CREDIT VALLEY CONSERVATION

CLEAN UP RURAL BEACHES

1994-1995

ANNUAL REPORT

Prepared by

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Prepared for

THE ONTARIO MINISTRY OF ENVIRONMENT AND ENERGY

March 1995

ACKNOWLEDGMENT

The author of this report would like to thank all who contributed to successful completion of this report.

The implementation of the CURB program has been made available through financial assistance of the Ontario Ministry of Environment and Energy (MOEE).

A special note of appreciation is extended to Bob Morris for his continuous support and guidance.

A grateful appreciation is expressed to Garry Palmateer from the MOEE London who led the biotracer study carried out in the watershed. Many thanks to the staff of the microbiological laboratory for providing water sample analysis.

Many thanks to the CURB Review Committee members for their work throughout the year. The members are:

Bob Morris	CVC, Chairman
Peter Mar	MOEE
Mark Janiec	Ministry of Agriculture, Food and Rural Affairs
Blyth Meek	Peel Soil and Crop Improvement Association
John Benham	Wellington Soil and Crop Improvement Association
Peter Randall	Peel Health Unit
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1.0 INTRODUCTION

In 1991, the Ontario Ministry of Environment and Energy (MOEE) has initiated a 10 year Clean Up Rural Beaches (CURB) Program in order to reduce bacterial pollution in rural swimming beaches throughout the province.

The Credit Valley Conservation (CVC) became involved in the CURB program in the spring of 1992. Within two years, the Rural Beaches Study Program has researched sources of bacterial pollution in the West Credit River Watershed. The study has identified and categorized, based on mathematical modeling, sources of bacterial pollution that contribute to the Belfountain swimming beach water quality degradation. The 1993 CURB Plan report summarized all finding, recommended remedial measures and estimated remedial measure costs.

1994 became the first of the five year implementation window, when grant money provided by the MOEE enables farmers and other watershed residents to carry out projects for improving water quality in the watershed.

This report presents an overview on projects the CVC CURB Review Committee dealt with in 1994 and activities undertaken during the year.

2.0 GOALS AND OBJECTIVES

The goal of the CURB program is to reduce bacterial pollution in the West Credit River Watershed and restore recreational swimming in the Belfountain Conservation Area reservoir.

A successful implementation of the first year CURB program was achieved with the following objectives:

- Public awareness of rural sources of bacterial pollution
- Introduction of remedial measure options to landowners
- Promotion of the CURB program grant assistance
- Assistance to landowners with Water Quality Improvement Plan applications and grant application forms

3.0 STUDY AREA

The West Credit River Watershed (106 square kilometers) is mostly located in the eastern portion of the County of Wellington and a small part of the Region of Peel approximately 50 kilometers northwest of Toronto, 30 kilometers northeast of Guelph and 40 kilometers north of Mississauga (Figure 1).

The Village of Erin (Population 2,489), Hillsburgh (Population 1,250) and Belfountain (Population 520) are the population centres within the watershed.

3.1 Land Use

The main land use within the West Credit River watershed is agriculture. Approximately 25% of the total area is pasture, 25% row crop (mainly corn, rarely cereal crops and soybeans), 25% hay, 15% woodlots, 5% wetlands and 5% urban.

Agricultural land use is still predominant however the number of active farmers dropped significantly within the last decade. According to a windshield survey there are approximately 100 farms including 30 beef farms, one dairy farm and a large number of hobby horse farms.

Cropping activities in the watershed are dominated by the cultivation of row crops, the most prevalent is corn, and several fields are in small grains and soybeans. The rest of the agricultural area is farmed in hay or used as a pasture.

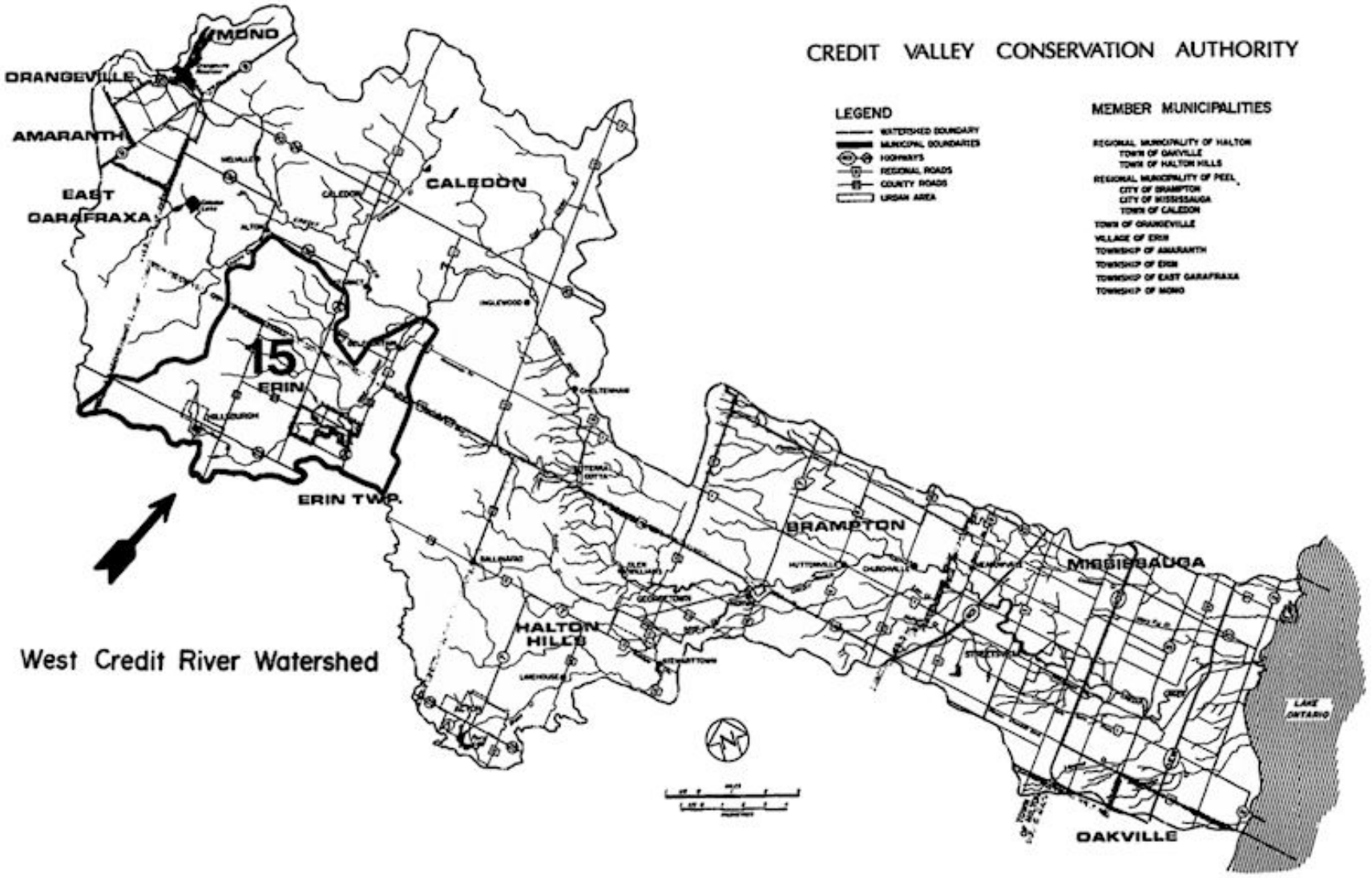

Figure 1: CREDIT RIVER WATERSHED

4.0 PROGRAM PROMOTION

One of the objectives of the Rural Beaches Study program was to make watershed residents aware of water quality degradation of the West Credit River watershed and its sources. An Open House held in the Village of Erin wrapped up the two year Rural Beaches Study and informed the landowners about financial and technical assistance for remedial projects offered by the CURB program beginning in April 1994. A newsletter that summarized past efforts and informed the public about the grant availability was distributed to all households in the watershed.

Press releases in local and major newspapers informed about participation in the CURB program and kept the public up to date. Farmers of high priority sites were approached in person, which given the small watershed area was a reasonable task. Naturally, the word spread among farmers and played an important role. The CURB program was also promoted at the Erin Fall Fair and the Royal Winter Fair. Promotional material and newspaper clippings are summarized in Appendix A.

5.0 CURB PROGRAM PROJECTS

A visual survey of the watershed undertaken in 1992, revealed 20 farms with high pollution potential relative to the West Credit River. Cattle have access to a watercourse at 19 high priority sites. Twelve farms did not have a satisfactory manure storage and at 7 sites runoff from feedlots or barnyards was noted. The CURB model identified sewage disposal systems as the major source of pollution to the river and the beach. Nevertheless, it could not specify which were the problematic ones. On the only dairy farm in the watershed improper disposal of milkhouse wastes occurred. Overland runoff from pastures also contributed to the water pollution, however, the CURB model did not take that into account. Farms identified by the CURB model became a priority target in the advertising campaign for participation in the CURB program. Due to a low number of high priority farms, most of the landowners were approached in person.

The participation in the CURB program is voluntary. Landowners could only be strongly encouraged to take advantage of offered grants. Therefore it is not guaranteed that all high priority sites will be addressed as outlined in the CURB Plan.

6.0 CURB PROGRAM APPLICATIONS

Beginning in April 1994, CVC started accepting applications for the proposed projects. The CURB facilitator conducted a site visit at each property and helped landowners to fill out the Water Quality Improvement Plan form. Necessary information about existing conditions and the proposed project was gathered at the site. Slides that documented the recent situation and showed existing problems, were taken. Water Quality Improvement Plans were then submitted to the CURB Review Committee for consideration. Applications approved by the CURB Committee were sent to the MOEE for a final approval.

6.1 The CURB Review Committee

The Committee consisted of representatives from Credit Valley Conservation, the Ministry of Environment and Energy, the Ministry of Agriculture, Food and Rural Affairs, Peel and Wellington-Dufferin-Guelph Health Units, and the Soil and Crop Improvement Association. The Committee was chaired by CVC.

The Committee held a meeting approximately once a month from May to November to review submitted applications. The Committee then upon agreement either recommended a proposal for the final approval at the MOEE, denied it, or deferred it to the next meeting if additional information was requested. The landowner was notified about the Committee resolution on his application in writing. The landowner was also advised not to begin the project until the application had been approved by the MOEE. After completion of the project, the CURB facilitator conducted a final site visit to confirm that the project was built in accordance with the proposal.

A grant application form was filled out and sent with accompanying invoices, receipts and cancelled cheques to the MOEE. When the application had been processed at the MOEE, CVC was notified to issue a cheque to a landowner. CURB program signs that describe a cooperation between the landowner, the MOEE and CVC were then distributed. The sign recognized landowner's environmental ethics.

During year one of the CVC CURB Program, the Committee dealt with 17 project applications. Nine applications were submitted for a sewage disposal system repair or replacement and seven applications for fencing cattle out of watercourses. One applicant put in a proposal for a solid covered manure storage.

There were also requests consulted over the phone and projects not recommended for participation in the program because of no visual impact on a watercourse. Several landowners called from outside of the CURB watershed. An information package on a desired topic was sent to each of these farmers.

6.2 CURB Application Approvals

Six out of nine applications for sewage disposal system grant were approved by the CURB Committee. Three applications were denied since the Committee felt that the projects would not improve water quality. All seven proposals for fencing cattle out of a watercourse were approved by the Committee. One application was submitted for a solid covered manure storage and approved with condition that a detailed design will be delivered. Since the farmer so far has not fulfilled this requirement, this proposal could not be finalized and reviewed by the MOEE.

All sewage disposal system and fencing projects submitted to the MOEE were approved (Figure 2). The application for the solid covered manure storage was not delivered to the MOEE for reviewing since the farmer did not submit a detailed design as the Committee requested.

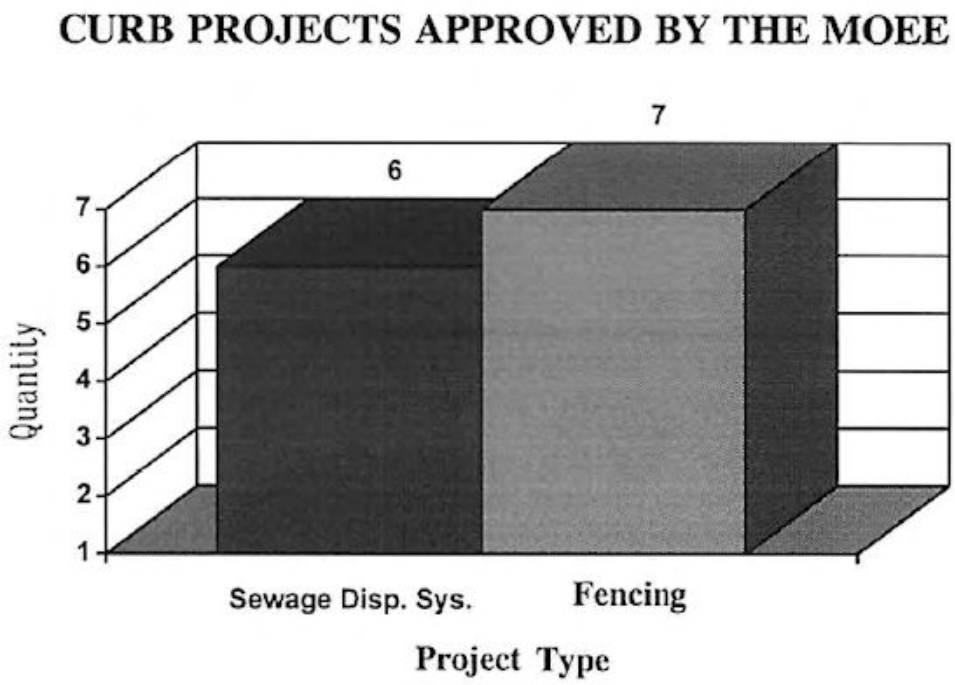

Figure 2: Approved CURB projects

6.3 Grant dollar allocation

The MOEE allocated $100,000 in grants for the CVC CURB projects. Based on the submitted applications, the CURB Committee allocated in total $49,138 for the projects approved in 1994. The greatest amount of funds, $26,140, was allocated for fencing projects, $12,000 for a solid covered manure storage and $11,000 towards sewage disposal systems. Figure 3 explains the grant dollar allocation for the approved projects.

