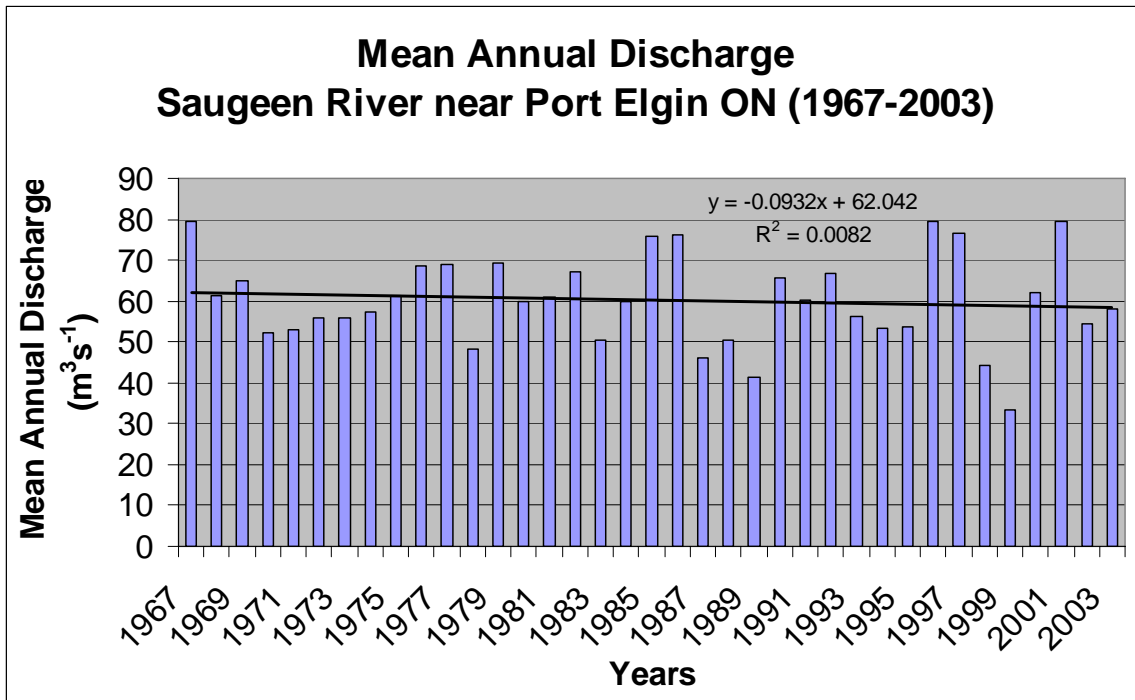


Figure 11 Mean Annual Discharge at Saugeen River near Port Elgin, Ontario (1967-2003) (Environment Canada 2006)

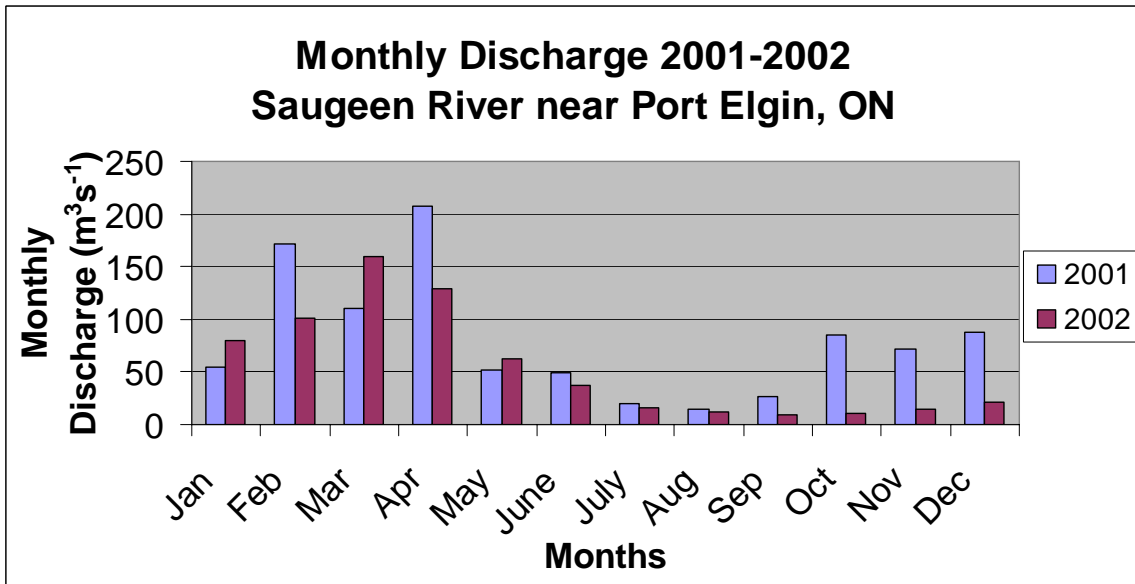


Figure 12 Monthly Discharge at Saugeen River near Port Elgin, Ontario (2001-2002) (Environment Canada 2006)

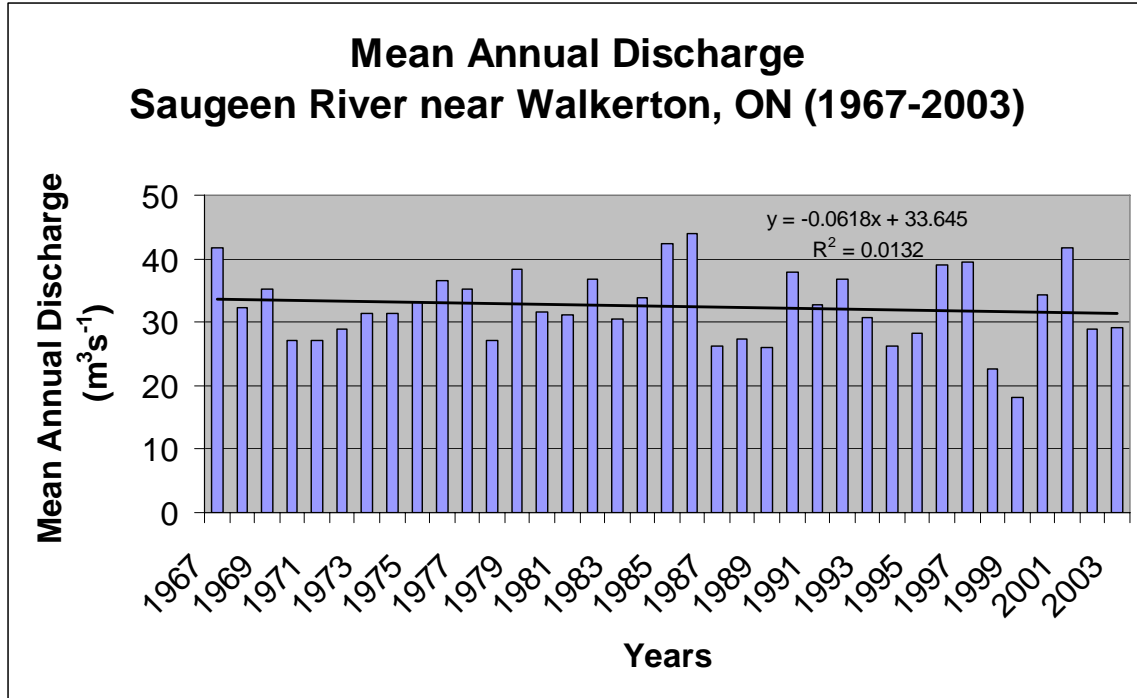


Figure 13 Mean Annual Discharge at Saugeen River near Walkerton, Ontario (1967-2003) (Environment Canada 2006)

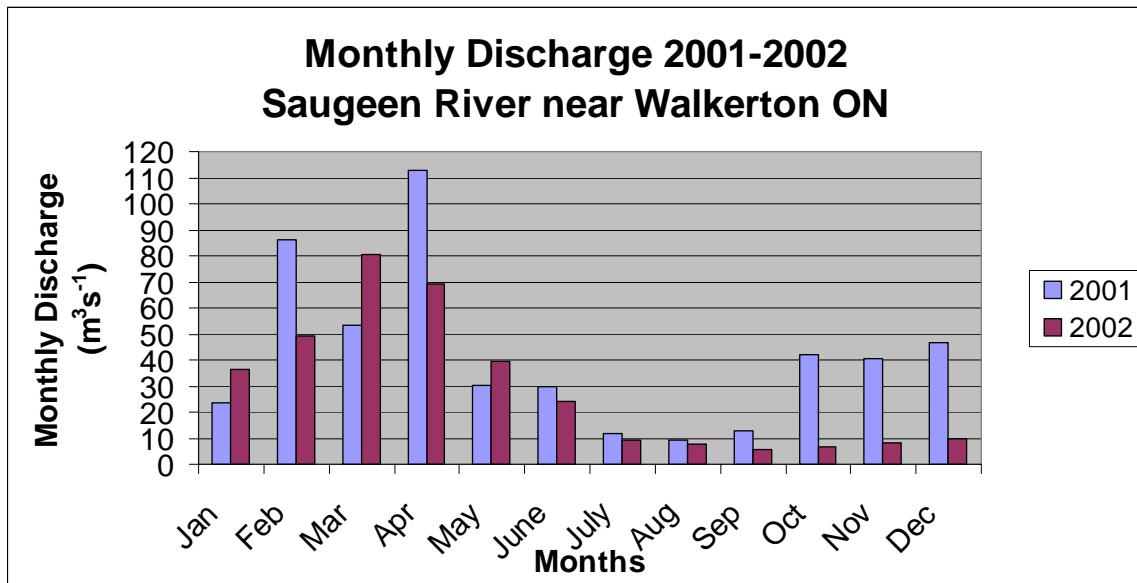


Figure 14 Monthly Discharge at Saugeen River near Walkerton, Ontario (2001-2002) (Environment Canada 2006)

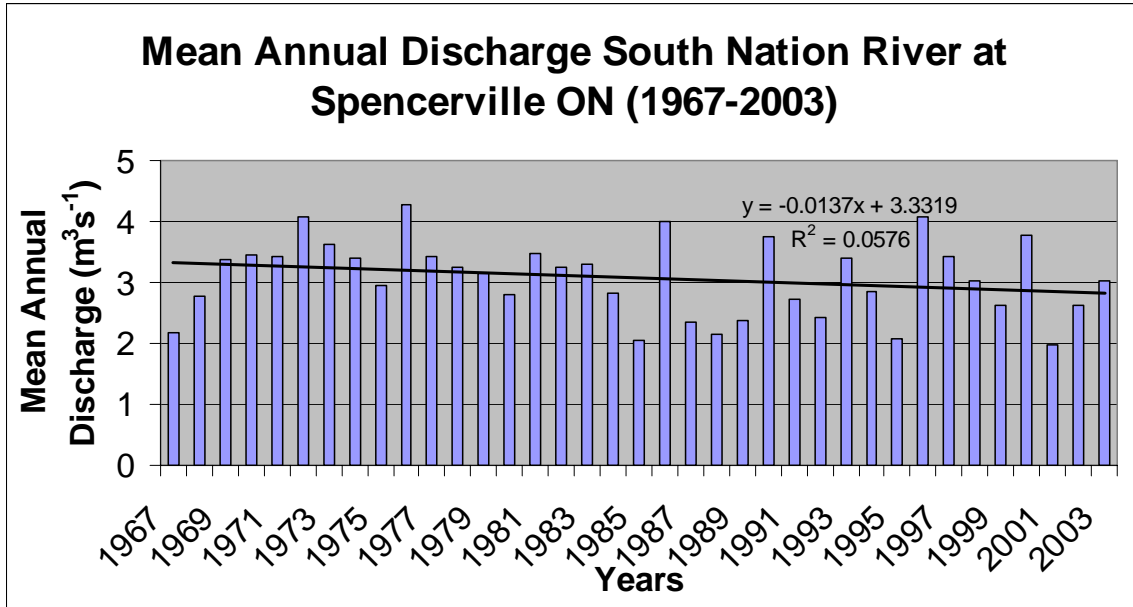


Figure 15 Mean Annual Discharge at South Nation River at Spencerville, Ontario (1967-2003) (Environment Canada 2006)