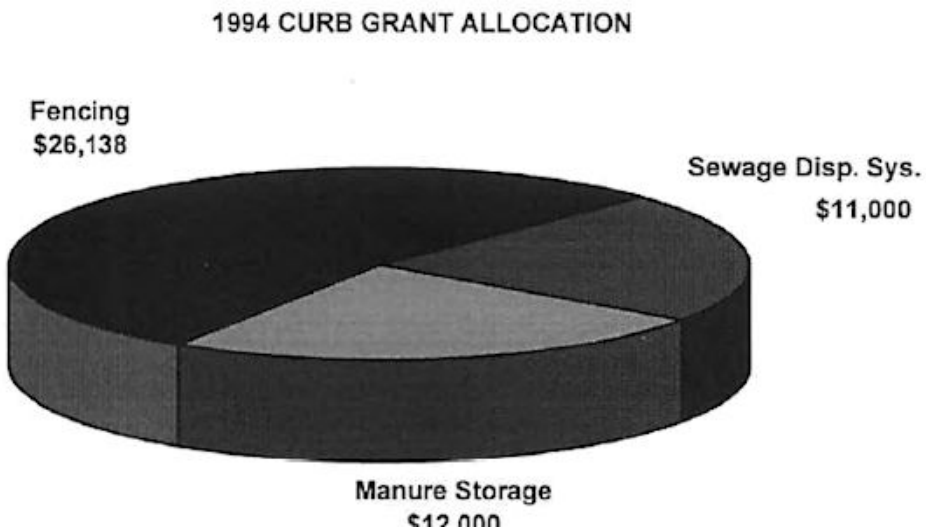

Figure 3: 1994 CURB grant allocation

6.4 Completed projects

Due to different circumstances, not all approved projects were constructed in 1994. Three out of six approved sewage disposal system projects were built this season. The reason for not constructing some of the projects was that the Committee approvals were made late in the fall and the weather did not allow for construction.

Four out of seven fencing projects were constructed during the summer and fall of 1994. The three remaining projects were not built and will be carried over to the next year. Figure 4 presents an overview on number and type of projects constructed in 1994.

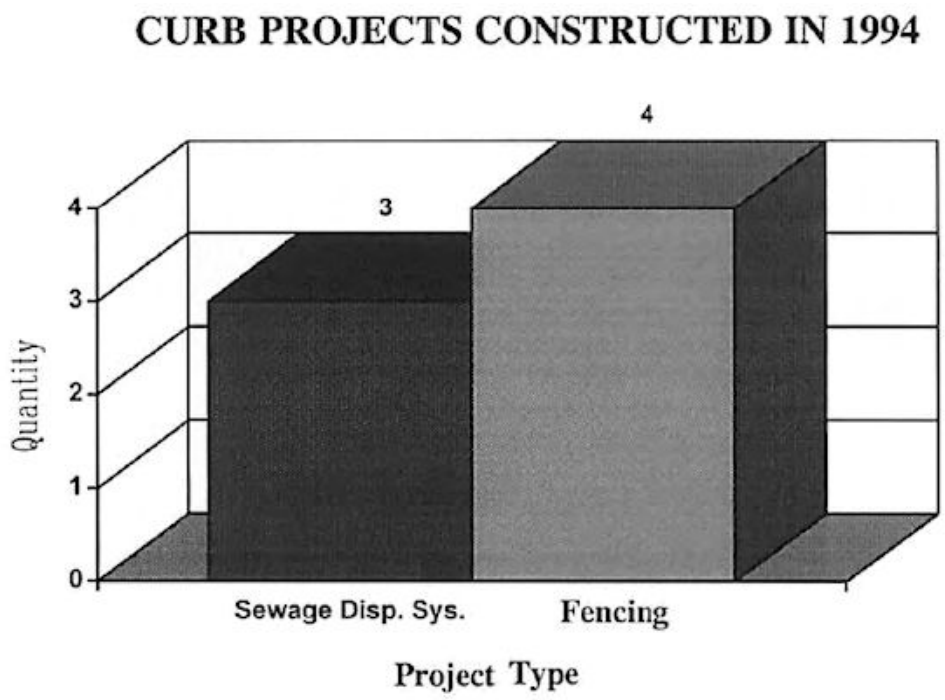

Figure 4: CURB projects constructed in 1994

Figure 5 describes the location of all approved projects.

6.5 Sewage Disposal System Projects

Three of the six approved proposals for sewage disposal projects were completed in 1994. One of these projects had a crucial significance to the beach water quality as the commercial building was located just upstream of the beach.

The CURB Program paid fifty percent of landowner expenses up to maximum of $2,000. In total $6,000 in grants were spent on sewage disposal system improvements. The actual project costs ranged from $4,351 to $14,200.

Projects that could not be built due to approval late in the season will be carried over to the next year. Figure 5 describes project locations.

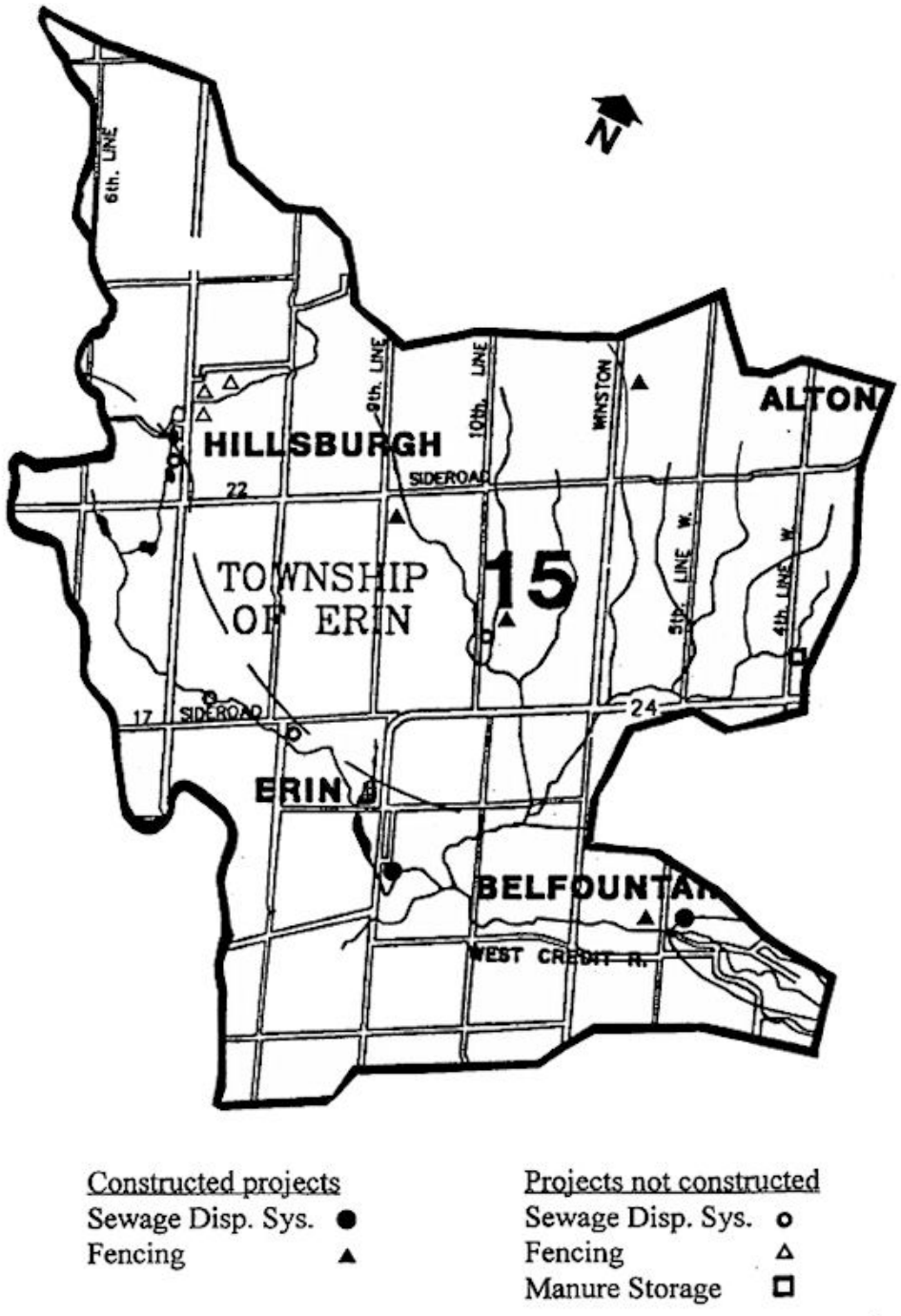

Figure 5: CURB PROJECT LOCATIONS

6.6 Fencing Projects

Four out of seven approved fencing projects were built in 1994. All of the projects restrict beef cattle from a watercourse while providing an alternate watering device. High-tensile or page wire fences were used for restricting cattle out of watercourses. Energy-free water bowls Mirafount or Freedom Fountain were used as an alternate water source. One farmer installed a Ritchie heated water bowl since he already had a good experience with this water bowl from other farms he owns. All alternate watering devices are hooked up to private water wells.

Fencing constructed at all project sites restricted about 155 beef cows out of the West Credit River.

Seventy five percent of eligible expenses for these projects was reimbursed by the CURB program. In total $15,700 in grants were spent to improve water quality in the watershed through fencing cattle out of the watercourses and providing alternate watering devices. The actual project costs ranged from $2,128 to $10,317. Improving water quality by fencing cattle out of watercourses is a very cost-effective measure. Measuring upstream and downstream water quality of the fencing site before and after construction should show significant improvement. Some of these sites will continue to be monitored next year.

Approved projects that were not built this season will be carried over to the next year.

For fencing project locations see Figure 5.

6.7 Manure Management Projects

The solid covered manure storage for the 70 head beef cattle herd was approved by the Committee in condition that a detailed design be submitted and alternative solutions considered. The farmer is proposing to cover the storage and the existing open feedlot adjacent to the storage with one roof. Due to an extreme width of the roof a final solution at an acceptable cost was not yet found. See Figure 5 for the project location.

6.8 1994 CURB Grant Summary

Altogether $21,700 was paid in grants for projects completed in 1994. Seventy two percent of the total was distributed towards fencing projects and 28% towards sewage disposal systems. Figure 6 presents grant money spent on projects in 1994.

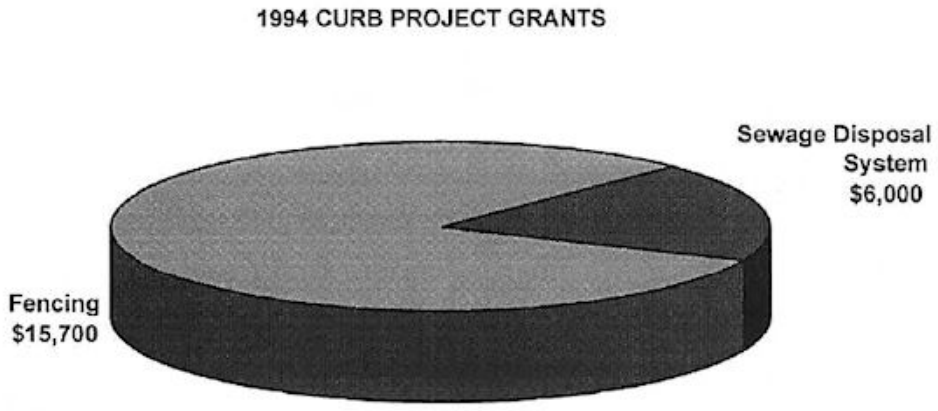

Figure 6: 1994 CURB project grants

7.0 BACTERIAL TRACER STUDY

The CURB report indicates that sewage disposal systems are the major contributor of fecal bacteria to watercourses and to the beach in the West Credit River watershed. Therefore more effort was put into investigating and proofing of the faulty systems by using a bacterial tracer.

A tracer bacterium called *Escherichia coli (E. coli)* NA was developed by Gary Palmateer, a microbiologist with the MOEE laboratory in London, and used for the first experimental tests. One of the tests determined contamination of private wells by a suspected malfunctioning tile bed. This successful test confirmed the great advantage of using a bacterial tracer rather than a chemical tracer. Nalidixic acid resistant *E. coli (E. coli* NA), a strain of a common bacterium *E. coli,* copies the behavior of *E. coli* in a groundwater environment since it has the same characteristics, it is easy to produce and environmentally harmless.

7.1 Sewage Disposal System Tests

Several sewage disposal systems in the watershed were examined to verify their impact on surface water quality.

Two sewage systems were tested in the Erin Heights subdivision in Erin. This subdivision is built on heavy soils. A perched water table and springs can be found in this area. According to the Wellington-Dufferin-Guelph Health Department survey from 1992, the circumstances mentioned above along with poor lot grading resulted in previous problems and replacements.