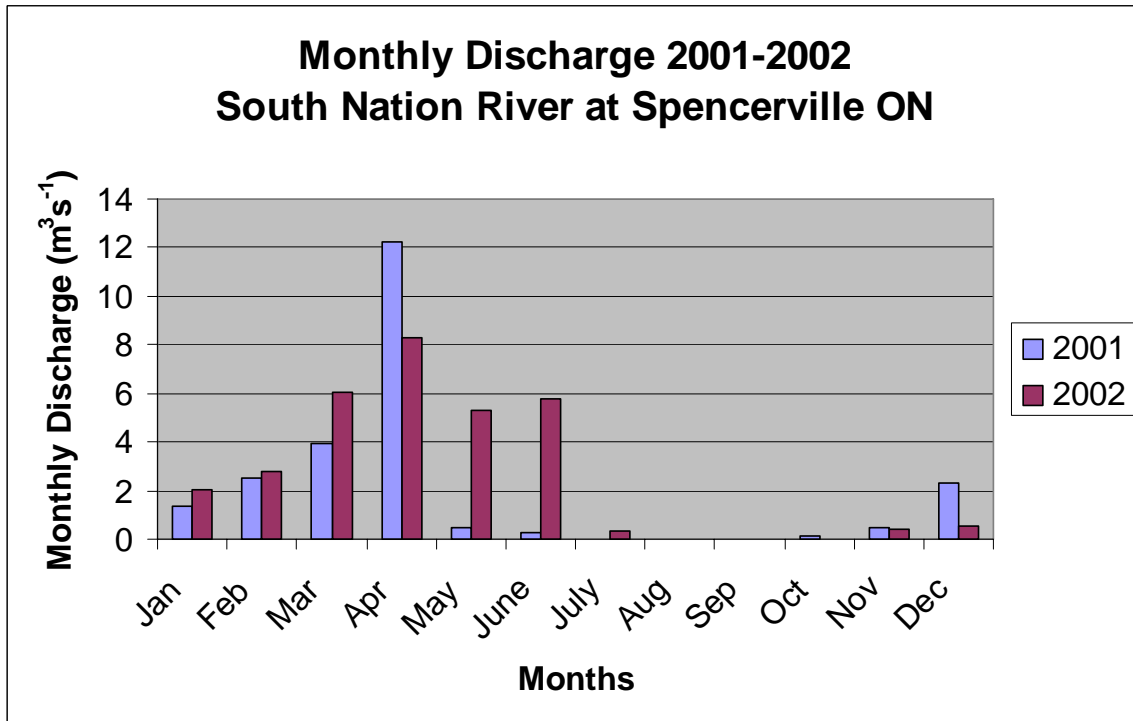


Figure 16 Monthly Discharge at South Nation River at Spencerville, Ontario (2001-2002) (Environment Canada 2006)

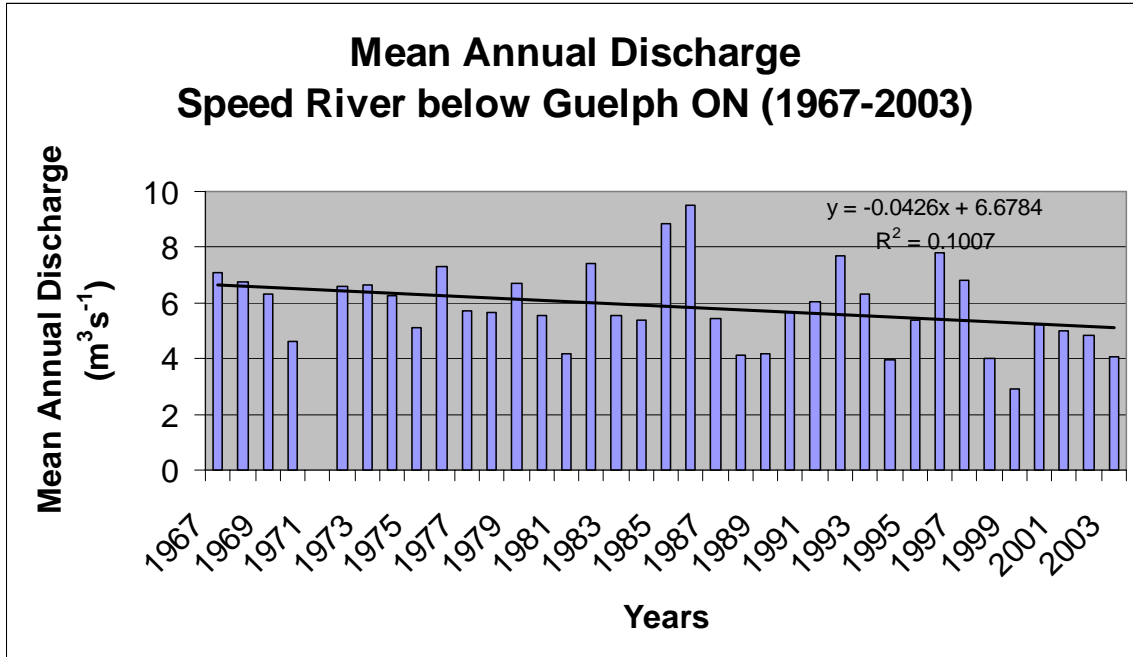


Figure 17 Mean Annual Discharge at Speed River below Guelph, Ontario (1967-2003) (Environment Canada 2006)

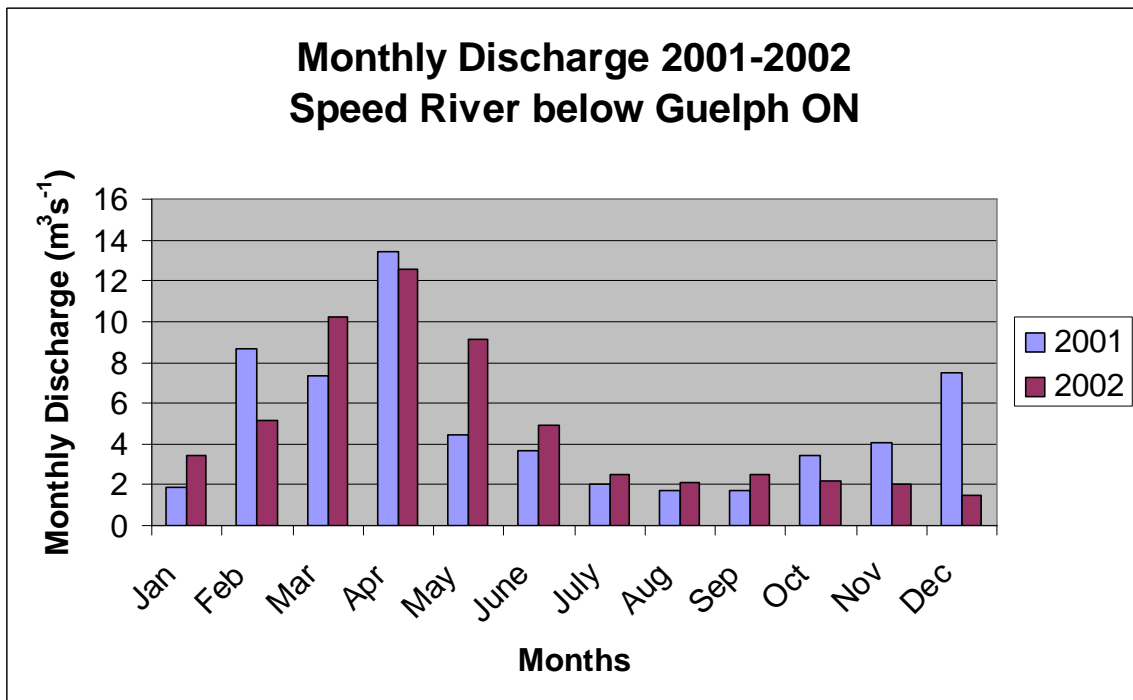


Figure 18 Monthly Discharge at Speed River below Guelph, Ontario (2001-2002) (Environment Canada 2006)

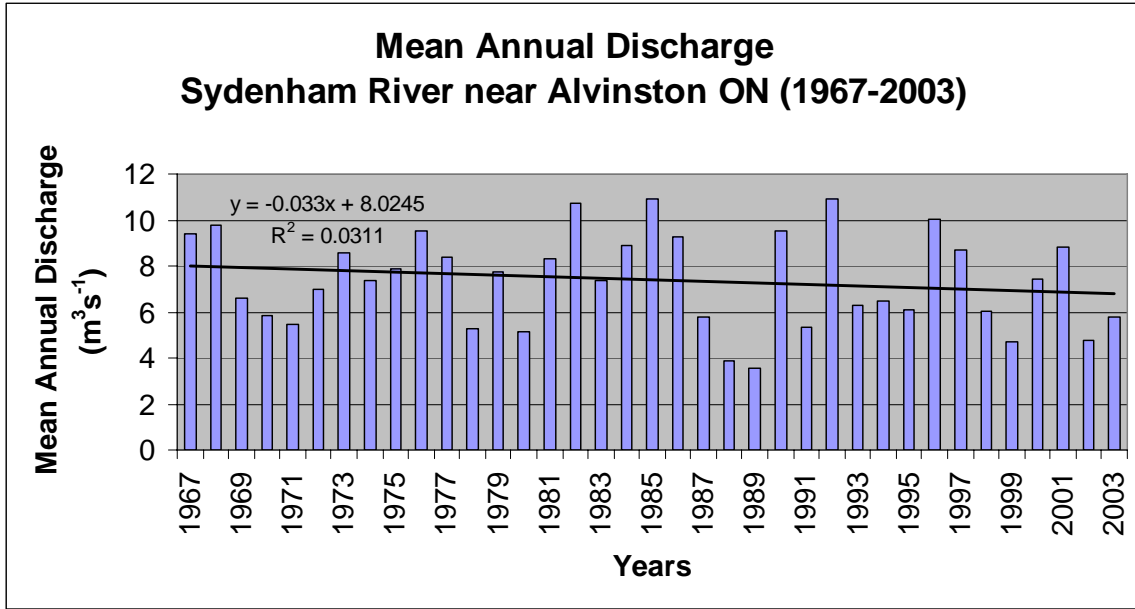


Figure 19 Mean Annual Discharge at Sydenham River near Alvinston, Ontario (1967-2003) (Environment Canada 2006)

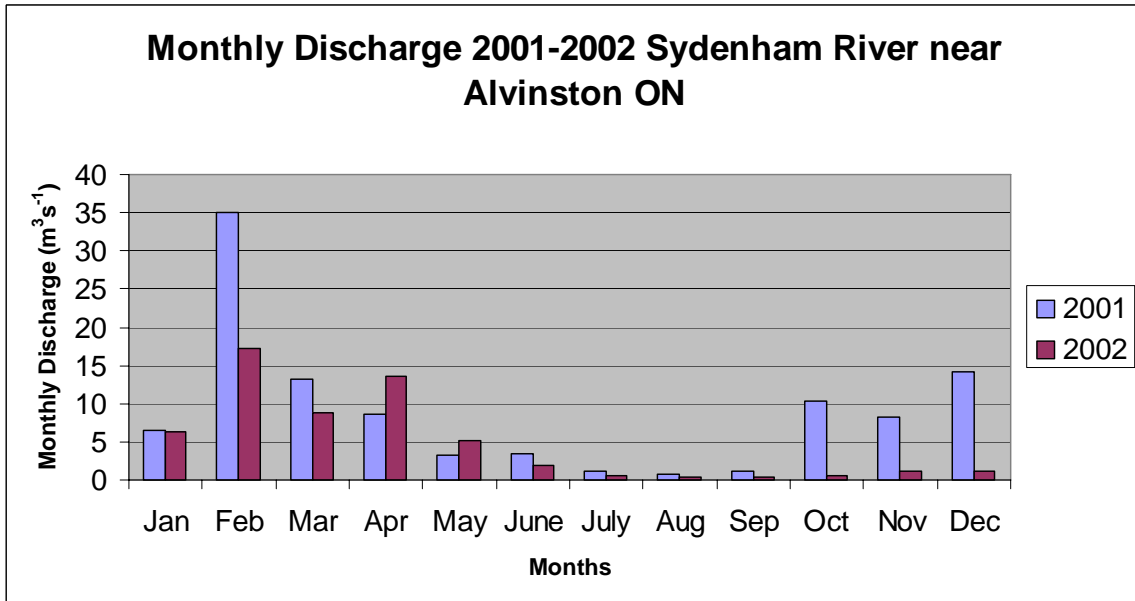


Figure 20 Monthly Discharge at Sydenham River near Alvinston, Ontario (2001-2002) (Environment Canada 2006)

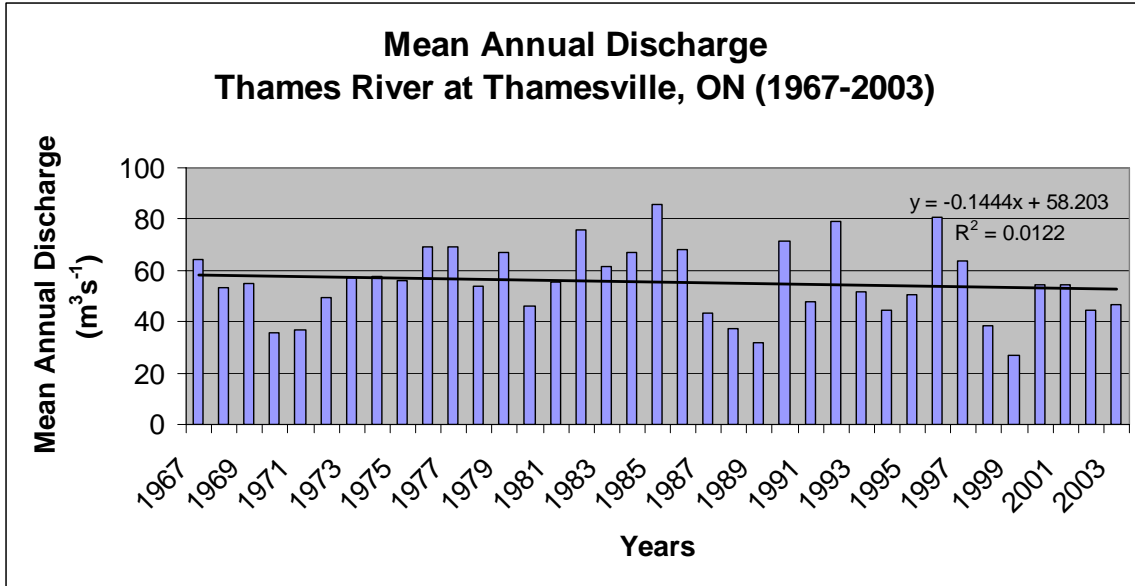


Figure 21 Mean Annual Discharge at Thames River at Thamesville, Ontario (1967-2003) (Environment Canada 2006)

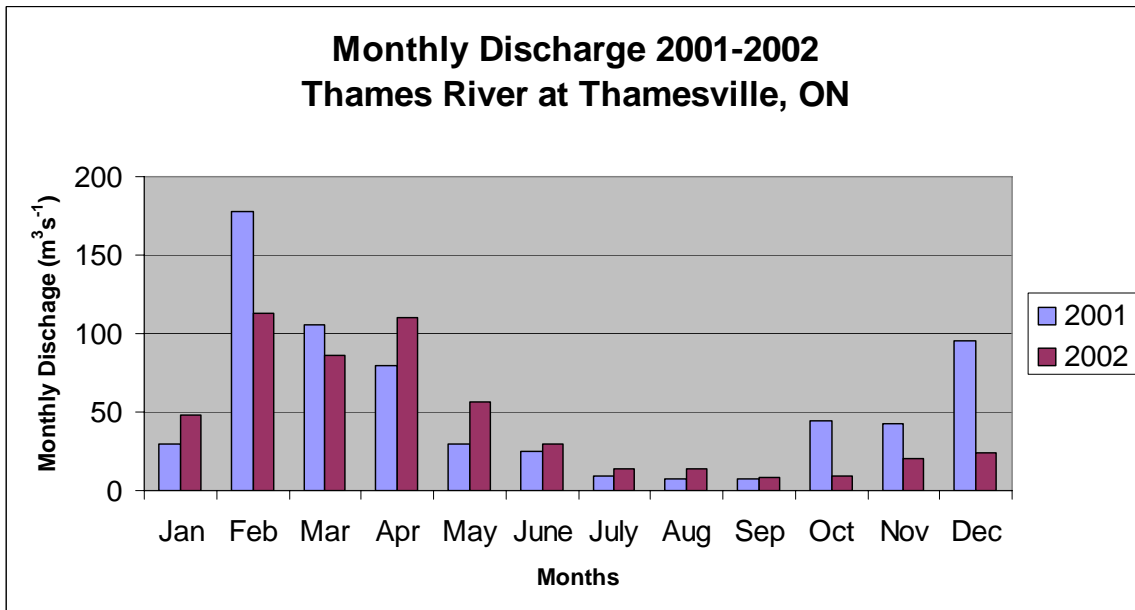


Figure 22 Monthly Discharge at Thames River at Thamesville, Ontario (2001-2002) (Environment Canada 2006)

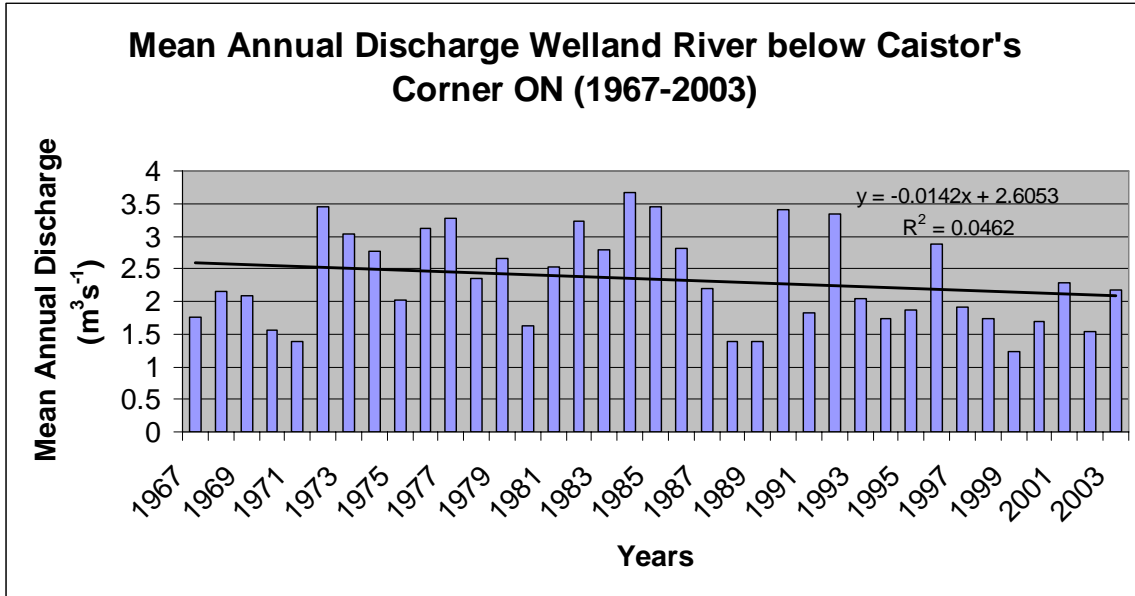


Figure 23 Mean Annual Discharge at Welland River below Caistor’s Corner, Ontario (1967-2003) (Environment Canada 2006)

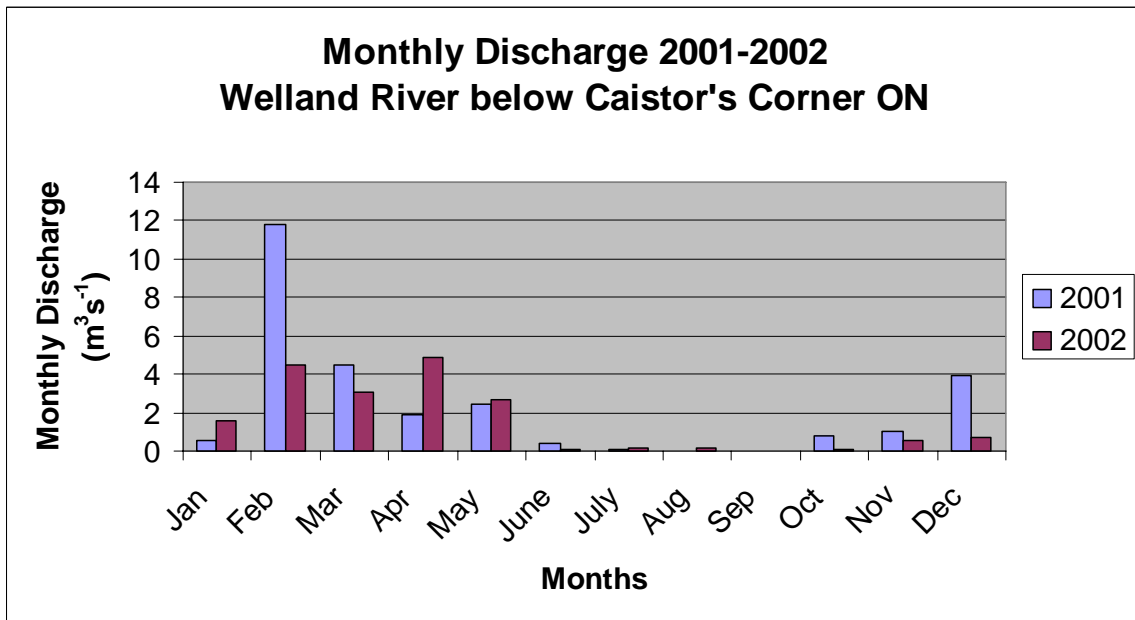


Figure 24 Monthly Discharge at Welland River below Caistor’s Corner, Ontario (2001-2002) (Environment Canada 2006)