Two residents of this subdivision submitted a proposal to the CURB Committee for repair due to a malfunction. Both sewage disposal systems were comprised of a regular size septic tank and a septic bed. Both experienced surface break out over the septic bed. The ground was described as spongy and saturated, especially in the spring and the fall. Basement toilets were backing up and could not be flushed. Both proposals were denied by the Committee since at the time of the application (summer 1994) no visible ponding or pathways that would link to surface water were observed. Upon an agreement of the owner one sewage system was tested in November 1994. Prior to initiation of the experiment, a control sample of surface water (storm sewer outfall)

was taken at the site to ensure that *E. coli* NA is not present. A high concentration of *E. coli* NA culture was than flushed down the toilet and the storm sewer outfall was sampled almost every day. The 11th day the *E. coli* NA was detected in a water sample.

Another sewage disposal system in Erin Heights subdivision was tested as well. The 6th day the *E. coli* NA was detected in a water sample taken from the storm sewer outfall.

In both cases bacteria reached the surface water via groundwater flow.

The same test was performed on a sewage disposal system in a house located on Dundas street. The existing sewage system is comprised of a septic tank and a leaching pit. Sewage is backing up in the basement toilet and ponding on surface of the seepage pit and the tank. *E. coli* NA was flushed down the toilet. Water samples were taken from the West Credit River, where the closest sampling station was about 160 m distant from the house. The *E. coli* NA was detected the 14th day in a water sample.

One sewage disposal system described by the owner as a seepage pit was tested in Belfountain. A water sample from a nearby stream (approximately 3 m to the seepage pit) was taken 45 minutes after the *E. coli* NA culture was poured to a toilet. The biotracer was detected in this very first water sample of the stream.

These tests verify that bacteria from malfunctioning or substandard sewage disposal systems could reach surface water via a groundwater flow, traveling long distances and surviving in the groundwater for lengthy periods.

8.0 MANURE SAMPLING TESTS

The study examines the results from manure testing undertaken in the study watershed during the fall 1994. The purpose of the study was to add nutrient information to the existing OMAFRA database and provide farmers with information on the nutrient value of tested manure by using the Manure Management Computer Program developed by Don Hilborn (OMAFRA, Woodstock). It is important for the farmer to know a nutrient value of manure to ensure proper spreading and using additional commercial fertilizers.

Solid beef manure was tested on six farms. In all cases manure was stored uncovered in a pile. Manure by its nature is a variable product, therefore taking a representative sample required effort to mix the sample. The following procedure was followed to collect each sample:

A pitchfork or shovel was used to take a sample from various parts of the manure pile, as deep as feasible. The sample was then put on a cleared mixing area on the floor. Using a shovel, manure was chopped and mixed thoroughly, then spread out and divided into quarters. Three quarters were discarded, the remainder was thoroughly mixed and again divided into quarters and three discarded. The procedure was repeated until the remaining quarter was about ½ litre volume. This amount was transferred into a wide mouth plastic shipping container, bagged and delivered the same day to the University of Guelph Soil and Plant Analysis Laboratory.

At the laboratory, each sample was analyzed for nitrogen, phosphorus, potassium, ammonium nitrogen and dry matter. The farmers were then contacted and informed about the manure test result. Table 1 summarizes data of the tested manure. All values are reported on a wet weight basis.

Table 1: Manure test results

Sample	N %	P %	K %	NH_4-N mg/kg	Dry Matter %
1	1.07	0.23	1.00	672	36.79
2	0.61	0.16	0.57	290	25.70
3	0.55	0.11	0.34	1150	23.05
4	0.60	0.15	0.85	195	27.62
5	0.42	0.08	0.25	40	60.11
6	0.50	0.07	0.36	55	42.24

The Manure Management computer model was only used in cases where farmers would spread the tested manure in the spring. Based on the sample analysis, the model recommended suggested application rates. In cases where manure was spread in the fall, the computer program could not be used since it accounted only for spring manure spreading. However, an updated version will be available in the spring 1995.

Table 2 illustrates suggested reductions in fertilizer application where this manure was applied in the spring and covered in soil within one day of application. These rates were calculated by the University of Guelph Analytical Services Laboratory.

Table 2: Reduction in fertilizer application suggested by the Guelph laboratory

Sample	N kg/tonne	P_2O_5 kg/tonne	K_2O kg/tonne
1	5.33	2.14	10.81
2	3.05	1.52	6.12
3	2.76	0.99	3.69
4	3.02	1.38	9.18
5	2.12	0.75	2.67
6	2.52	0.66	3.85

9.0 WATER QUALITY DATA PRESENTATION

9.1. Water Quality Monitoring Network

A sampling network of 18 sampling stations was established under the Rural Beaches Program. In 1992 and 1993 these sites were sampled once a week from beginning of June through mid-September. Special sites that reflected cattle access to a watercourse or milkhouse waste discharge were added in 1993. Figure 7 shows outlines the watershed and the 1994 sampling stations.

Under the CURB program, in 1994, the number of routinely sampled sites decreased to 14, yet providing a representative picture of the water quality in the watershed. These sites were sampled from beginning of June until mid-September, approximately once a week. Dry and wet weather sampling was also undertaken in 1994. It was important to distinguish dry and wet weather sampling days, since precipitation influenced significantly bacterial and chemical parameter concentration. Due to an exceptionally dry summer, 10 out of 12 sampling runs were undertaken under dry weather conditions. This means that no precipitation occurred for two consecutive days prior to sampling. Wet weather sampling is the one undertaken during or within 24 hours of a rain event. The swimming area was also sampled once a week by the Peel Health Unit during the summer months.

9.2 Water Quality Analysis

The water quality analysis were performed at the MOEE's Central laboratory in Toronto. Each sample was analyzed for bacterial indicators of fecal pollution, chemical and physical parameters as indicated in Table 3. Water quality data are summarized in Appendix B.

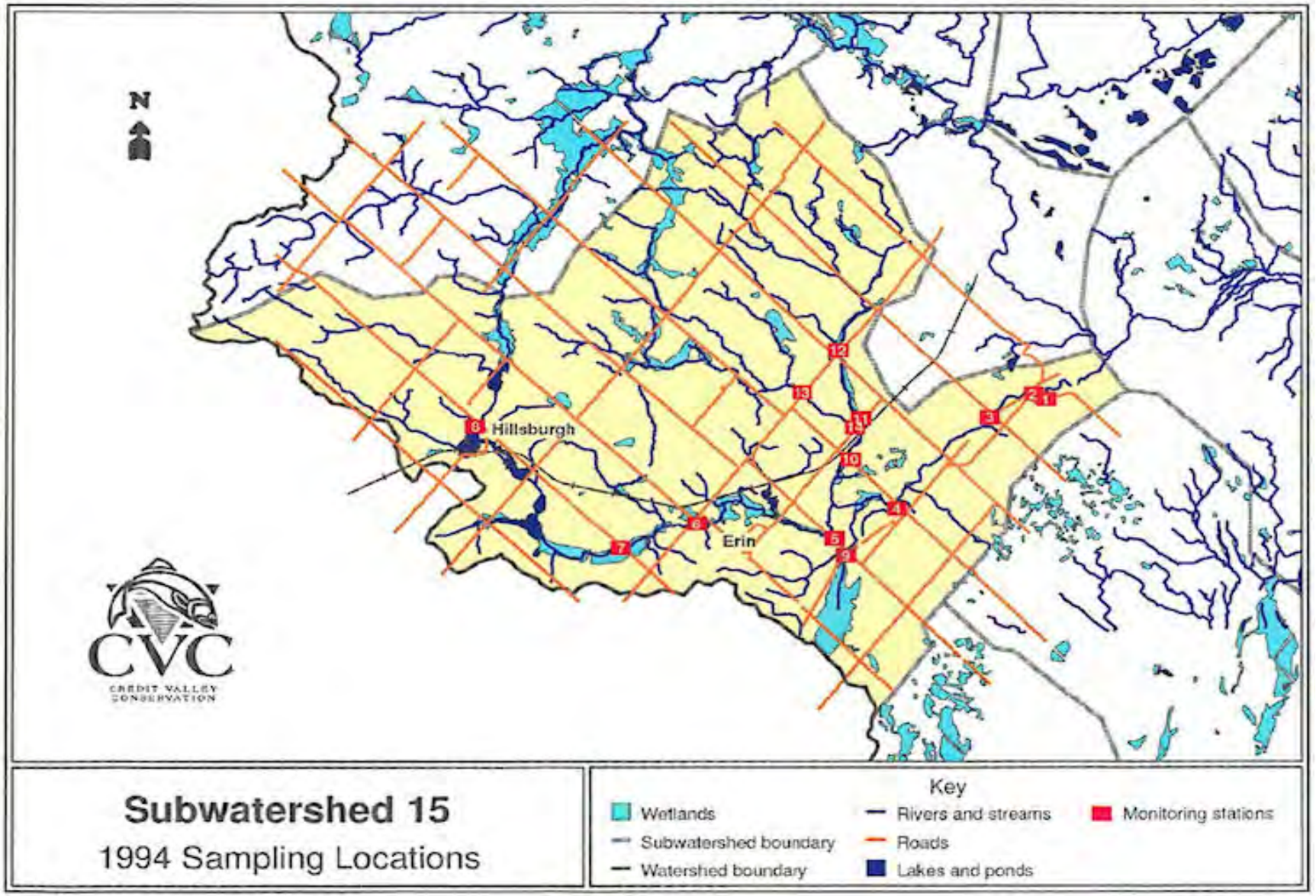
N
Hillsburgh
Erin
CVC
CREDIT VALLEY CONSERVATION
Subwatershed 15
1994 Sampling Locations
Key
Wetlands
Subwatershed boundary
Watershed boundary
Rivers and streams
Roads
Lakes and ponds
Monitoring stations

Table 3: Parameters analyzed for each sample

Bacterial Indicators	Chemical and Physical Parameters
Escherichia coli (E. coli)	Total Phosphorus
Fecal streptococci	Soluble Phosphorus
Pseudomonas aeruginosa	Total Kjeldahl Nitrogen
	Ammonium
	Nitrate
	Nitrite
	Chlorides
	Dissolved Oxygen
	Dissolved Organic Carbon
	pH
	Residue Suspended Particles
	Conductivity
	Turbidity
	Temperature

This report will summarize only the key bacterial and chemical parameters at routinely sampled stations in the West Credit River watershed.

9.2.1 Microbiological Parameters

Escherichia coli

Based on a recreational water quality guideline published by the Ontario Ministry of Health in 1992, *Escherichia coli (E. coli)* replaced fecal coliforms as the main indicator for sewage or fecal contamination of recreational waters (swimming and bathing beaches). If the *E. coli* concentration for the sample exceed 100 per 100 ml, the site should be considered unsuitable for swimming and bathing.

At dry weather conditions the geometric mean *E. coli* concentrations in the Wet Credit River ranged from 53/100 ml at Station 12 to 236/100 ml at Station 8. The *E. coli* geometric mean, maximum, minimum, 1st and 3rd quartile of each station from June through mid-September are summarized in Figure 8. All geometric mean densities of

stations located on the main watercourse exceeded the guideline, except at Station 7, that shows how bacteria concentrations drop due to sedimentation in ponds upstream of this station. The geomean of the swimming beach was 124/100 ml. Fifty seven percent of stations exceeded the water quality guideline of 100/100 ml as depicted in Figure 8.

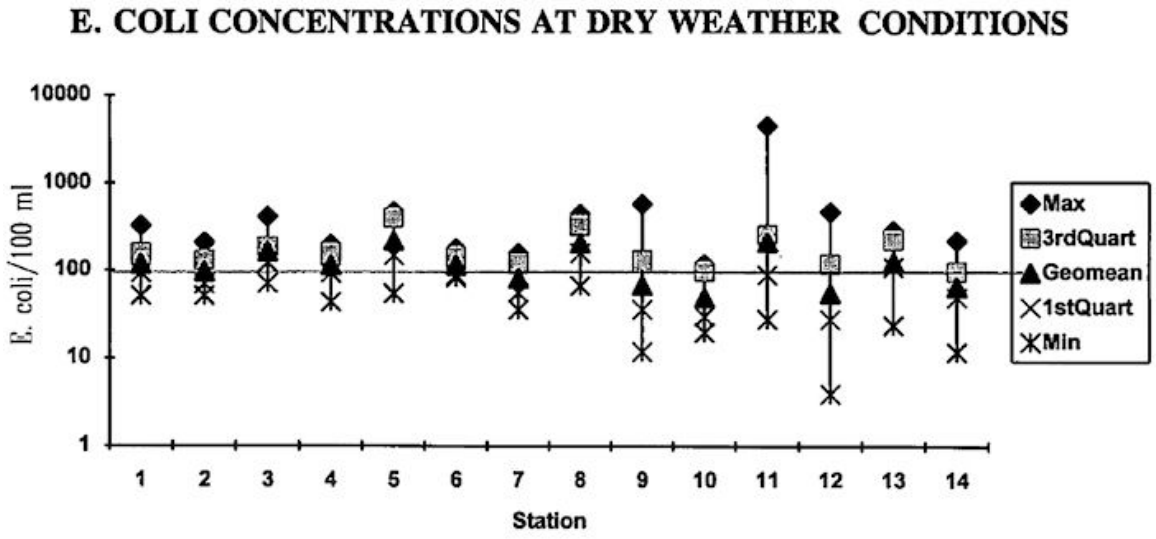

Figure 8: Dry weather *E. coli* concentration in the West Credit River watershed

Wet weather conditions seemed to have a significant impact on water quality in the watershed. All stations highly exceeded the guideline of 100 *E. coli/100* ml. Figure 9 provides summary on *E. coli* levels during wet weather conditions in the watershed from June through mid-September. The lowest geomean of 248/100 ml was measured at Station 6 and the highest geomean of 1587/100 ml was detected at Station 4. The geomean at the beach was 1180/100 ml.