**Table 15 Monthly Water Levels (m) at Big Rideau Lake, ON (1988-2005)
(Rideau Valley Conservation Authority, 2006a)**

| Year | Jan | Feb | March | April | May | June | July | Aug | Sept | Oct | Nov | Dec | Mean |
|------|---------------|---------------|---------------|---------------|---------------|--------------|---------------|---------------|---------------|---------------|---------------|---------------|----------------|
| 1988 | X | X | X | X | X | 123.7 | 123.5 | 123.3 | 123.14 | X | X | X | X |
| 1989 | X | X | X | X | X | 123.86 | 123.69 | 123.44 | 123.29 | X | X | X | X |
| 1990 | X | X | X | X | X | 123.83 | 123.68 | 123.54 | 123.31 | X | X | X | X |
| 1991 | X | X | 123.32 | X | X | 123.77 | 123.61 | 123.45 | 123.36 | X | X | X | X |
| 1992 | 123.25 | 123.32 | 123.24 | 123.78 | 123.87 | 123.83 | 123.68 | 123.57 | 123.52 | 123.15 | 123.21 | 123.15 | 123.464 |
| 1993 | 123.27 | 123.15 | 123.14 | 123.81 | 123.85 | 123.87 | 123.65 | 123.36 | 123.27 | 123.25 | 123.31 | 123.53 | 123.455 |
| 1994 | 123.31 | 123.41 | X | 123.74 | 123.9 | 123.84 | 123.77 | 123.57 | 123.4 | 123.19 | 123.16 | 123.24 | X |
| 1995 | 123.52 | 123.41 | 123.49 | 123.8 | 123.86 | 123.81 | 123.61 | 123.48 | 123.76 | 123.2 | 123.33 | 123.42 | 123.558 |
| 1996 | 123.51 | 123.62 | 123.74 | 123.85 | 123.89 | 123.83 | 123.67 | 123.53 | 123.41 | 123.21 | 123.29 | 123.34 | 123.574 |
| 1997 | 123.39 | 123.43 | 123.59 | 123.83 | 123.87 | 123.79 | 123.6 | 123.37 | 123.27 | 123.22 | 123.27 | 123.34 | 123.498 |
| 1998 | 123.45 | 123.42 | 123.61 | 123.89 | 123.8 | 123.62 | 123.56 | 123.46 | 123.31 | 123.23 | 123.23 | 123.31 | 123.491 |
| 1999 | 123.46 | X | 123.32 | 123.81 | 123.62 | 123.54 | X | 123.1 | 123.04 | 123.01 | 122.99 | 123.05 | X |
| 2000 | 123.29 | 123.52 | 123.84 | 123.96 | 123.93 | 123.88 | 123.78 | 123.65 | 123.44 | 123.17 | 123.21 | 123.39 | 123.588 |
| 2001 | 123.48 | 123.5 | 123.36 | 123.79 | 123.87 | 123.8 | 123.6 | 123.33 | 123.13 | X | X | 123.23 | X |
| 2002 | 123.49 | 123.55 | 123.8 | 123.93 | 123.91 | 123.9 | 123.76 | 123.55 | 123.36 | 123.18 | 123.15 | 123.19 | 123.564 |
| 2003 | 123.21 | 123.25 | 123.37 | 123.78 | 123.89 | 123.86 | X | 123.62 | 123.44 | 123.2 | 123.3 | X | X |
| 2004 | X | 123.62 | 123.59 | X | X | X | 123.86 | 123.69 | 123.54 | 123.19 | 123.2 | 123.47 | X |
| 2005 | 123.48 | X | 123.45 | 123.85 | 123.86 | 123.82 | 123.68 | 123.41 | 123.24 | 123.22 | 123.4 | 123.55 | X |

X=no data

**Table 16 Monthly Water Levels (m) at Bobs Lake, ON (1988-2005) (Rideau
Valley Conservation Authority, 2006b)**

| Year | Jan | Feb | March | April | May | June | July | Aug | Sept | Oct | Nov | Dec | Mean |
|------|---------------|---------------|---------------|---------------|----------|----------|----------|---------------|---------------|---------------|---------------|---------------|----------|
| 1988 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1989 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1990 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1991 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1992 | X | 161.42 | X | X | X | X | X | 162.11 | 161.98 | 161.71 | 161.76 | 161.67 | X |
| 1993 | 161.65 | 161.44 | 161.2 | 162.21 | 162.6 | 162.57 | 162.44 | X | X | X | X | X | X |
| 1994 | X | X | 161.52 | 162.23 | X | X | X | X | X | X | 161.38 | 161.47 | X |
| 1995 | 161.79 | 161.96 | 161.96 | 162.25 | 162.35 | 162.39 | X | 162.03 | 161.76 | 161.6 | 161.7 | 161.69 | X |
| 1996 | 161.68 | 162.15 | 162.57 | 162.73 | 162.7 | 162.59 | 162.39 | 162.16 | 161.96 | 161.7 | 161.8 | 161.82 | 162.188 |
| 1997 | 161.82 | 161.74 | 162.13 | 162.62 | 162.71 | 162.59 | X | X | 161.78 | 161.5 | 161.55 | 161.44 | X |
| 1998 | 161.6 | 161.52 | 162.04 | 162.72 | 162.57 | 162.44 | X | X | 161.88 | 161.48 | 161.37 | 161.46 | X |
| 1999 | 161.58 | X | 161.92 | 162.46 | 162.57 | X | X | 162.02 | 161.6 | 161.37 | 161.43 | 161.65 | X |
| 2000 | 161.82 | 161.8 | 162.22 | 162.75 | X | 162.8 | 162.6 | 162.3 | X | X | X | 161.78 | X |
| 2001 | 161.89 | 161.92 | 162.04 | X | X | X | X | 161.97 | 161.74 | 161.63 | 161.59 | 161.75 | X |
| 2002 | 161.87 | 161.97 | 162.41 | 162.83 | X | X | X | X | X | X | X | X | X |
| 2003 | X | X | X | 162.55 | 162.74 | 162.63 | 162.48 | X | X | 161.58 | X | 157.3 | X |
| 2004 | 161.99 | 161.82 | 162.12 | 162.65 | 162.67 | 162.68 | 162.42 | 162.17 | X | 161.63 | 161.65 | 162.06 | X |
| 2005 | 162.33 | X | 162.09 | 162.71 | 162.65 | 162.5 | 162.31 | 161.98 | 161.75 | 161.58 | X | 161.89 | X |

X=no data

Table 17 Monthly Water Levels (m) at Christie Lake, ON (1988-2005) (Rideau Valley Conservation Authority, 2006c)

| Year | Jan | Feb | March | April | May | June | July | Aug | Sept | Oct | Nov | Dec | Mean |
|------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|----------------|
| 1988 | 154.6 | 154.55 | 154.6 | 154.59 | 154.29 | 154.15 | 154.26 | 154.46 | 154.46 | 154.29 | 154.19 | 154.17 | 154.384 |
| 1989 | 154.18 | 154.13 | 154.12 | 154.37 | 154.67 | 154.35 | 154.3 | 154.42 | 154.54 | 154.47 | 154.24 | 154.24 | 154.336 |
| 1990 | 154.29 | 154.46 | 154.47 | 154.48 | 154.83 | 154.54 | 154.52 | 154.39 | 154.26 | 154.31 | 154.31 | 154.36 | 154.435 |
| 1991 | 154.72 | 154.65 | 154.67 | 154.79 | 154.65 | 154.34 | 154.36 | 154.38 | 154.38 | 154.24 | 154.13 | 154.15 | 154.455 |
| 1992 | 154.23 | 154.37 | 154.34 | 154.61 | 154.68 | 154.34 | 154.33 | 154.4 | 154.48 | 154.51 | 154.66 | 154.84 | 154.483 |
| 1993 | 154.86 | 154.76 | 154.55 | 154.71 | 154.67 | 154.38 | 154.37 | 154.52 | 154.52 | 154.35 | 154.35 | 154.76 | 154.567 |
| 1994 | 154.58 | 154.44 | 154.37 | 154.51 | 154.43 | 154.47 | 154.42 | 154.49 | 154.45 | 154.59 | 154.23 | 154.22 | 154.433 |
| 1995 | 154.66 | 154.86 | 154.45 | 154.22 | 154.25 | 154.25 | 154.32 | 154.45 | 154.43 | 154.52 | 154.71 | 154.8 | 154.493 |
| 1996 | 154.66 | 154.75 | 154.47 | 154.86 | 154.93 | 154.5 | 154.48 | 154.51 | 154.67 | 154.73 | 154.71 | 154.89 | 154.68 |
| 1997 | 154.89 | 154.69 | X | 154.95 | 154.85 | 154.45 | 154.42 | 154.59 | 154.68 | 154.53 | 154.61 | 154.67 | X |
| 1998 | 154.68 | 154.63 | 154.56 | 154.93 | 154.42 | 154.37 | 154.4 | 154.46 | 154.6 | 154.6 | 154.15 | 154.18 | 154.498 |
| 1999 | 154.54 | 154.66 | 154.62 | 154.75 | 154.29 | 154.35 | 154.45 | 154.51 | 154.69 | 154.37 | 154.26 | 154.26 | 154.479 |
| 2000 | 154.5 | 154.42 | 154.35 | 154.64 | 154.98 | 154.73 | 154.86 | 154.9 | 154.76 | 154.46 | 154.23 | 154.37 | 154.6 |
| 2001 | 154.63 | 154.61 | 154.58 | 154.65 | 154.53 | 154.41 | 154.37 | 154.43 | 154.48 | 154.37 | 154.22 | 154.32 | 154.467 |
| 2002 | 154.49 | 154.42 | 154.37 | 154.89 | 154.99 | X | X | 154.6 | 154.7 | 154.4 | 154.21 | 154.16 | X |
| 2003 | 154.17 | 154.29 | 154.43 | 154.51 | 154.64 | 154.66 | 154.4 | 154.52 | 154.56 | 154.63 | 154.65 | 154.88 | 154.528 |
| 2004 | 154.94 | 154.54 | 154.38 | 154.65 | 154.82 | 154.75 | 154.51 | 154.53 | 154.65 | 154.59 | 154.24 | 154.63 | 154.603 |
| 2005 | 154.88 | 154.74 | 154.36 | X | 154.67 | 154.42 | X | X | 154.41 | 154.5 | 154.38 | 154.78 | X |

X=no data

Table 18 Monthly Water Levels (m) at Upper Rideau Lake, ON (1988-2005) (Rideau Valley Conservation Authority 2006d)

| Year | Jan | Feb | March | April | May | June | July | Aug | Sept | Oct | Nov | Dec | Mean |
|------|---------------|---------------|---------------|---------------|--------------|---------------|---------------|---------------|---------------|--------------|---------------|---------------|----------------|
| 1988 | X | X | X | X | X | 124.63 | 124.55 | 124.43 | 124.34 | X | X | X | X |
| 1989 | X | X | X | X | X | 124.65 | 124.58 | X | 124.4 | X | X | X | X |
| 1990 | X | X | X | X | X | 124.66 | 124.6 | 124.53 | 124.39 | X | X | X | X |
| 1991 | X | X | X | X | X | 124.58 | 124.54 | 124.49 | 124.41 | X | X | X | X |
| 1992 | X | X | X | X | X | 124.66 | 124.64 | 124.63 | 124.67 | X | X | X | X |
| 1993 | X | X | X | X | X | X | 124.6 | 124.54 | 124.53 | X | X | X | X |
| 1994 | X | X | X | X | X | 124.68 | 124.58 | 124.49 | 124.41 | X | X | X | X |
| 1995 | X | X | X | X | X | 124.6 | 124.47 | 124.4 | 124.29 | X | X | X | X |
| 1996 | X | X | X | X | X | 124.7 | 124.65 | 124.6 | 124.58 | X | X | X | X |
| 1997 | X | X | X | X | 124.69 | 124.67 | 124.64 | 124.56 | 124.54 | X | X | 124.08 | X |
| 1998 | 124.13 | 124.1 | 124.33 | X | 124.61 | 124.6 | 124.6 | 124.5 | 124.48 | 124.44 | 124.29 | 124.14 | X |
| 1999 | 124.13 | 124.11 | 124.32 | 124.53 | 124.63 | 124.63 | 124.54 | 124.43 | 124.35 | 124.26 | 124.09 | 124.12 | 124.345 |
| 2000 | 124.12 | 124.12 | 124.37 | 124.65 | 124.7 | 124.67 | 124.67 | 124.62 | 124.6 | 124.55 | 124.11 | 124.13 | 124.443 |
| 2001 | 124.13 | X | 124.21 | 124.5 | 124.6 | 124.58 | 124.48 | 124.35 | X | X | 124.15 | X | X |
| 2002 | 124.12 | 124.23 | 124.46 | 124.71 | 124.7 | 124.7 | 124.5 | 124.36 | 124.23 | 124.2 | 124.16 | 124.11 | 124.373 |
| 2003 | 124.11 | 124.13 | 124.33 | 124.69 | 124.71 | 124.67 | X | 124.63 | X | 124.41 | 124.2 | X | X |
| 2004 | 124.11 | 124.12 | 124.37 | 124.69 | 124.7 | 124.63 | 124.52 | 124.59 | 124.5 | 124.33 | 124.17 | 124.03 | 124.397 |
| 2005 | 124.13 | X | 124.14 | 124.61 | 124.67 | 124.6 | X | 124.37 | 124.26 | 124.24 | 124.15 | 124.2 | X |

X=no data

Table 19 Monthly Water Levels (m) at Wolfe Lake, ON (1988-2005) (Rideau Valley Conservation Authority, 2006e)

| Year | Jan | Feb | March | April | May | June | July | Aug | Sept | Oct | Nov | Dec | Mean |
|------|---------------|---------------|---------------|---------------|---------------|---------------|--------------|---------------|---------------|---------------|---------------|---------------|----------------|
| 1988 | 135.94 | 135.89 | 135.97 | 136.52 | 136.59 | 136.49 | 136.37 | 136.26 | 136.08 | 136.02 | 135.99 | 135.87 | 136.166 |
| 1989 | 135.9 | 136.04 | 136.15 | 136.54 | 136.55 | 136.62 | 136.48 | 136.22 | 136.11 | 136.04 | 136.07 | 135.97 | 136.224 |
| 1990 | 135.94 | 136.09 | 136.38 | 136.53 | 136.48 | 136.56 | 136.47 | 136.35 | 136.19 | 136.19 | 136.11 | 136.05 | 136.278 |
| 1991 | 136.13 | 136.03 | 136.38 | 136.41 | 136.4 | 136.42 | 136.3 | 136.12 | 136.06 | 136.02 | 135.97 | 135.92 | 136.18 |
| 1992 | 135.9 | 135.95 | 136.16 | 136.55 | 136.54 | 136.51 | 136.41 | 136.38 | 136.41 | 136.22 | 136.2 | 136.18 | 136.284 |
| 1993 | 136.2 | 136.15 | 136.05 | 136.45 | 136.43 | 136.54 | 136.45 | 136.22 | 136.13 | 136.13 | 136.04 | 136.05 | 136.237 |
| 1994 | 135.96 | 135.9 | 135.92 | 136.42 | 136.63 | 136.55 | 136.46 | 136.3 | 136.14 | 136.05 | 136 | 135.88 | 136.184 |
| 1995 | 136 | 136.06 | 136.24 | 136.33 | 136.39 | 136.42 | 136.3 | 136.26 | 136.03 | 136.02 | 136.07 | 136.04 | 136.18 |
| 1996 | 136.04 | 136.18 | 136.48 | 136.6 | 136.58 | 136.53 | 136.42 | 136.28 | 136.3 | 136.37 | 136.26 | 136.17 | 136.351 |
| 1997 | 136.09 | 136.05 | 136.33 | 136.54 | 136.6 | 136.53 | 136.44 | 136.26 | 136.18 | 136.14 | 136.12 | 135.97 | 136.271 |
| 1998 | 136.02 | 135.98 | 136.27 | 136.53 | 136.46 | 136.38 | 136.32 | 136.2 | 136.15 | 136.09 | 136.07 | 136 | 136.206 |
| 1999 | 136.04 | 136.14 | 136.27 | 136.56 | 136.45 | 136.39 | 136.27 | 136.09 | 135.99 | 135.95 | 135.96 | 136.09 | 136.183 |
| 2000 | 136.09 | 136.07 | 136.34 | 136.6 | 136.64 | 136.64 | 136.57 | 136.19 | 136.02 | 136.01 | 135.95 | 135.94 | 136.255 |
| 2001 | 135.93 | 135.96 | 136.16 | 136.48 | 136.56 | 136.57 | 136.4 | 136.2 | 136.01 | 135.93 | 135.95 | 136.05 | 136.183 |
| 2002 | 136.12 | 136.28 | 136.61 | 136.74 | 136.69 | 136.75 | 136.5 | 136.32 | 136.15 | 136.09 | 136.1 | 136.15 | 136.375 |
| 2003 | 136.21 | 136.24 | 136.34 | 136.7 | X | 136.64 | 136.53 | 136.57 | 136.38 | 136.25 | 136.33 | X | X |
| 2004 | 136.41 | 136.23 | 136.42 | 136.62 | 136.63 | X | X | 136.48 | X | 136.18 | 136.18 | 136.32 | X |
| 2005 | 136.41 | X | 136.2 | 136.6 | 136.6 | 136.57 | 136.41 | 136.14 | 136.03 | 136.04 | 136.09 | 136.33 | X |

X=no data

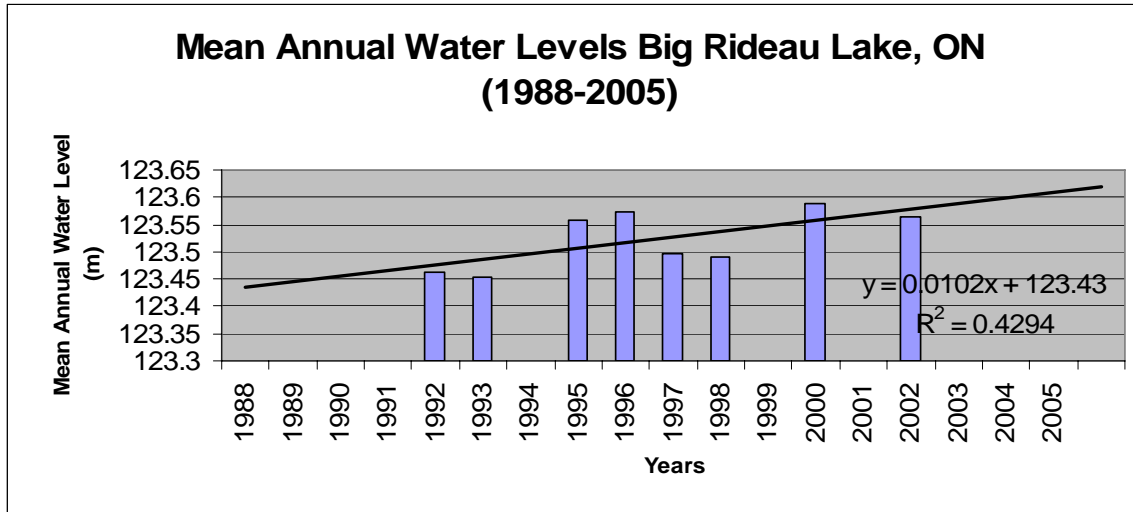


Figure 25 Mean Annual Water Levels at Big Rideau Lake, ON (1988-2005) (Rideau Valley Conservation Authority, 2006a)

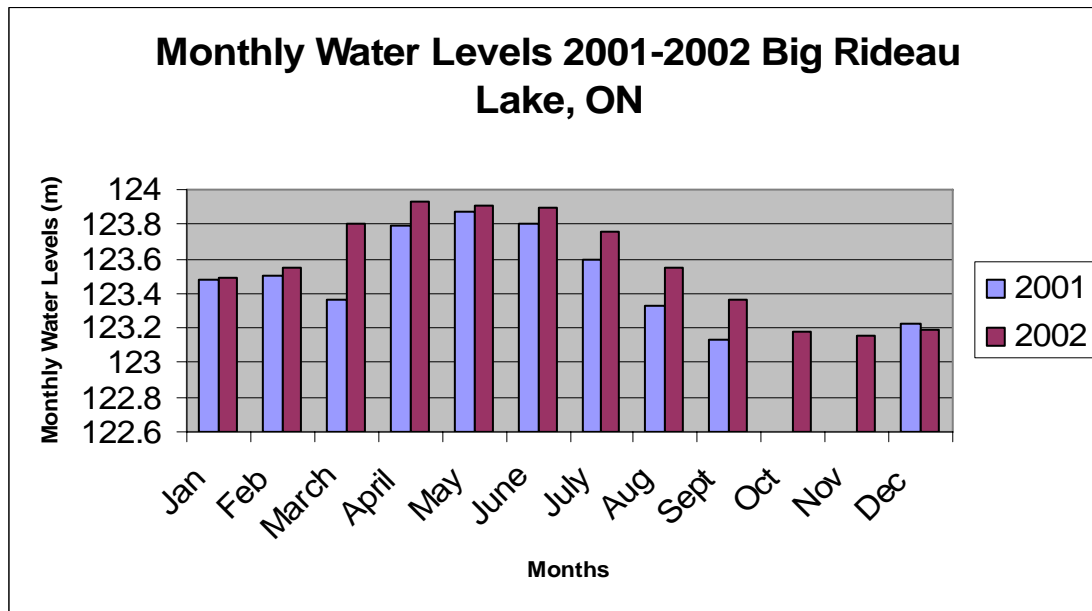


Figure 26 Monthly Water Levels at Big Rideau Lake, ON (2001-2002) (Rideau Valley Conservation Authority, 2006a)