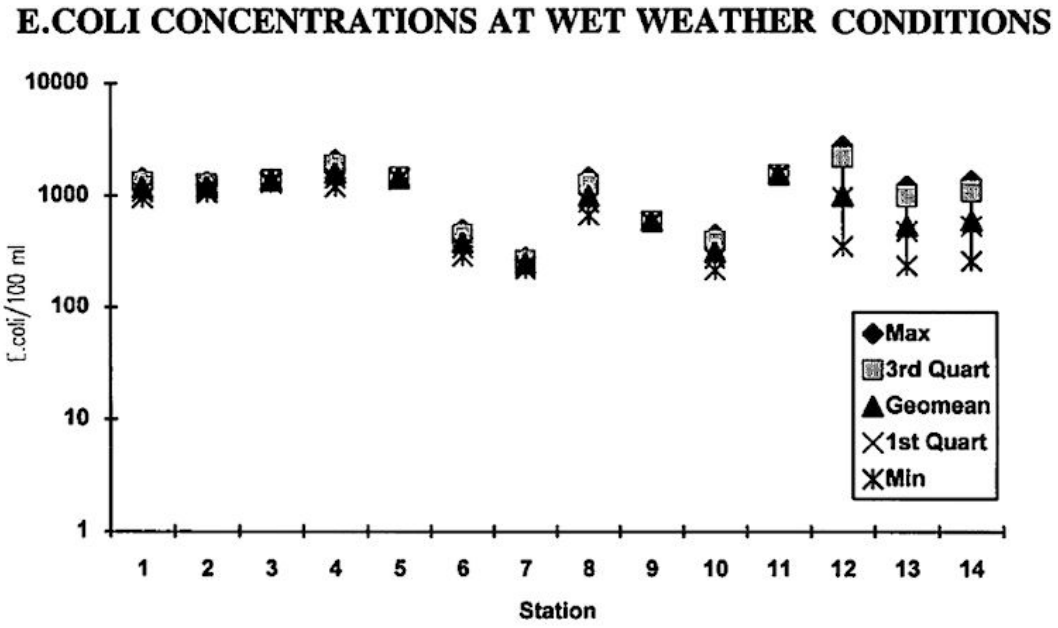

Figure 9: Wet weather *E.coli* concentrations in the West Credit River watershed

1992-1994 *E. coli* Summary in the Watershed

Figure 10 describes *E. coli* geomean concentrations from 1992-1994 in the West Credit River watershed during dry weather conditions. The water quality seems to be quite consistent without any significant trends. The geomean *E. coli* concentration at the beach from 1992 through 1994 was 82/100 ml, 125/100 ml and 120/100 ml, respectively.

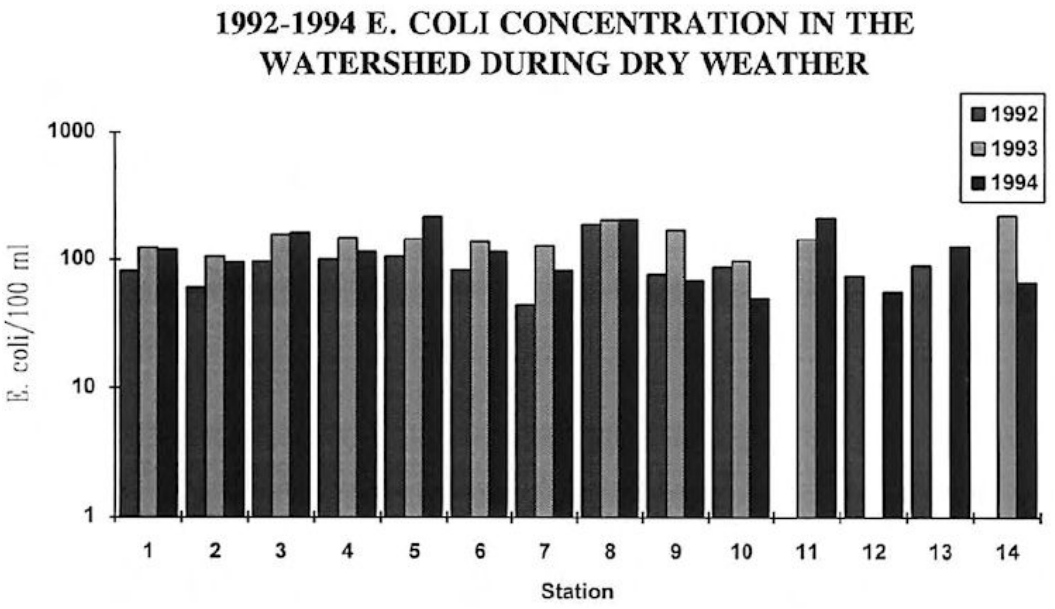

Figure 10: 1992- 1994 dry weather *E. coli* geomean in the watershed

The 1994 *E. coli* geomean levels during the wet weather conditions were at most sampling stations much higher than in the previous years. No major changes occurred in the watershed land use, therefore changes in bacteria densities could be linked to a different volume of runoff on the sampling days. Figure 11 describes *E.coli* geomean in the West Credit River watershed during wet weather conditions.

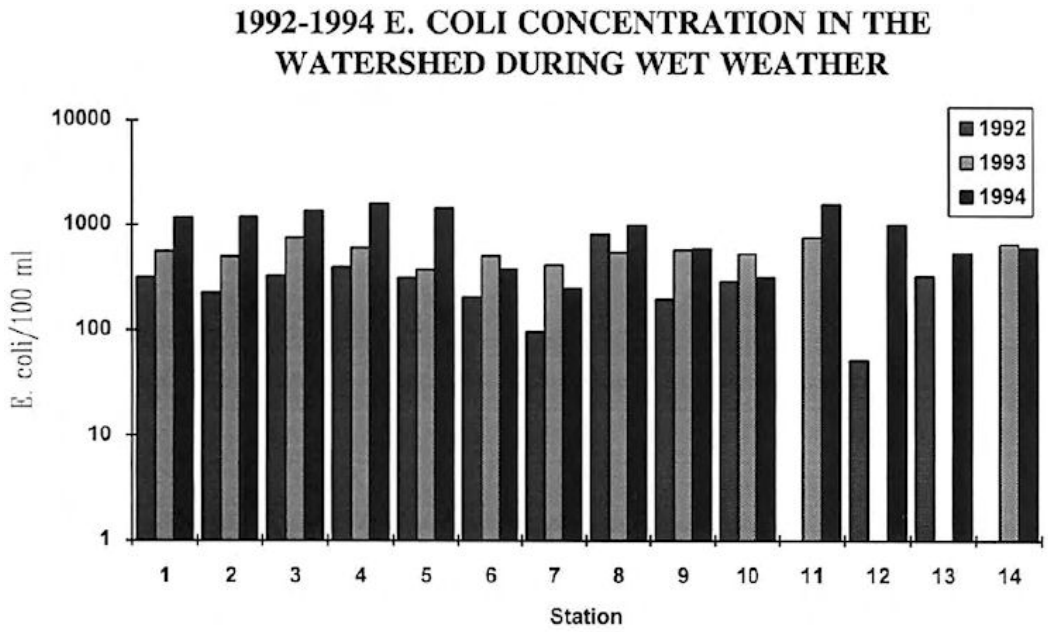

Figure 11: 1992-1994 wet weather *E. coli* geomean in the watershed

<u>*Pseudomonas aeruginosa*</u>

Pseudomonas aeruginosa (Ps. aeruginosa) is a pathogen, causing ear, throat, eye and skin infection.

The importance of *Ps. aeruginosa* as an indicator of the hygienic water quality has been well documented. The value of *Ps. aeruginosa* as a pollution source indicator stems from its apparent specificity of source. High levels are found to be specifically associated with point sources of sewage pollution. Correlation between *Ps. aeruginosa* and standard bacterial parameters are noted. In the author's opinion, *Ps. aeruginosa* can be effectively used to detect and trace point sources of municipal and industrial sewage pollution and is more effective in this regard than is the use of the standard total coliform, fecal coliform and fecal streptococcal parameters. The ubiquitous presence of these latter organisms in moderately polluted waters tends to mask their input sources, a problem that the use of the *Ps. aeruginosa* overcomes (D. Jenkins, G. Palmateer, D.M Young).

High levels of *Ps. aeruginosa* are also related to milkhouse waste discharge.

In dry weather conditions, *Pseudomonas aeruginosa* geometric mean at each station in the watershed was 0/100 ml.

In wet weather conditions higher geometric mean densities were detected only at water sampling stations within built-up areas. Station 7 in Hillsburgh revealed the geomean of 1/100 ml, Station 4 in Erin 12/100 ml, Station 9 in Erin 3/100 ml, Station 4 and 3 below Erin 9/100 ml and 12/100 ml, and both Stations 1 and 2, at the swimming beach and just upstream of the beach had the geomean of 4/100 ml. These results pinpoint the human impact on the river. Figure 12 describes wet weather *Ps. aeruginosa* densities in the watershed.

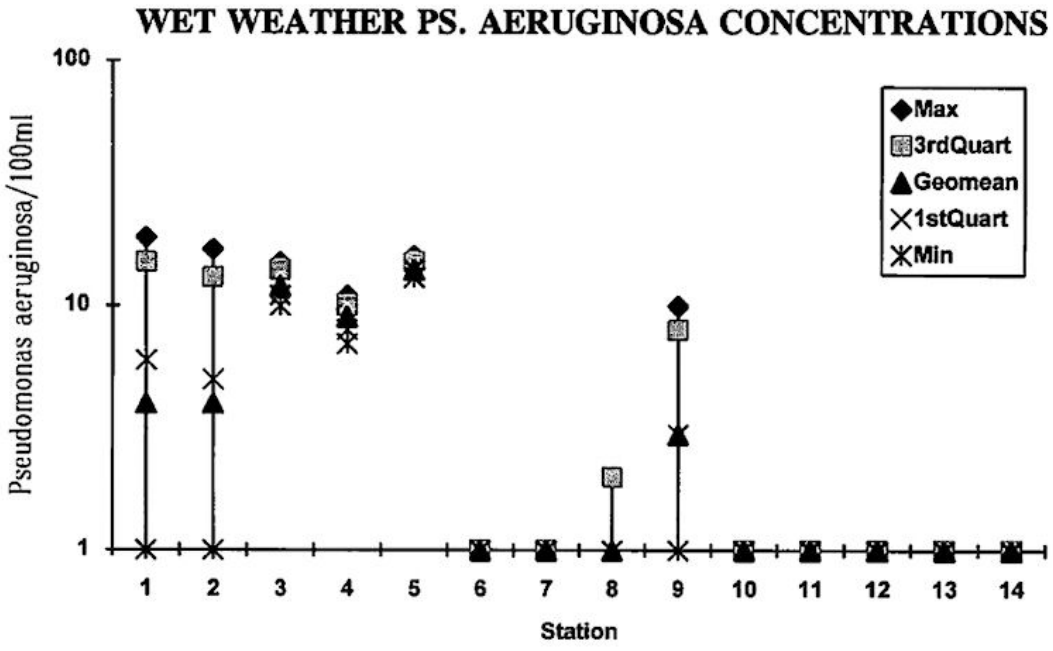

Figure 12: Wet weather *Ps. aeruginosa* concentrations in the watershed

A storm sewer outfall that collects stormwater from Erin Heights subdivision was sampled three times in June 1993 and once in 1994, during rainy weather, in order to assess the amount of bacteria and chemical parameters tested for.

The storm sewer outfall was sampled on June 8, 1993 and two times on June 21, 1993 in an approximately one hour interval. One sample was collected on September 14,1994 on a rainy day.

Ps. aeruginosa concentrations of the tested samples were 152/100 ml on June 8,1993 and 100/100 ml and 64/100 ml on June 21,1993.

A concentration of 120/100 ml was detected in a water sample collected on September 14,1994. *Ps. aeruginosa* found in such densities could be linked to possible cross-connections of sewage disposal systems to the storm sewer system. There is also a probability that springs that flow through some tile fields get contaminated and contaminants are carried via groundwater flow to the storm sewer outfall. This assumption was confirmed later this fall through a biotracer test already described above.

9.2.2. Chemical Parameters

Nitrates

Nitrates are the principal, highly soluble and most stable form of combined nitrogen which results from complete nitrogen oxidation. Surface waters contain at least trace levels of nitrates, but rarely as much as 5 mg/L and often less than 1 mg/L (McNeely et al.1979, MOEE 1981) Concentrations greater than 5 mg/L may signify unsanitary conditions, since a major source of nitrates is human and animal waste. The Ministry of Natural Resources guideline states that 0.2 mg/L should not be exceeded for protection of fisheries (Fish Habitat Protection Guideline for Developing Areas, 1994).

Nitrites

The nitrite ion is less stable than the nitrate ion, because it rapidly oxidizes to nitrates. Therefore nitrite concentrations in surface waters are usually in order of 0.001 mg/L.

There is no MOEE guideline for nitrates for recreational water quality. However the MOEE guideline states that drinking water should not exceed 10 mg/L of nitrate and nitrite. The concentration of nitrate plus nitrite in water used for livestock watering should not exceed 100 mg/L (Canadian Water Quality Guidelines).

Nitrates

Nitrate concentrations in the watershed were quite variable. The dry weather average concentrations ranged from the lowest of 0.033 mg/L at Station 12 to the highest of 3.517 mg/L at Station 8. The average nitrate concentration at the beach was 1.308 mg/L. Nitrate concentration of a single sample collected from the Erin Heights storm sewer was 6.080 mg/L which was the highest measurement in the watershed. Figure 13 depicts nitrate densities throughout the watershed during the dry conditions.

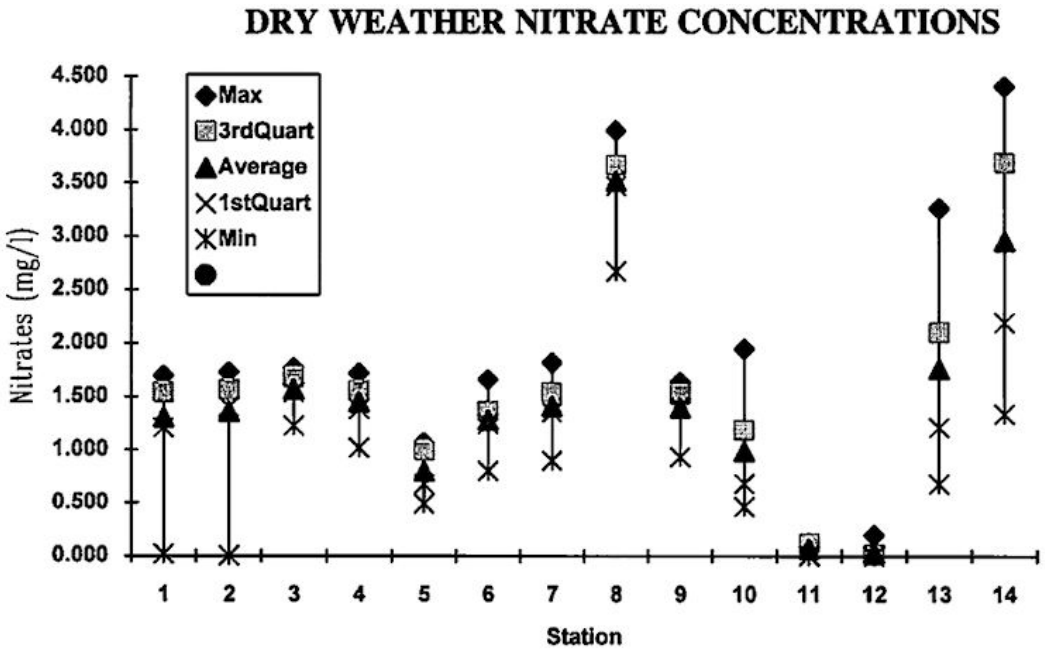

Figure 13: Dry weather nitrate concentrations in the watershed

Wet weather nitrate levels revealed a similar pattern as the dry weather measurements. The lowest average of 0.015 mg/L was measured at Station 11 and the highest one of 3.830 mg/L at Station 14. A concentration of 3.860 mg/L was detected in a single sample collected from the Erin Heights storm sewer outfall. The swimming beach average concentration was 1.455 mg/L. Figure 14 shows wet weather nitrate concentrations within the watershed.

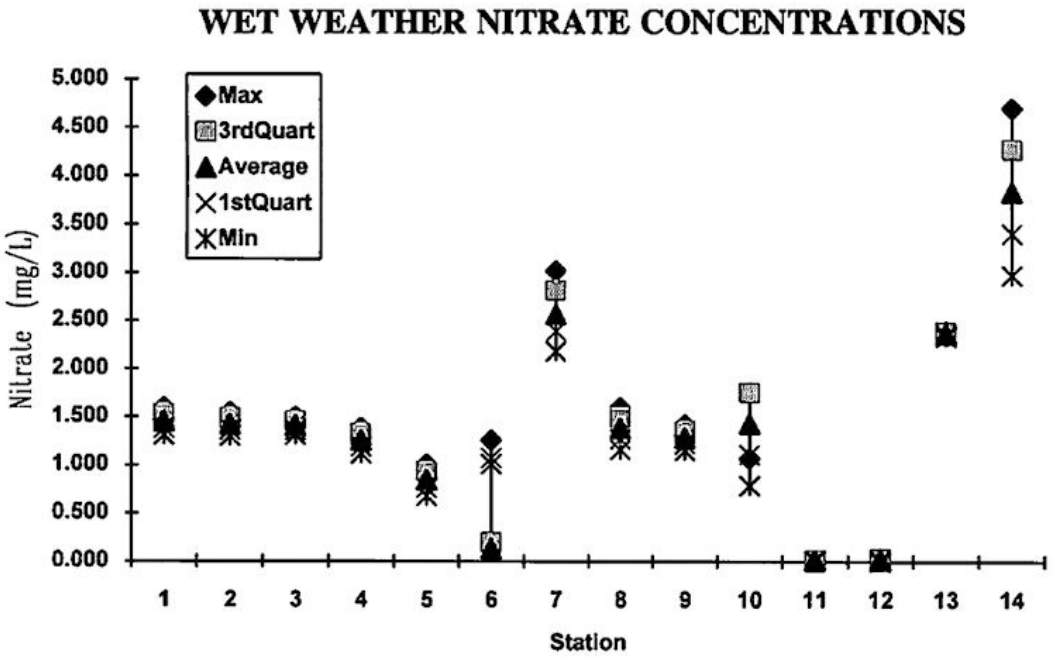

Figure 14: Wet weather nitrate concentrations in the watershed

Total Kjeldahl Nitrogen (TKN)

TKN measures both ammonia and organic nitrogen. The concentration in rivers that are not influenced by excessive organic input range from 0.1- 0.5 mg/L (McNeely,1979).

Dry weather TKN average concentrations ranged from the low of 0.306 mg/L at Station 3 to the high of 1.477 mg/L at Station 12. Figure 15 illustrates dry weather TKN levels within the watershed.

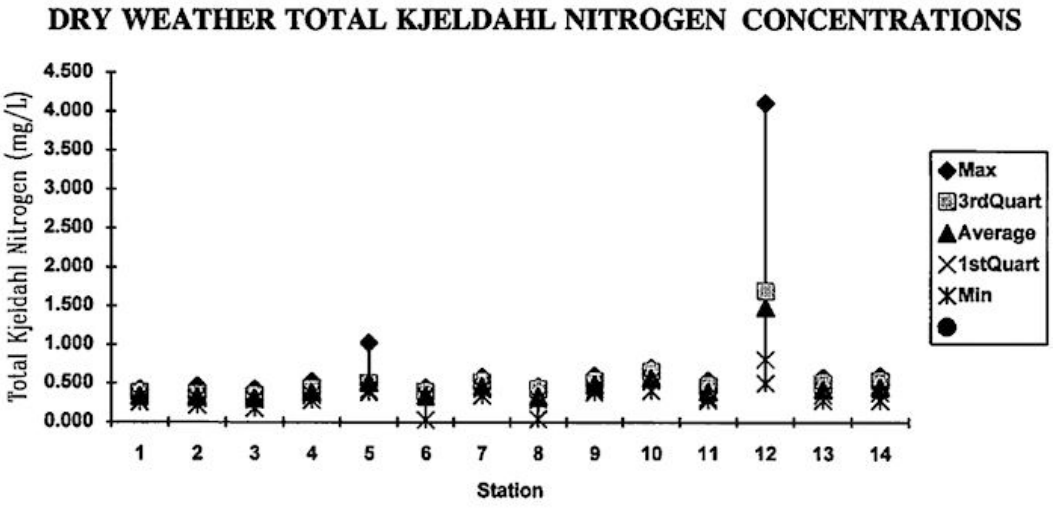

Figure 15: Dry weather TKN concentrations in the watershed

All average levels of wet weather samples reached or exceeded the recommended 0.5 mg/L TKN level. 0.490 mg/L was the lowest average concentration measured at the beach (Station 1) and 2.650 mg/L was the highest one recorded at Station 12. Figure 16 illustrates wet weather TKN concentrations within the watershed.

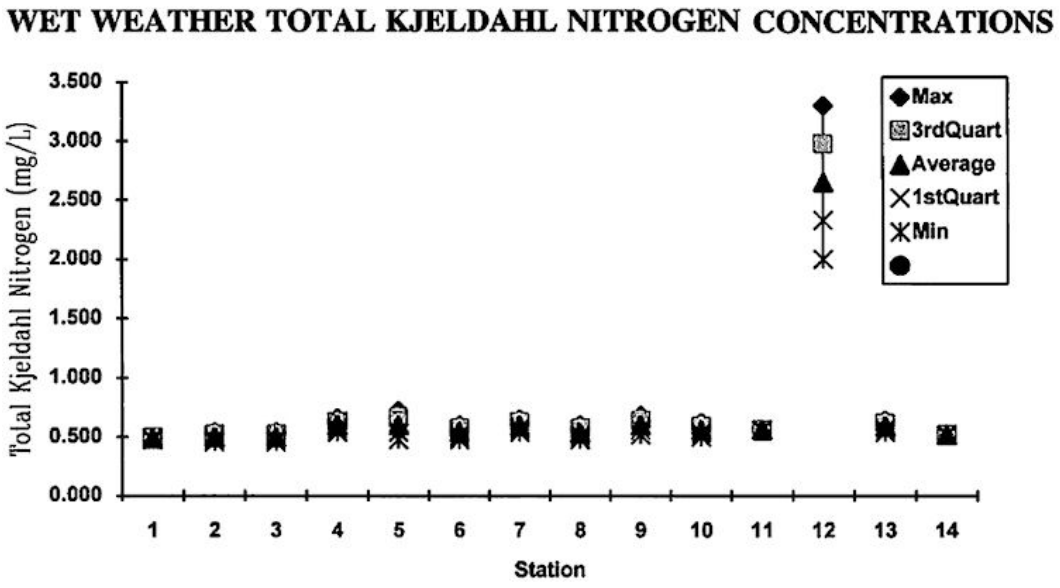

Figure 16: Wet weather TKN concentrations within the watershed.

Total Phosphorus

Although phosphorus occurs naturally in surface waters, elevated levels cause excessive algae growth and subsequent eutrophication. Phosphorus is rarely found in high concentration in surface water because it is actively taken up by plants.

The MOEE guideline states that the phosphorus concentration in rivers and streams should not exceed 0.03 mg/L to prevent excessive algae growth and eutrophication.

At dry weather conditions the average phosphorus levels ranged from the low of 0.009 mg/L at Station 3 to the high of 0.146 mg/L at Station 12. The MOEE guideline of 0.03 mg/L was reached or exceeded at 5 stations in the watershed. Figure 17 illustrates dry weather total phosphorus levels in the watershed.

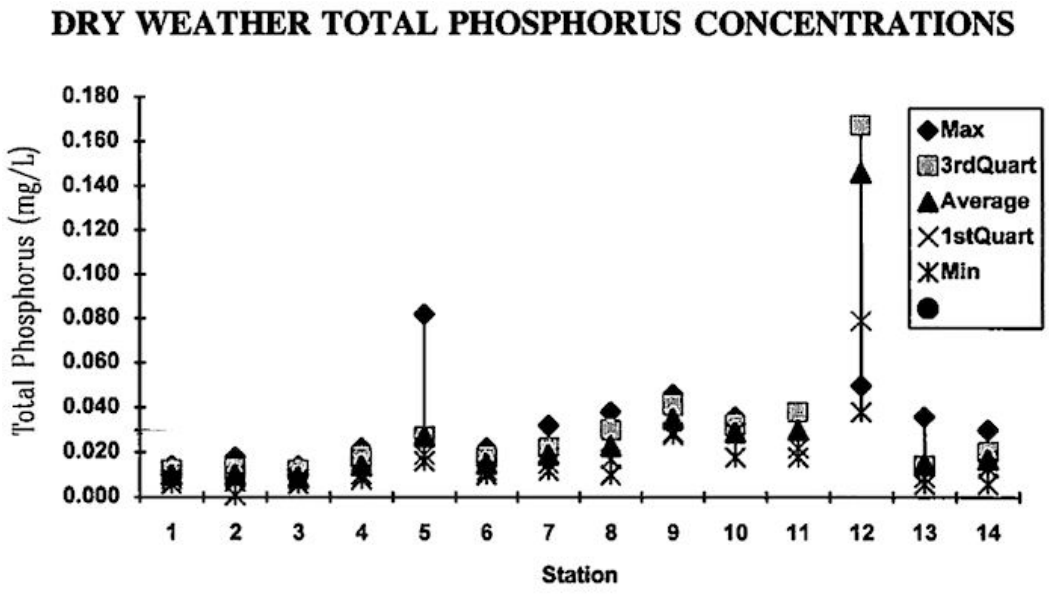

Figure 17: Dry weather total phosphorus concentrations in the watershed

Wet weather conditions revealed slightly higher concentrations associated with runoff events. The guideline was reached or exceeded at eleven sampling stations. The lowest average concentration of 0.021 mg/L was measured at Station 13 and the highest one at Station 12 was 0.285 mg/L. Wet weather total phosphorus concentrations are indicated in Figure 18.