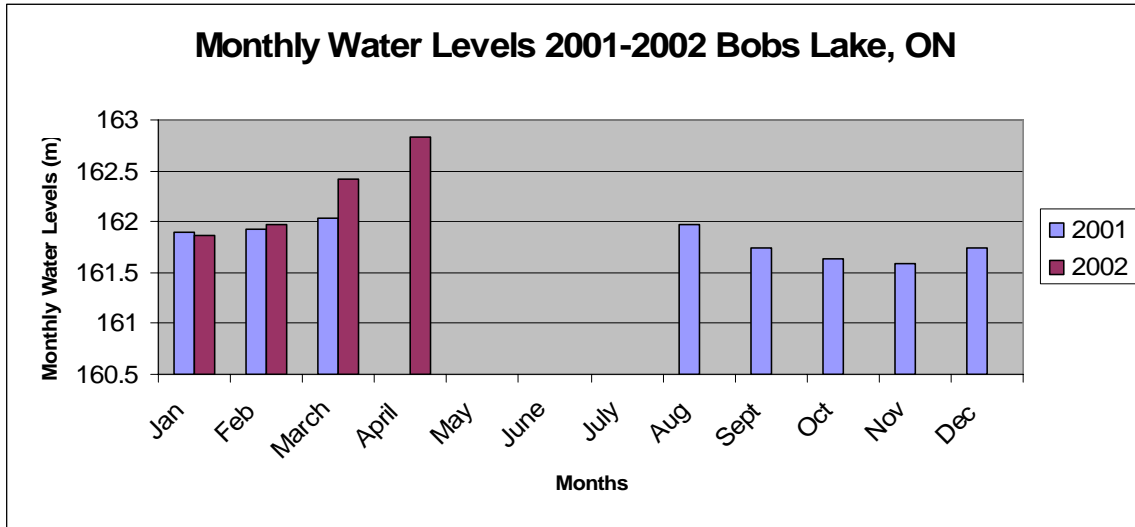


Figure 27 Monthly Water Levels at Bobs Lake, ON (2001-2002) (Rideau Valley Conservation Authority, 2006b)

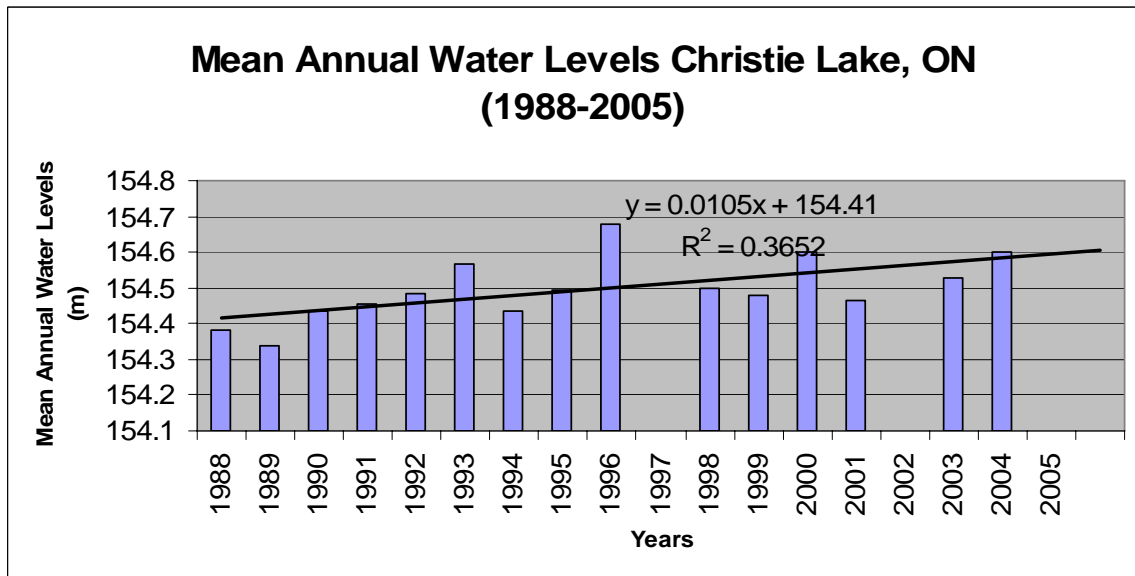


Figure 28 Mean Annual Water Levels at Christie Lake, ON (1988-2005) (Rideau Valley Conservation Authority, 2006c)

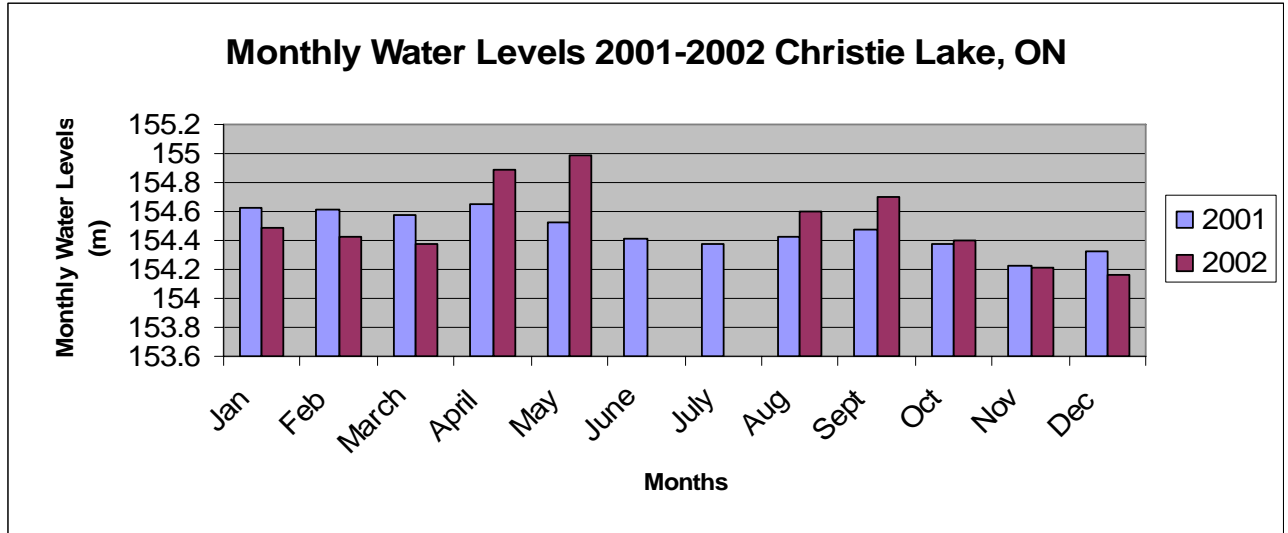


Figure 29 Monthly Water Levels at Christie Lake, ON (2001-2002) (Rideau Valley Conservation Authority, 2006c)

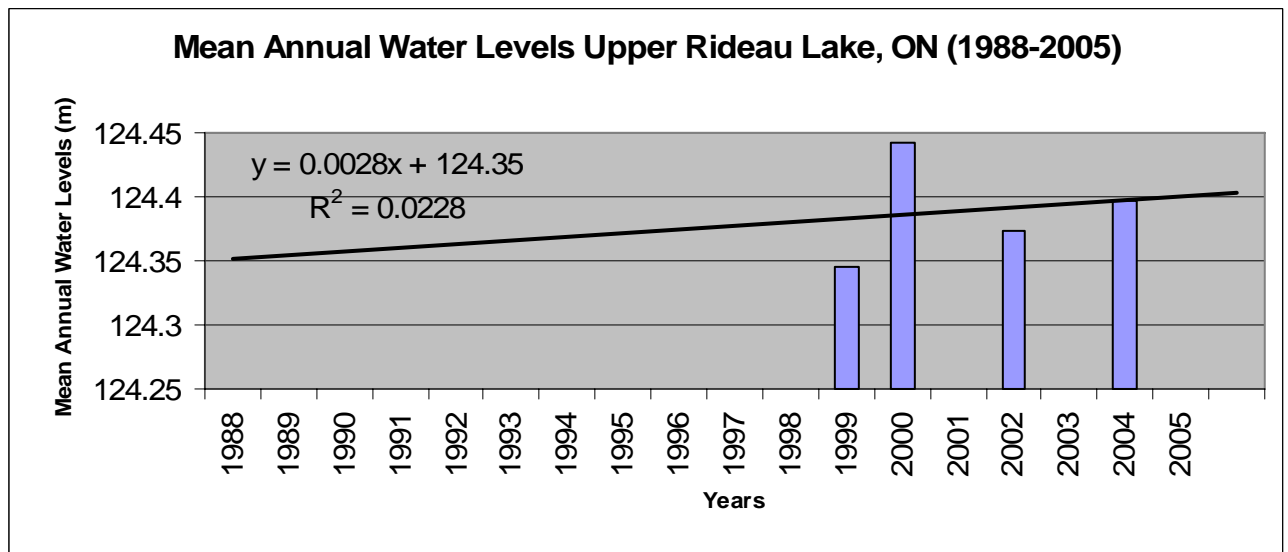


Figure 30 Mean Annual Water Levels at Upper Rideau Lake, ON (1988-2005) (Rideau Valley Conservation Authority, 2006d)

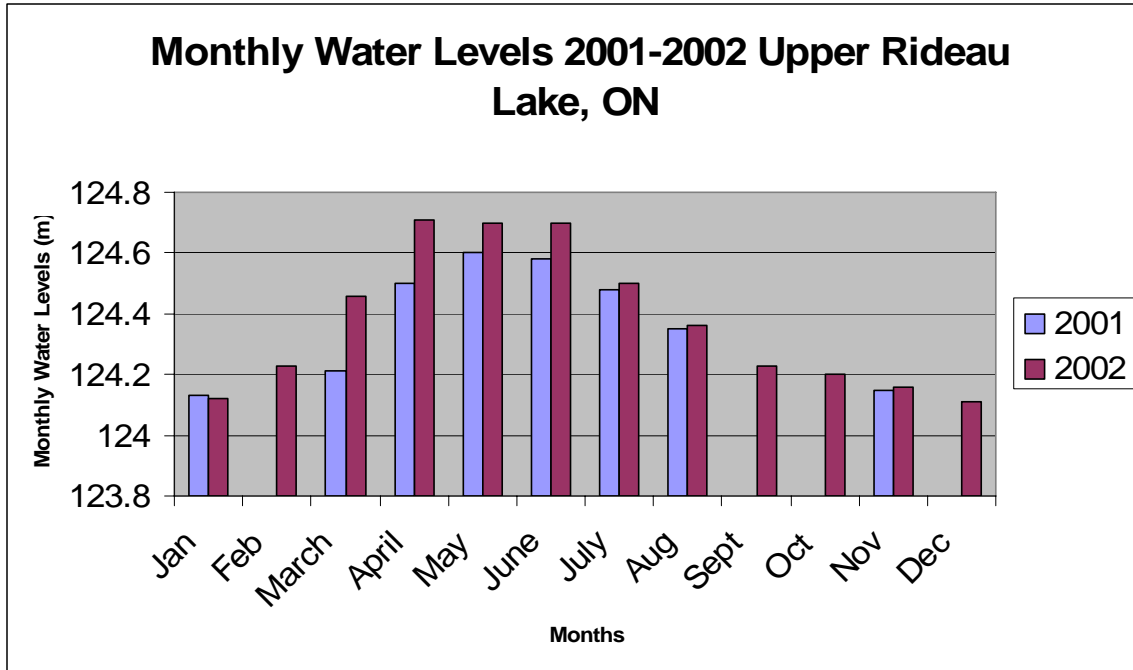


Figure 31 Monthly Water Levels at Upper Rideau Lake, ON (2001-2002) (Rideau Valley Conservation Authority, 2006d)