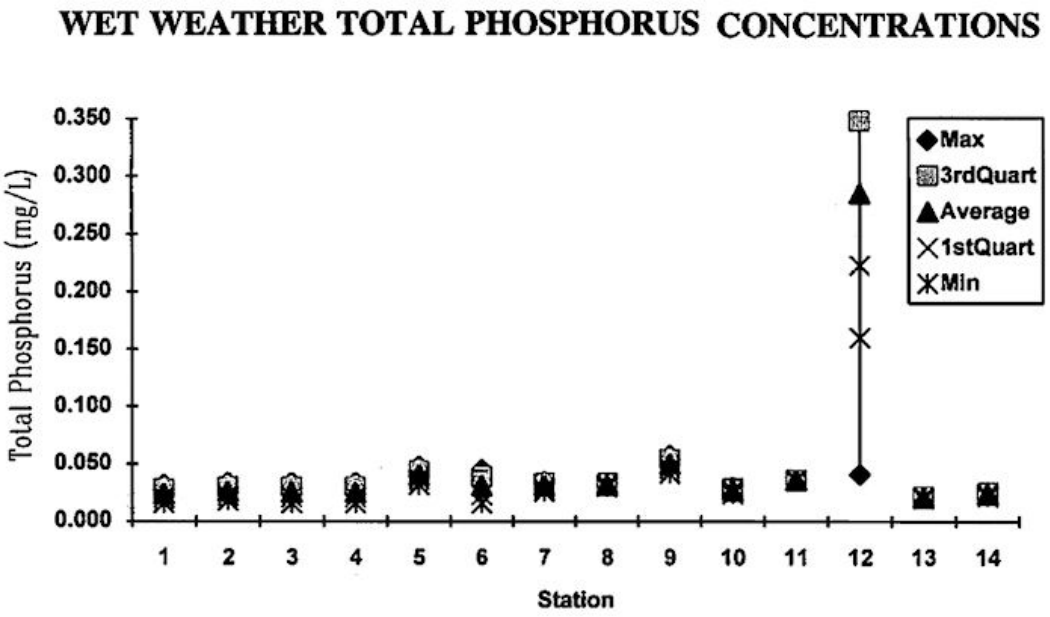

Figure 18: Wet weather total phosphorus concentrations in the watershed

9.2.3 Special Sampling Sites

Some sites were sampled occasionally in 1993 to find out how the water quality is affected by cattle accessing a stream or by milkhouse wastes discharged into a stream.

One beef farm with about 20 head of cattle was monitored in late August and beginning of September 1993. At dry weather conditions the *E. coli* geomean above the farm was 72/100 ml and 163/100 ml below the farm. Wet weather conditions reveal substantially higher concentration of 860/100 ml above the farm and 1324/100 ml below the farm.

Another site with 70 beef cattle having access to a West Credit River tributary was monitored several times. The dry weather *E. coli* geomean below utilized pastures was 1919/100 ml. There was not an upstream measurement taken since the cattle have access to an extensive length of the stream that rises just above these pastures.

The dry weather *E. coli* geomean of samples collected downstream of a pasture with about 50 dairy cow herd had a concentration of 385/100 ml. Wet weather sample had a concentration of 1325/100 ml. Cows have access to the entire length of the stream that rises at the pasture. Therefore no upstream water sample was taken.

Both of the sites were addressed by the CURB program in 1994. Continuous monitoring in 1995 will assess the expected water quality changes.

One grab sample was collected below a dairy farm with improper disposal of milkhouse wastes and with a feedlot and a manure pile located some 15 m from the stream. A concentration of 171,000 *E. coli/100* ml and 100 *Ps. aeruginosa/1*00 ml was detected. The wet weather geomean had a density of 74,572 *E. coli/100* ml and 273 *Ps. aeruginosa/1*00 ml. The farm is located on a tributary that flows through wetlands that help to filter out bacteria and nutrients. Although the farm is of a lower priority to the beach, it causes a serious local water quality problem. The farmer will be approached next year.

A storm sewer outfall in Erin Heights Subdivision in Erin was sampled several times during June and July, 1993 during a rainfall event. *E. coli* concentration of individual samples were 980/100 ml, 4,800/100 ml and 4,200/ 100 m, respectively. *Ps. aeruginosa* concentration were 152/100 ml, 100/100 ml and 64/100 ml. A single grab sample was taken during wet weather in September, 1994. The result showed 770 *E.coli*/100 ml and 120 *Ps. aeruginosa/l* 00 ml in the water sample. High *Ps. aeruginosa* counts could be linked to sewage disposal system malfunction in this subdivision. A biotracer study on two sewage disposal systems in the subdivision was conducted in the fall of 1994 to verify a connection between a tile bed effluent and the storm sewer outfall. In these two cases the suspected link was verified. For more information on the biotracer study refer to Chapter 7.0.

10.0 SUMMARY

1994/95 represented the first year of the CURB Program. During this time, the CURB Review Committee reviewed 17 project applications. Fourteen applications were approved and three proposals were denied, because the Committee believed that they would not improve water quality. Six approved projects were completed in 1994 and the rest will be carried over to 1995/96. The Committee allocated $49,138 in grants for the approved projects. In total $22,600 were spent for the projects completed in 1994. Eighty one percent of the total, $18,300 was distributed towards fencing projects and 19%, $4,300 towards sewage disposal systems.

The Committee was approving applications based on a priority system in regards to the water quality at the beach. However, projects that were of a lower priority to the beach and addressed a local water quality problem, were also approved. The Committee believed that the landowners should not be denied a grant allocation if they voluntarily addressed an improper agricultural practice that resulted in water quality degradation.

Watershed wide promotion helped initiate the CURB program. The residents were informed through newsletters, press releases, an Open House and a personal contact during site visits, on water quality problems in the West Credit River. The public was informed on bacterial sources of pollution identified through the Rural Beaches Study, offered solutions or alternatives and government grants.

A positive response from the farming community was noted. The reply to the sewage disposal system repair could be better, if the financial incentive were higher. The Village of Erin residents might be also more hesitant, knowing that there has been a study initiated to determine options and feasibility for a communal sewage treatment. CVC participates in the meetings and provides the consultant with data gathered through the CURB program during the past three years.

Stormwater was identified by the CURB model as one of the components contributing to degraded water quality. The CURB program, however, does not provide grants to address this issue. Nevertheless, the very successful Yellow Fish Road Program will be introduced in the spring of 1995 in Erin and Hillsburgh. A fish logo is painted beside storm drains to make the public aware that storm drains discharge into the river.

The water quality in the West Credit River watershed, assessed as *E. coli* geomean, seemed to be quite consistent at most stations monitored during the past three years. Although *E. coli* geomean during the wet weather revealed higher concentrations, it very much depended on the amount of precipitation on the particular sampling day. Routine sampling sites will continue to be monitored next year as well as special sampling stations where water quality improvement projects are implemented.

Farmers who did not complete projects approved in 1994, will be contacted in the spring of 1995. The facilitator will conduct a site visit of other priority sites recognized by the CURB plan.

CVC will advertise the second year of the CURB program through various measures to get watershed residents involved and kept up to date.

REFERENCES

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Ontario Ministry of Environment, 1984. Water Management: Goals, Policies, Objectives and Implementation Procedures of the Ministry of the Environment.

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Palmateer, G., 1994. Ontario Ministry of Environment and Energy. Personal Communication.

APPENDIX A: CURB PROGRAM PROMOTION

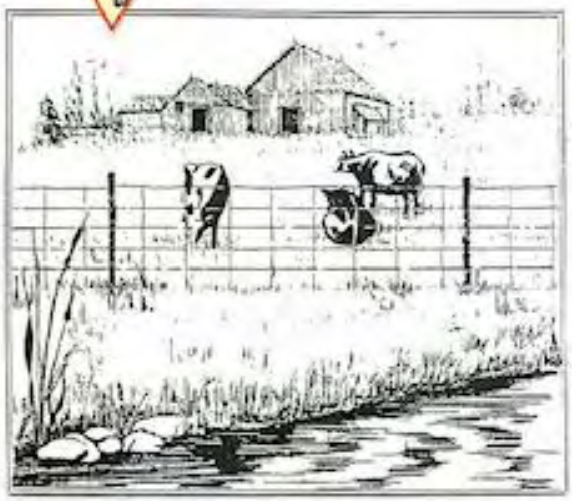
CURB

CLEAN UP RURAL BEACHES

YOU MAY QUALIFY FOR THE CURB GRANT PROGRAM

CREDIT VALLEY CONSERVATION AUTHORITY

Spring 1994



A two year Rural Beaches Study was carried out by the Credit Valley Conservation Authority (CVCA) from 1992-1994 on the West Credit River watershed. Funding is provided by the Ministry of the Environment and Energy through its Provincial Clean Up Rural Beaches Program (CURB).

The objectives of the study were to identify the sources of bacterial pollution impacting on watercourses and the downstream swimming beach at the Belfountain Conservation Area, to promote the program and identify remedial measures to reduce or eliminate these impacts.

The Clean Up Rural Beaches Plan report identifies the sources of bacterial pollution and predicts their relative contribution to the beach. The plan also recommends remedial measures that would help to improve water quality at the Belfountain beach.

The CURB Plan released by the CVCA in April 1994, has identified faulty private sewage disposal systems as a major contributor of bacteria to the West Credit River and the swimming beach, followed by cattle access to watercourses, wildlife populations and urban stormwater. Runoff from barnyards and manure stacks, and improper disposal of milkhouse washwater also accounted for excessive bacteria levels in the watershed.

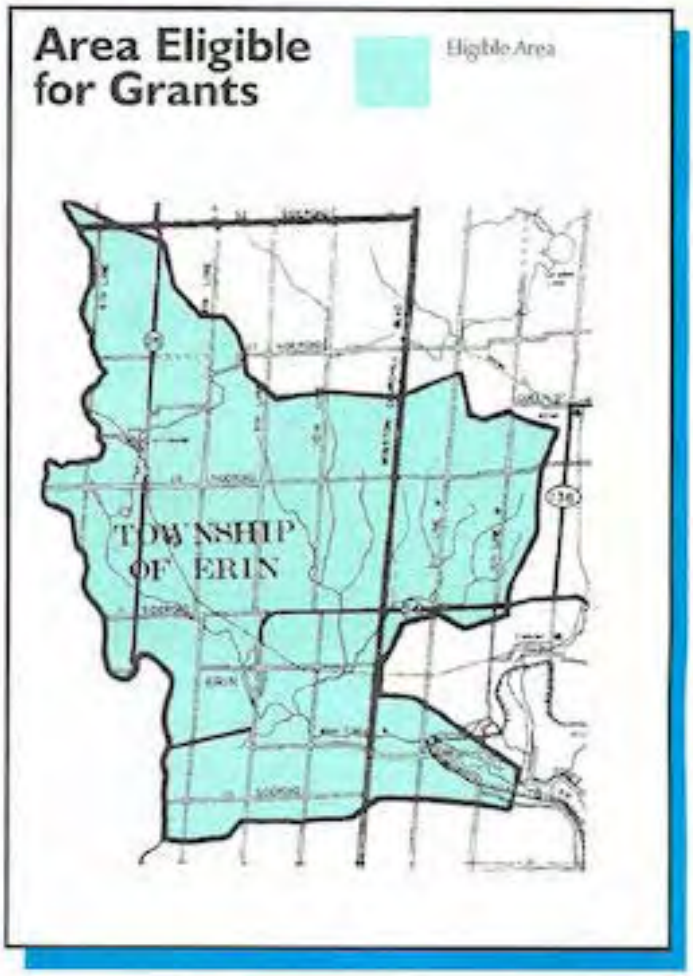
Beginning in April 1994 the CURB program will provide financial assistance to farmers and rural residents in the West Credit River watershed (see map) to implement remedial measures that will improve water quality.

CALL FOR GRANT INFORMATION

CURB

The CURB program is a five year initiative providing grants to residents of the West Credit River watershed who may be impacting surface water quality. If you are a resident in the eligible area, contact the Credit Valley Conservation Authority for a grant application.

The CURB program is undertaken by the Credit Valley Conservation Authority in co-operation with the Ontario Ministry of Environment and Energy.



40 Years
C V C A
CREDIT VALLEY CONSERVATION AUTHORITY
1954-1994

Call Marta Soucek
1-800-668-5557
ext. 271
at the
Credit Valley Conservation Authority

ATTENTION RESIDENTS

in the West Credit River Watershed!

GRANTS
NOW AVAILABLE

Eligible Items	Grant Rate	Grant Ceiling
Household Sewage Disposal	50%	$2,000
Milkhouse Wastewater Disposal	50%	$5,000
Livestock Fencing	75%	$10,000
Manure Storage Facility	50%	$12,000

Help contribute to the improvement in water quality in the West Credit River and Belfountain Beach. If you are a local resident, landowner or farm operator you may be eligible for grants. CURB (Clean Up Rural Beaches), through the Ministry of Environment and Energy can help improve your septic system, the health of your livestock, maximize the value of your manure and help improve rural water quality.

CURB
CLEAN UP RURAL BEACHES

THE ADVOCATE
APRIL 27, 1994

CVCA open house

The CVCA will hold an Open House providing information about the Clean Up Rural Beaches and Conservation Services Programs at the Village of Erin Municipal Office on Thurs. May 26, 1994 at 7:30 p.m.

In the spring of 1992, the Credit Valley Conservation Authority (CVCA) became involved in the Ontario Ministry of the Environment and Energy's (MOEE) Provincial Clean Up Rural Beaches (CURB) Program in order to address rural bacterial sources impacting on West Credit River and Belfountain Conservation Area water quality.

This program was introduced by the Ministry of the Environment in 1991 as a response to repeated beach closures throughout Ontario in earlier years.

During an ten year period, the program will provide $57 million to enable elimination of sources of bacterial and nutrient contamination impacting Ontario beaches.

Two year water quality study

The Credit Valley Conservation Authority has now finalized the two year water quality study on the West Credit River watershed that was undertaken from 1992-1994.

"We've identified private sewage disposal system impact as a major contributor of bacteria to the West Credit River and the Belfountain Conservation Area swimming beach," says CURB Coordinator Marta Soucek.

"Cattle access to watercourses is the second major source of bacteria to the beach, followed by wildlife populations and urban stormwater. Runoff from barnyards and manure stacks, and improper disposal of milkhouse washwater also accounted for excessive bacterial levels in the watershed."

As of April 1994, the CURB program offers grants to rural residents in the West Credit River watershed to help implement remedial measure projects that would improve water quality.

"The CURB program will provide financial assistance to farmers who build structures and adopt practices as part of their Water Quality Improvement Plan, and to rural residents who repair or rebuild a private sewage disposal system," says Soucek.

"To restrict cattle out of the watercourses, the CURB program will cover the costs for fencing, alternate water supply, mid-level crossing and bank revegetation."

Grants will cover 75 per cent of each project cost with a ceiling of $10,000.

A grant rate of 50 per cent and a grant ceiling of $12,000 is offered for the manure storage or runoff tank costs.

The CURB Program will also cover 50 per cent of the cost for a private sewage disposal system upgrading or replacement with a ceiling of $2,000. A grant rate of 50 per cent with a ceiling of $5,000 is offered for milkhouse washwater disposal systems.

Objective to improve water quality

"Although the primary objective of the program is to improve water quality at the Belfountain Conservation Area swimming beach, the improved water quality will be beneficial to the entire Credit River watershed," says Soucek.

Other benefits of good water quality are: a healthier recreational environment, a better, more diverse fish population, a better habitat for wildlife, a decreased health risk for livestock, improved aesthetics, other water uses, and improved Great Lakes water quality.

"We need community participation if there is to be any hope of resolving the pollution problem in the West Credit," says Soucek. This Open House is an opportunity to learn more about the value of

THE ADVOCATE
AUGUST 24, 1994

CURB program focuses on clean-up

The Ontario Ministry of the Environment and Energy (MOEE) is allocating $6 million per year to financially assist landowners in carrying out projects to help improve the surface water quality of our provinces' rivers and streams.

In 1991, the Ministry of the Environment introduced the Clean Up Rural Beaches (CURB) Program, a project aimed at targeting sources of bacteria and nutrient contamination impacting Ontario beaches. To date, 29 conservation authorities across Ontario have participated in the water quality improvement program.

Marta Soucek, CURB coordinator for the Credit Valley Conservation Authority, recently finalized a two-year water quality study on the West Credit River watershed from Hillsburgh to Belfountain.

Belfountain beach has been closed since 1987 because of bacterial pollution.

"Private sewage disposal system impact has been identified as a major contributor of bacteria to the West Credit River and Belfountain Conservation Area swimming beach," Soucek said. "Cattle access to watercourses is the second major source of bacteria to the beach."

"The CURB program now provides financial assistance to farmers who build structures and adopt practices as part of their Water Quality Improvement Plan, and to rural residents who repair or rebuild a private sewage disposal system," Soucek said. "Everyone who lives in the watershed is eligible to apply. A number of landowners have already become involved in the program."

For those who qualify, the government will pay up to 75 per cent of the cost of fencing to eliminate cattle access to rivers (up to $10,000).

This includes the use of alternate watering devices, crossings and bank revegetation; 50 per cent of the cost of manure management measures such as manure storages and runoff tanks (up to $12,000); 50 per cent of the cost of improving washwater disposal methods (up to $5,000); and 50 per cent of the cost of upgrading sewage disposal systems (up to $2,000).

For further information or to apply for a CURB grant, contact Marta Soucek at 1-800-668-5557, ext. 271.

Waterways: News Magazine of the CVC, Fall 1994

Belfountain beach pollution sources

PINPOINTED

Erin farmer John Gerse, considers participating in curb program.

In the spring of 1992 the Credit Valley Conservation Authority became involved in the Ministry of the Environment and Energy's Provincial Clean Up Rural Beaches (CURB) Program.

The study focuses on the rural bacteria sources affecting the West Credit River and the downstream swimming beach at Belfountain Conservation Area.

The CVCA's study is part of a 10-year provincial project that will provide $57 million to clean up bacterial pollution from rural beaches throughout Ontario.

Marta Soucek, beaches coordinator for Credit Valley Conservation Authority, recently completed extensive water quality testing and surveys of fields, streams and farmland in the West Credit River watershed.

"Having assessed the sources of fecal bacteria from rural areas affecting the river and beach, we can now develop a plan of action and implement remedies to correct the problem," said Soucek.

Soucek's findings indicate that faulty private sewage disposal systems are contributing 70% of the total seasonal load of bacterial pollution to Belfountain beach.

Sewage disposal systems in the village of Erin contribute about 48% of the total bacteria.

Hillsburgh sewage disposal systems contribute 10% of the total load, while 8% of the bacteria originates in Belfountain disposal systems and 5% in rural residences.

Unrestricted cattle access to watercourses is identified as the second major source of bacteria, at 14% of the total load.

"Watercourses where livestock cross, drink and also defecate eventually flow into Belfountain beach area delivering excessive amounts of bacteria that makes the water unsafe for swimming," said Soucek.

Urban stormwater accounts for 8% of the total pollution count while wildlife accounts for 7%.

Barnyard runoff, manure stack runoff and milkhouse washwater disposal systems combined to account for the remaining 1% of the total beach bacteria load.

As of April 1994 the CURB program offers grants to rural residents in the West Credit River watershed who help carry out projects that will improve water quality.

"The CURB program will provide financial assistance to farmers who build structures and adopt practices as part of their Water Quality Improvement Plan, and to rural residents who repair or rebuild a private sewage disposal system," said Soucek.

To restrict cattle out of the water courses the CURB program will cover the cost of fencing, alternate water supply, mid-level crossing and bank revegetation."

Grants will cover 75% of each project cost with a ceiling of $10,000.

A grant rate of 50% and a grant ceiling of $12,000 is offered for the manure storage or runoff tank cost. The CURB Program will also cover 50% of the cost for a private sewage disposal system upgrading or replacement with a ceiling of $2,000.

A grant rate of 50% with a ceiling of $5,000 is offered for milkhouse washwater disposal systems.

Total estimated cost to fully carry out remedial measures for the West Credit River watershed is $1 million.

"Effecting all the remedial measures would result in 85% bacteria reduction at the beach," said Soucek.

Belfountain beach has been closed to swimmers for the last seven years because of the high bacterial levels.

APPENDIX B: WATER QUALITY DATA

1994 - DRY WEATHER DATA																	
BELFOUNTAIN BEACH STATION 1																	
Date	E. coli	Ps. aer.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	DO	Temp.
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg.C
08-Jun-94	52	1	32	583	8.35	36.80	4.3	1.38	0.012	0.0010	0.320	0.002	1.140	0.0330	3.6	3.6	13.1
16-Jun-94	168	1	92	585	8.23	38.30	3.3	1.76	0.014	0.0010	0.400	0.018	1.600	0.0090	2.6	8.6	19.1
04-Jul-94	164	1	144	130	7.36	36.40	4.8	2.03	0.012	0.0010	0.420	0.020	1.420	0.0080	2.8	9.7	14.5
14-Jul-94	144	1	120	580	8.27	37.50	4.9	1.15	0.012		0.360	0.008	1.480	0.0070	2.5	9.0	16.0
02-Aug-94	330	1	330	570	8.25	35.90	6.1	1.53	0.014	0.0015	0.320	0.006	1.130	0.0100	2.7		17.0
11-Aug-94	120	1	150	582	8.29	37.50	4.8	0.92	0.012	0.0010	0.380	0.020	0.025	0.0110	2.6		13.3
18-Aug-94	100	1	104	593	8.31	36.70	3.8	1.11	0.008	0.0010	0.320	0.004	1.500	0.0060	2.3		13.0
23-Aug-94	104	1	40	604	8.29	38.20	2.8	0.93	0.008	0.0010	0.320	0.006	1.540	0.0040	2.1		13.0
30-Aug-94	80	1	48	593	8.32	36.70	2.3	0.81	0.006	0.0010	0.260	0.002	1.540	0.0040	2.1		
12-Sep-94	92	1	68	600	8.29	36.20	1.1	0.84	0.006	0.0015	0.260	0.002	1.700	0.0060	1.8		
Max	330	1	330	604	8.35	38.30	6.1	2.03	0.014	0.0015	0.420	0.020	1.700	0.0330	3.6	9.7	19.1
3rd Quart	159	1	138	593	8.31	37.50	4.8	1.49	0.012	0.0010	0.375	0.016	1.540	0.0098	2.7	9.2	16.3
Median	112	1	98	584	8.29	36.75	4.1	1.13	0.012	0.0010	0.320	0.006	1.490	0.0075	2.6	8.8	13.9
Geom/Avg	120	1	90	542	8.20	37.02	3.8	1.25	0.010	0.0011	0.336	0.009	1.308	0.0098	2.5	7.7	14.9
1st Quart	94	1	53	581	8.26	36.48	2.9	0.92	0.008	0.0010	0.320	0.003	1.210	0.006	2.2	7.4	13.1
Min	52	1	32	130	7.36	35.90	1.1	0.81	0.006	0.0010	0.260	0.002	0.025	0.004	1.8	3.6	13.0

UPSTREAM OF BELFOUNTAIN - STATION 2																	
Date	E. coli	Ps. aer.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	DO	Temp.
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg.C
8-Jun-94	60	1	88	581	8.39	36.50	4.6	1.37	0.012	0.0010	0.320	0.002	1.620	0.0070	2.7	10.4	12.1
16-Jun-94	100	1	100	585	8.31	38.20	8.2	2.11	0.001	0.3800	0.380	1.630	0.007	0.0070	2.4	8.4	19.1
4-Jul-94	148	1	176	566	8.34	37.40	7.2	1.78	0.018	0.0010	0.460	0.018	1.370	0.0070	2.8	10.0	14.5
14-Jul-94	136	1	100	578	8.35	37.30	11.4	1.60	0.010		0.340	0.002	1.510	0.0050	2.2	9.1	15.1
2-Aug-94	210	1	390	563	8.29	35.40	6.6	1.44	0.016	0.0010	0.320	0.006	1.200	0.0080	2.8		17.0
11-Aug-94	90	1	110	581	8.34	37.20	4.3	0.90	0.012	0.0500	0.340	0.018	1.510	0.0080	2.4		13.2
18-Aug-94	64	1	120	590	8.37	36.20	4.4	1.33	0.012	0.0010	0.300	0.002	1.530	0.0060	2.2		
23-Aug-94	116	1	72	599	8.36	37.80	3.2	0.71	0.006	0.0010	0.300	0.002	1.550	0.0020	1.9		12.5
30-Aug-94	52	1	112	589	8.39	36.40	2.2	0.62	0.008	0.0010	0.260	0.002	1.570	0.0030	2.2		10.9
12-Sep-94	92	1	68	594	8.40	35.80	1.3	0.71	0.006	0.0010	0.220	0.002	1.730	0.0040	1.6		9.8
3rd Quart	210	1	390	599	8.40	38.20	11.4	2.11	0.018	0.3800	0.460	1.630	1.730	0.0080	2.8	10.4	19.1
Median	131	1	118	590	8.39	37.38	7.1	1.56	0.012	0.0010	0.340	0.015	1.565	0.0070	2.6	10.1	15.1
Geom/Avg	96	1	105	583	8.36	36.85	4.5	1.35	0.011	0.0010	0.320	0.002	1.520	0.0065	2.3	9.6	13.2
1st Quart	98	1	116	583	8.35	36.82	5.3	1.26	0.010	0.0486	0.324	0.168	1.360	0.0057	2.3	9.5	13.8
Min	71	1	91	579	8.34	36.25	3.5	0.76	0.007	0.0010	0.300	0.002	1.405	0.0043	2.2	8.9	12.1
	52	1	68	563	8.29	35.40	1.3	0.62	0.001	0.0010	0.220	0.002	0.007	0.0020	1.6	8.4	9.8

5th LINE WEST - STATION 3																	
Date	E. coli	Ps. aer.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	DO	Temp.
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg.C
8-Jun-94	316	1	64	583	8.33	36.70	2.4	1.13	0.008	0.0010	0.280	0.002	1.570	0.0040	2.9	9.8	13.5
16-Jun-94	100	1	100	590	8.22	38.50	1.1	1.48	0.012	0.0010	0.340	0.012	1.700	0.0110	2.6	8.4	19.1
4-Jul-94	188	1	184	565	8.37	38.20	4.5	1.54	0.014	0.0010	0.420	0.018	1.350	0.0080	2.8	9.6	14.1
14-Jul-94	116	1	132	585	8.25	36.70	3.6	0.90	0.010	0.0010	0.340	0.010	1.710	0.0080	2.1	9.1	14.9
2-Aug-94	420	1	360	568	8.20	34.90	3.7	1.65	0.012	0.0010	0.320	0.004	1.230	0.0090	3.0		16.5
11-Aug-94	170	1	140	584	8.26	36.90	2.6	0.69	0.008	0.0020	0.320	0.028	1.530	0.0080	2.4		13.2
18-Aug-94	168	1	76	598	8.29	36.40	2.4	0.87	0.008	0.0010	0.300	0.002	1.610	0.0050	2.1		
23-Aug-94	144	1	108	603	8.28	37.60	2.2	0.73	0.008	0.0010	0.300	0.002	1.600	0.0040	2.1		12.2
30-Aug-94	184	1	84	591	8.31	36.30	1.7	0.62	0.008	0.0010	0.260	0.002	1.620	0.0050	2.2		10.8
12-Sep-94	72	1	60	596	8.36	36.10	1.0	0.64	0.006	0.0010	0.180	0.002	1.770	0.0060	1.7		9.9
Max	420	1	360	603	8.37	38.50	4.5	1.65	0.014	0.0020	0.420	0.028	1.770	0.0110	3.0		
3rd Quart	187	1	138	595	8.33	37.43	3.4	1.39	0.012	0.0010	0.335	0.012	1.680	0.0080	2.8		
Median	169	1	104	588	8.29	36.70	2.4	0.89	0.008	0.0010	0.310	0.003	1.605	0.0070	2.3		
Geom/Avg	166	1	112	586	8.29	36.83	2.5	1.03	0.009	0.0011	0.306	0.008	1.569	0.0068	2.4	9.2	13.8
1st Quart	123	1	78	583	8.25	36.33	1.8	0.70	0.0081	0.0010	0.285	0.002	1.540	0.0050	2.1		
Min	72	1	60	565	8.20	34.90	1.0	0.62	0.0061	0.0010	0.180	0.002	1.230	0.0040	1.7		