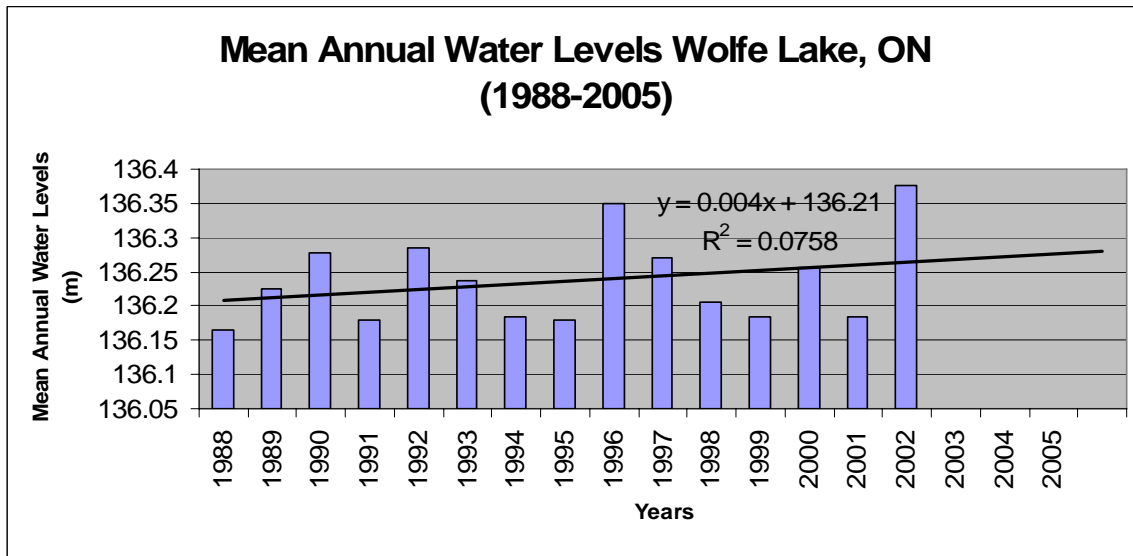


Figure 32 Mean Annual Water Levels at Wolfe Lake, ON (1988-2005) (Rideau Valley Conservation Authority, 2006e)

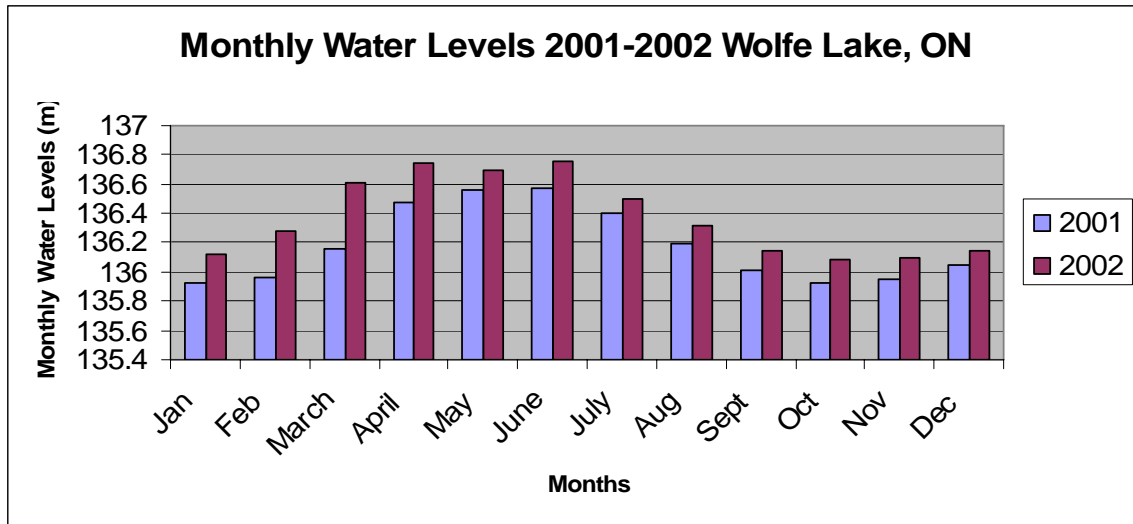


Figure 33 Monthly Water Levels at Wolfe Lake, ON (1988-2005) (Rideau Valley Conservation Authority, 2006e)

Table 20 Monthly Lake Levels (m) at Scugog Lake, Ontario (1988-2005) (Trent Severn Waterway, 2006)

| Year | Jan | Feb | March | April | May | June | July | Aug | Sept | Oct | Nov | Dec | Mean |
|------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|
| 1988 | X | X | X | 50.07 | X | X | X | 49.79 | X | X | X | X | X |
| 1989 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1990 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1991 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1992 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1993 | X | X | X | 50.12 | X | X | X | X | X | X | X | X | X |
| 1994 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1995 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1996 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1997 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1998 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1999 | X | X | X | X | X | X | X | 49.86 | 49.81 | 49.89 | 49.88 | 49.82 | X |
| 2000 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 2001 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 2002 | X | X | X | X | X | X | X | X | 49.80 | 49.80 | 49.85 | 49.74 | X |
| 2003 | 49.72 | 49.67 | 49.75 | 50.10 | 50.04 | 50.00 | 49.93 | 49.89 | 49.82 | 49.83 | 49.86 | 49.84 | 49.87 |
| 2004 | 49.86 | 49.75 | 49.88 | 50.01 | 50.05 | 50.03 | 49.98 | 49.94 | 49.87 | 49.81 | 49.81 | 49.85 | 49.90 |
| 2005 | 49.900 | 49.709 | 49.645 | 50.211 | 50.048 | 49.951 | 49.872 | 49.797 | 49.749 | 49.772 | 49.804 | 49.929 | 49.87 |

X=no data

Table 21 Monthly Lake Levels (m) at Rice Lake, Ontario (1988-2005) (Trent Severn Waterway, 2006a)

| Year | Jan | Feb | March | April | May | June | July | Aug | Sept | Oct | Nov | Dec | Mean |
|------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|----------|
| 1988 | X | X | X | 86.87 | X | X | X | X | X | X | X | X | X |
| 1989 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1990 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1991 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1992 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1993 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1994 | X | X | X | X | X | X | X | X | X | X | X | 86.67 | X |
| 1995 | X | X | X | X | 86.75 | X | X | X | X | X | X | X | X |
| 1996 | X | X | X | X | 86.79 | X | X | X | X | X | 86.667 | 86.678 | X |
| 1997 | 86.665 | 86.715 | X | X | X | X | X | X | X | X | 86.68 | X | X |
| 1998 | X | X | X | X | 86.72 | X | 86.711 | 86.733 | 86.708 | 86.688 | 86.688 | 86.678 | X |
| 1999 | 86.677 | 86.670 | 86.668 | 86.699 | 86.756 | 86.758 | X | X | X | X | X | X | X |
| 2000 | X | X | 86.690 | 86.752 | 86.858 | 86.757 | 86.756 | 86.725 | X | 86.7 | X | 86.7 | X |
| 2001 | X | X | 86.699 | 86.783 | 86.727 | 86.706 | 86.709 | 86.718 | 86.707 | 86.686 | 86.678 | 86.707 | X |
| 2002 | 86.685 | 86.682 | 86.689 | 86.820 | X | 86.733 | 86.733 | 86.721 | X | 86.71 | X | 86.69 | X |
| 2003 | 86.697 | X | 86.696 | 86.720 | 86.722 | 86.715 | X | X | X | X | X | X | X |
| 2004 | X | X | X | X | 86.776 | 86.795 | 86.765 | 86.722 | 86.715 | 86.691 | 86.693 | 86.686 | X |
| 2005 | 86.824 | 86.711 | 86.684 | 86.831 | 86.716 | 86.741 | 86.732 | 86.722 | 86.717 | 86.703 | 86.701 | 86.709 | 86.733 |

X=no data

Table 22 Monthly Lake Levels (m) at Lake Simcoe, Ontario (1988-2005) (Trent Severn Waterway, 2006b)

| Year | Jan | Feb | March | April | May | June | July | Aug | Sept | Oct | Nov | Dec | Mean |
|------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| 1988 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1989 | X | X | X | X | X | 19.12 | 19.02 | 18.91 | 18.83 | 18.75 | 18.78 | 18.76 | X |
| 1990 | X | X | X | 19.1 | 19.09 | X | X | X | X | X | X | X | X |
| 1991 | 18.8 | 18.75 | 18.84 | 19.19 | X | X | X | X | X | X | 18.6 | 18.62 | X |
| 1992 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1993 | X | X | X | 18.99 | X | X | X | X | X | X | X | X | X |
| 1994 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1995 | X | X | X | X | X | X | X | X | X | X | 18.91 | 18.93 | X |
| 1996 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1997 | X | X | X | 19.1 | X | X | X | X | X | X | X | X | X |
| 1998 | 18.843 | 18.824 | 18.928 | 19.110 | 19.086 | 19.038 | 19.039 | 18.945 | 18.848 | 18.745 | 18.666 | 18.695 | 18.897 |
| 1999 | 18.737 | 18.775 | 18.759 | 18.851 | 18.862 | 18.899 | 18.956 | 18.854 | 18.779 | 18.725 | 18.788 | 18.790 | 18.815 |
| 2000 | 18.754 | 18.757 | 18.888 | 18.996 | 19.136 | 19.181 | 19.147 | 18.979 | 18.872 | 18.779 | 18.751 | 18.767 | 18.917 |
| 2001 | 18.751 | 18.790 | 18.834 | 19.020 | 19.110 | 19.090 | 19.014 | 18.902 | 18.799 | 18.781 | 18.771 | 18.795 | 18.888 |
| 2002 | 18.781 | 18.801 | 18.947 | 19.098 | 19.127 | 19.135 | 19.013 | 18.939 | 18.799 | 18.703 | 18.683 | 18.679 | 18.892 |
| 2003 | 18.700 | 18.730 | 18.796 | 19.052 | 19.122 | 19.081 | 18.991 | 18.922 | 18.763 | 18.710 | 18.776 | 18.845 | 18.874 |
| 2004 | 18.897 | 18.848 | 18.869 | 19.065 | 19.140 | 19.108 | 19.022 | 18.902 | 18.803 | 18.684 | 18.660 | 18.699 | 18.891 |
| 2005 | 18.806 | 18.812 | 18.778 | 19.057 | 19.114 | 19.089 | 19.022 | 18.907 | 18.787 | 18.705 | 18.669 | 18.699 | 18.870 |

Table 23 Monthly Lake Levels (m) at Balsam Lake, Ontario (1988-2005) (Trent Severn Waterway, 2006c)

| Year | Jan | Feb | March | April | May | June | July | Aug | Sept | Oct | Nov | Dec | Mean |
|------|----------|----------|----------|----------|----------|----------|----------|----------|---------------|---------------|---------------|---------------|----------|
| 1988 | 55.93 | 55.54 | 56.13 | X | X | 56.2 | X | X | 56.2 | 56.163 | 56.100 | 56.078 | X |
| 1989 | 55.93 | X | X | 56.154 | 56.236 | 56.210 | X | 56.21 | 56.22 | X | 56.03 | X | X |
| 1990 | X | 55.65 | 55.55 | X | X | 56.21 | X | 56.2 | X | X | 56.12 | 56.11 | X |
| 1991 | 55.985 | 55.653 | 55.544 | 56.207 | X | X | 56.213 | 56.199 | X | X | 56.102 | 56.102 | X |
| 1992 | X | 55.605 | 55.334 | 55.651 | 56.225 | X | X | X | X | X | 56.12 | X | X |
| 1993 | 56.09 | X | 55.320 | 55.856 | X | 56.23 | X | 56.22 | X | X | X | X | X |
| 1994 | X | X | X | X | X | X | 56.211 | 56.226 | X | X | X | X | X |
| 1995 | X | X | X | X | 56.197 | 56.237 | X | 56.21 | X | X | X | X | X |
| 1996 | X | X | X | X | X | X | X | X | 56.23 | X | X | X | X |
| 1997 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1998 | X | X | X | X | X | X | X | 56.22 | 56.21 | X | X | X | X |
| 1999 | X | X | X | X | X | X | X | 56.200 | 56.193 | 56.210 | 56.154 | 56.050 | X |
| 2000 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 2001 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 2002 | X | X | X | X | X | X | X | X | 56.202 | 56.177 | 56.145 | 56.121 | X |
| 2003 | 56.032 | 55.808 | 55.574 | 56.149 | 56.196 | 56.204 | 56.206 | 56.203 | 56.191 | 56.185 | 56.147 | 56.117 | 56.084 |
| 2004 | 56.081 | 55.766 | 55.802 | 56.164 | 56.225 | 56.208 | 56.207 | 56.188 | 56.193 | 56.181 | 56.100 | 56.129 | 56.104 |
| 2005 | 56.021 | 55.672 | 55.349 | 55.999 | 56.172 | 56.206 | 56.152 | 56.178 | 56.167 | 56.125 | 56.107 | 56.167 | 56.026 |

X=no data

Table 24 Monthly Lake Levels (m) at Mississauga Lake, Ontario (1988-2005) (Trent Severn Waterway, 2006d)

| Year | Jan | Feb | March | April | May | June | July | Aug | Sept | Oct | Nov | Dec | Mean |
|------|--------------|----------|--------------|--------------|--------------|-------------|-------------|-------------|-------------|-------------|----------|----------|----------|
| 1988 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1989 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1990 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1991 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1992 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1993 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1994 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1995 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1996 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1997 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1998 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 1999 | X | X | 1.11 | X | X | X | X | X | X | 1.26 | X | 1.31 | X |
| 2000 | 1.247 | 1.189 | 1.530 | X | X | 2.539 | 2.344 | X | 1.618 | 1.333 | 1.100 | 1.274 | X |
| 2001 | 1.305 | X | 1.466 | 2.072 | 2.494 | X | 2.03 | X | 1.14 | 1.02 | X | X | X |
| 2002 | X | X | X | X | X | 2.41 | X | 1.79 | X | X | X | X | X |
| 2003 | X | X | 1.06 | X | 2.52 | 2.49 | X | X | X | X | X | 1.6 | X |
| 2004 | 1.5 | 1.2 | X | 2.2 | 2.51 | X | 2.308 | 2.032 | 1.629 | 1.172 | 0.999 | 1.128 | X |
| 2005 | 1.447 | 1.309 | 1.116 | 2.090 | 2.530 | 2.501 | 2.265 | 1.682 | 1.344 | 1.202 | 0.993 | 1.120 | 1.633 |

Table 25 Adaptations Adopted (2001-2005) by Conservation Authority for Water Conservation during drought conditions (Environment Canada 2006a)

| | 2001 | 2002 | 2003 | 2004 | 2005 |
|-------------------------------|--|---|--|--|---|
| Conservation Authority | | | | | |
| Essex Region | No actions taken | No meetings were held this year | No meetings were held this year | No meetings were held this year | No meetings were held this year |
| Grand River | The municipalities of Centre Wellington and the City of Guelph implemented lawn-watering bans due to the heavy demand placed on the groundwater system | City of Guelph developed a comprehensive outdoor water use bylaw, which helped reduce water demand by 20%-30% | The entire Grand River and its tributaries were in L1. Mill Creek in L2. Aggregate Operators in the Mill Creek watershed increased the frequency of pond elevation monitoring. Brant Irrigation Advisory Committee was formed. | The Outdoor Water Use Bylaw (Guelph, Brantford) has been successful in reducing the summer use ratio. Offline ponds were constructed by the golf course industry to reduce their water withdrawals from Eramosa River. | Restrictions imposed on Brant County's outdoor water use bylaw - watering allowed on odd/even days, based on persons address during certain hours. Brant/Oxford Irrigation Advisory Committee (IAC) dissolved due to lack of funding. |
| Long Point Region | No minutes available | Various municipal watering bans were in effect due to low water conditions (Level I) such as watering during certain times of the day on certain days | No actions taken | No actions taken | County of Oxford has created a new water use ban in order to deal with water spikes |
| Upper Thames | No actions taken | No actions taken | No actions taken | No actions taken except for monitoring low flow conditions and expanding gauge network | No actions taken except for monitoring low flow conditions and expanding gauge network |
| York Region | Some golf courses were exceeding their permitted rates of water use and automated lawn watering systems continued to operate even though a lawn watering ban was in effect in the Toronto Region | Strict ban on outdoor water use in place for July in Newmarket - not a normal situation | Tentative indicators were established for Levels I and II drought conditions specific to that watershed but Level III indicators would remain as per provincial standards | No actions taken | No actions taken |

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| | | | | | |
|--------------------------------|---|--|---|---|--|
| <p>Cataraqui Region</p> | <p>Participated in the Provincial Groundwater Monitoring Program to acquire better knowledge about the status of the groundwater levels</p> | <p>Level II status declared in a news release, prompting MOE to release letters of reduction to Permit to take Water (PTTW) users</p> | <p>Water Conservation Materials have been compiled from publications received from National Drinking Water Clearinghouse in West Virginia</p> | <p>No meetings were held this year due to high water levels</p> | <p>Participated in the MNR project to evaluate the effectiveness of Ontario streamflow indicators to identify drought conditions</p> |
| <p>Rideau Valley</p> | <p>The WRT recognized the Level III drought that occurred from late July through October which was based on a report documenting social, environmental and economic impacts of the drought, including more than 50 completed questionnaires and interviews with water managers and water users.</p> | <p>Inactive</p> | <p>Inactive</p> | <p>Inactive</p> | <p>“Drought awareness” information has been made available to the public on the Rideau Valley Conservation Authority’s website due to the persistent Level I drought conditions in the watershed</p> |
| <p>South Nation</p> | <p>A hotline was established for residents to call in and report drought impacts so South Nation Conservation can identify locations of vulnerable groundwater sources. Water restrictions were imposed by individual municipalities such as watering on alternate days during certain hours, a ban on all sprinklers (except for hand held hoses).</p> | <p>Level II declared by WRT. A press release was issued asking people to conserve water and municipalities were asked to enforce water restriction by-laws. Drought signs were installed at various entry points to the SNC watershed with the following words “<i>Drought conditions in effect – please conserve water</i>”</p> | <p>Board of Directors approved Terms of Reference</p> | <p>No meetings were held this year</p> | <p>No meetings were held this year</p> |



Figure 34 Conservation Authorities for Southwestern Ontario (Conservation Ontario 2005)

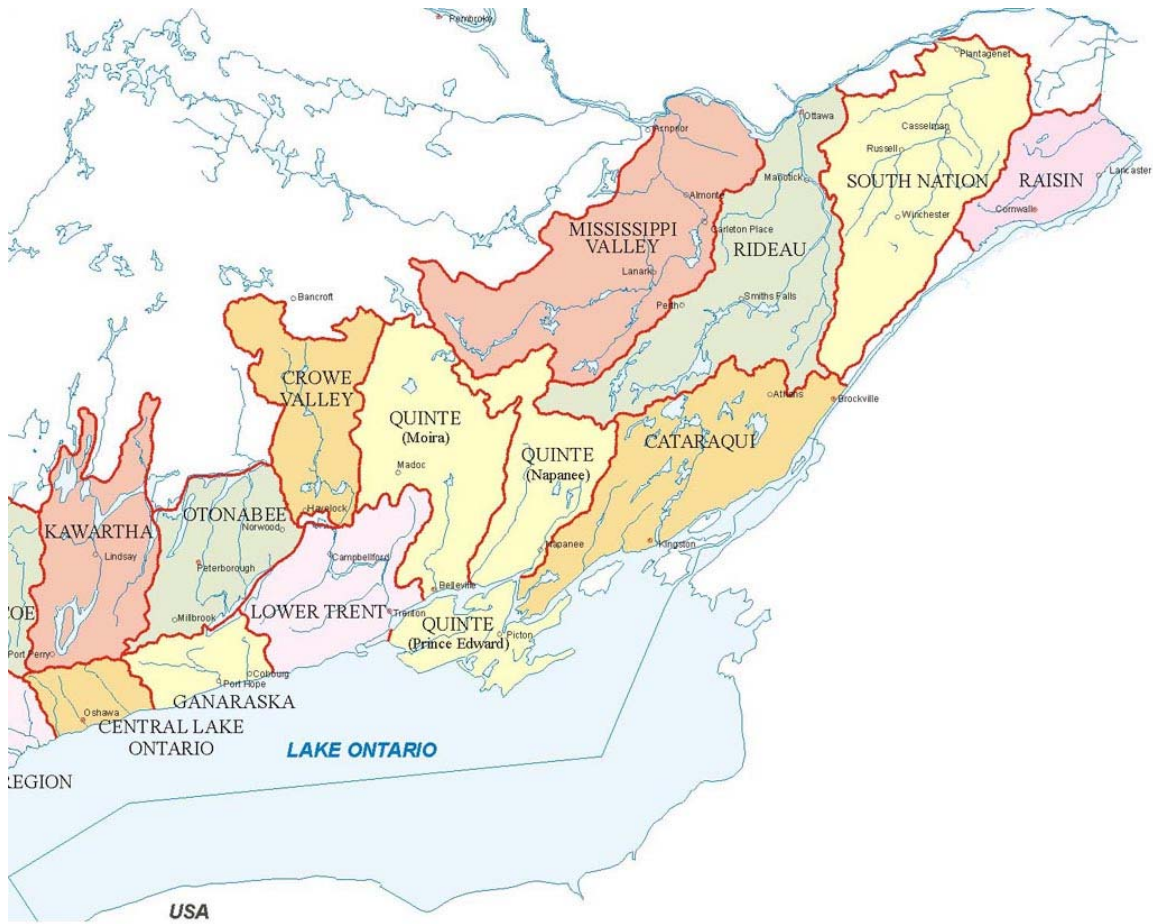


Figure 35 Conservation Authorities for Southeastern Ontario (Conservation Ontario 2005)