WEST CREDIT 10-TH LINE - STATION 4																	
Date	E. coli	Ps. aer.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	DO	Temp.
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg.C
8-Jun-94	44	3	48	591	8.37	41.60	2.6	1.11	0.014	0.0010	0.340	0.002	1.500	0.0080	3.4	9.3	18.0
16-Jun-94	140	1	156	591	8.25	43.30	6.5	1.87	0.020	0.0010	0.420	0.014	1.570	0.0190	3.1	8.5	20.1
4-Jul-94	200	1	180	568	8.29	41.80	6.1	2.22	0.022	0.0015	0.520	0.280	1.220	0.0130	3.4		
14-Jul-94	160	1	256	581	8.30	39.50	5.1	1.81	0.018	0.0055	0.480	0.024	1.680	0.0140	2.5	8.8	16.0
2-Aug-94	160	1	400	568	8.28	38.40	3.8	0.93	0.016	0.0010	0.360	0.002	1.020	0.0150	3.2		18.0
11-Aug-94	140	1	260	583	8.26	40.50	2.9	1.16	0.010	0.0025	0.340	0.012	1.370	0.0110	3.0		14.4
18-Aug-94	92	1	112	603	8.35	40.30	2.4	0.84	0.010	0.0010	0.360	0.002	1.500	0.0060	2.6		
23-Aug-94	100	1	156	603	8.32	41.30	2.5	1.19	0.010	0.0010	0.360	0.002	1.440	0.0060	2.6		14.3
30-Aug-94	148	1	188	587	8.32	39.00	2.5	0.89	0.012	0.0010	0.320	0.002	1.490	0.0070	2.5		12.6
12-Sep-94	72	1	96	597	8.36	39.10	1.5	0.82	0.008	0.0010	0.280	0.002	1.720	0.0090	2.0		11.4
Max	200	3	400	603	8.37	43.30	6.5	2.22	0.022	0.0055	0.520	0.280	1.720	0.0190	3.4	9.3	20.1
3rd Quart	157	1	239	596	8.34	41.53	4.8	1.66	0.018	0.0014	0.405	0.014	1.553	0.0140	3.2	9.1	18.0
Median	140	1	168	589	8.31	40.40	2.8	1.14	0.013	0.0010	0.360	0.002	1.495	0.0110	2.8	8.8	15.2
Geom/Avg	116	1	160	587	8.31	40.48	3.6	1.28	0.014	0.0017	0.378	0.034	1.451	0.0110	2.8	8.9	15.6
1st Quart	94	1	123	582	8.28	39.20	2.5	0.90	0.010	0.0010	0.340	0.002	1.388	0.0070	2.5	8.7	13.9
Min	44	1	48	568	8.25	38.40	1.5	0.82	0.008	0.0010	0.280	0.002	1.020	0.0060	2.0	8.5	11.4

10TH LINE TRIBUTARY - STATION 10																	
Date	E. coli	Ps. aer.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	DO	Temp.
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg.C
8-Jun-94	104	1	20	524	8.28	17.60	4.1	2.03	0.022	0.0035	0.500	0.002	0.465	0.0070	6.2	9.3	15.0
16-Jun-94	120	1	140	527	8.17	16.80	5.2	2.26	0.030	0.0050	0.680	0.096	0.680	0.0240	6.0	8.2	22.0
4-Jul-94	52	1	76	565	8.33	17.00	6.0	2.91	0.030	0.0055	0.680	0.054	0.675	0.0200	5.7	8.7	19.0
14-Jul-94	112	1	124	463	8.33	15.40	6.8	2.23	0.036	0.0075	0.700	0.092	0.810	0.0210	5.1	8.2	21.0
2-Aug-94	40	1	60	461	8.32	13.60	5.2	2.12	0.028	0.0015	0.560	0.056	0.695	0.0170	4.6		21.5
11-Aug-94	30	1	90	483	8.29	13.90	6.3	2.37	0.032	0.0100	0.540	0.058	1.030	0.0170	4.2		16.8
18-Aug-94	24	1	52	489	8.35	13.20	10.5	2.55	0.032	0.0025	0.540	0.028	1.290	0.0170	3.5		
23-Aug-94	30	1	90	479	8.34	13.10	8.9	3.16	0.030	0.0010	0.520	0.032	1.060	0.0170	3.8		17.4
30-Aug-94	80	1	90	479	8.40	11.70	9.5	3.89	0.034	0.0015	0.540	0.012	1.230	0.0140	3.5		15.8
12-Sep-94	20	1	100	499	8.38	12.00	4.0	2.11	0.018	0.0010	0.400	0.002	1.950	0.0170	2.7		13.6
Max	120	1	140	565	8.40	17.60	10.5	3.89	0.036	0.0100	0.700	0.096	1.950	0.0240	6.2	9.3	22.0
3rd Quart	98	1	98	518	8.35	16.45	8.4	2.82	0.032	0.0054	0.650	0.058	1.188	0.0193	5.61	8.9	21.0
Median	46	1	90	486	8.331	13.75	6.2	2.32	0.030	0.0030	0.5401	0.043	0.920	0.0170	4.4	8.5	17.4
Geom/Avg	50	1	75	497	8.32	14.43	6.7	2.56	0.029	0.0039	0.5661	0.043	0.989	0.0170	4.5	8.6	18.0
1st Quart	30	1	64	479	8.30	13.13	5.2	2.15	0.029	0.0015	0.525	0.016	0.684	0.0170	3.6	8.6	15.8
Min	20	1	20	461	8.17	11.70	4.0	2.03	0.018	0.0010	0.400	0.002	0.465	0.0070	2.7	8.2	13.6

EAST TRIBUTARY - STATION 11																	
Date	E. coli	Ps. aer.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	DO	Temp.
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg.C
8-Jun-94	144	1	20	540	8.23	21.10	4.2	3.13	0.036	0.0180	0.460	0.002	0.005	0.0020	6.0	8.8	17.9
16-Jun-94	160	1	148	555	8.19	20.00	3.7	2.97	0.038	0.0110	0.540	0.014	0.010	0.0020	6.7	8.0	22.1
4-Jul-94	144	1	260	505	8.34	22.40	3.4	2.51	0.026	0.0105	0.500	0.018	0.010	0.0050	5.9	9.4	16.1
14-Jul-94	1220	1	1300	537	8.05	14.80	3.0	2.20	0.022	0.0095	0.280	0.056	0.135	0.0070	2.8	8.2	15.0
2-Aug-94	4600	1	3800	544	7.91	18.70	2.9	3.79	0.038	0.0050	0.360	0.022	0.060	0.0080	3.0		17.0
11-Aug-94	260	1	800	561	7.93	20.60	4.1	2.57	0.028	0.0085	0.320	0.042	0.125	0.0070	3.0		12.7
18-Aug-94	90	1	800	574	8.03	25.80	5.3	1.44	0.018	0.0065	0.300	0.320	0.120	0.0030	2.5		
23-Aug-94	28	1	90	583	8.08	29.40	5.4	1.63	0.022	0.0035	0.340	0.058	0.100	0.0050	2.7		
30-Aug-94	84	1	104	581	8.00	30.50	20.1	3.84	0.038	0.0065	0.420	0.112	0.095	0.0060	2.9		12.2
12-Sep-94																	
Max	4600	1	3800	583	8.34	30.50	20.1	3.84	0.038	0.0180	0.540	0.320	0.135	0.0080	6.7	9.4	22.1
3rd Quart	260	1	800	574	8.19	25.80	5.3	3.13	0.038	0.0105	0.460	0.058	0.120	0.0070	5.9	9.0	17.5
Median	144	1	260	555	8.05	21.10	4.1	2.57	0.028	0.0085	0.360	0.042	0.095	0.0050	3.0	8.5	16.1
Geom/Avg	216	1	305	553	8.08	22.59	5.8	2.68	0.030	0.0088	0.391	0.072	0.073	0.0050	3.9	8.6	16.1
1st Quart	90	1	104	540	8.00	20.00	3.4	2.20	0.022	0.0065	0.320	0.018	0.010	0.0030	2.8	8.2	
Min	28	1	20	505	7.91	14.80	2.9	1.44	0.018	0.0035	0.280	0.002	0.005	0.0020	2.5	8.0	

WEST TRIBUTARY - STATION 14																	
Date	E. coli	Ps. aer.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	DO	Temp.
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg.C
8-Jun-94	12	1	20	508	8.54	16.00	3.0	1.20	0.016	0.0015	0.500	0.002	0.680	0.0080	6.4	9.2	16.1
16-Jun-94	224	1	72	517	8.30	15.30	6.7	1.50	0.030	0.0065	0.600	0.320	1.040	0.0250	5.8	7.9	23.3
4-Jul-94	48	1	104	500	8.30	15.60	3.3	1.44	0.020	0.0550	0.540	0.016	1.340	0.0090	5.1	8.8	19.0
14-Jul-94	92	1	176	465	8.41	14.20	3.3	0.86	0.018	0.0065	0.540	0.032	1.480	0.0070	4.2	8.1	16.0
2-Aug-94	176	1	228	459	8.45	13.00	5.0	1.03	0.022	0.0015	0.460	0.020	1.170	0.0090	4.0		21.0
11-Aug-94	80	1	210	482	8.35	13.20	2.4	0.52	0.008	0.0020	0.380	0.018	1.980	0.0080	3.2		14.7
18-Aug-94	68	1	376	497	8.42	13.50	8.6	0.66	0.020	0.0010	0.440	0.002	1.930	0.0050	2.9		
23-Aug-94	56	1	144	479	8.46	12.20	4.1	0.15	0.014	0.0100	0.380	0.002	2.140	0.0040	2.8		16.3
30-Aug-94	100	1	140	514	8.44	11.30	2.0	0.68	0.012	0.0010	0.340	0.002	2.610	0.0050	2.6		13.4
12-Sep-94	28	1	68	520	8.51	11.50	1.5	0.61	0.006	0.0010	0.280	0.002	3.260	0.0010	2.2		12.6
Max	224	1	376	520	8.54	16.00	8.6	1.50	0.030	0.0550	0.600	0.320	3.260	0.0250	6.4	9.2	23.3
3rd Quart	98	1	202	513	8.46	15.03	4.8	1.16	0.020	0.0065	0.530	0.020	2.100	0.0088	4.9	8.9	19.0
Median	74	1	142	499	8.43	13.35	3.3	0.77	0.017	0.0018	0.450	0.009	1.705	0.0075	3.6	8.5	16.1
Geom/Avg	67	1	121	494	8.42	13.58	4.0	0.87	0.017	0.0086	0.446	0.042	1.763	0.0081	3.9	8.5	16.9
1st Quart	50	1	80	480	8.37	12.40	2.6	0.62	0.013	0.0011	0.380	0.002	1.213	0.0050	2.8	8.1	14.7
Min	12	1	20	459	8.30	11.30	1.5	0.15	0.006	0.0010	0.280	0.002	0.680	0.0010	2.2	7.9	12.6

EAST TRIBUTARY HWY 24 - STATION 12																	
Date	E. coli	Ps. aer.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	DO	Temp.
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg.C
8-Jun-94	72	1	120	526	8.07	17.90	4.4	2.57	0.038	0.0070	0.500	0.002	0.005	0.0020	5.7	8.4	17.0
16-Jun-94	56	1	112	530	7.88	17.70	11.6	5.79	0.080	0.0055	0.750	0.022	0.015	0.0010	6.4	7.8	26.0
4-Jul-94	480	1	30	465	8.07	15.70	50.4	14.20	0.180	0.0125	1.450	0.108	0.010	0.0030	6.2	8.0	19.5
14-Jul-94	168	1	44	394	7.90	17.10	83.5	28.30	0.500	0.0205	4.100	0.232	0.050	0.0030	6.0	7.8	20.0
2-Aug-94	132	1	44	368	7.66	17.60	31.6	1.91	0.100	0.0135	1.400	0.092	0.005	0.0020	6.5		20.0
11-Aug-94	50	1	20	347	7.88	17.30	126.0	11.30	0.048	0.0215	0.540	0.228	0.010	0.0020	6.8		13.9
18-Aug-94	20	1	30	365	7.91	21.90	51.3	8.54	0.158	0.0115	1.700	0.468	0.200	0.0030	6.4		
23-Aug-94	4	1	20	602	8.21	91.60	23.7,	7.53	0.170	0.0160	1.650	0.250	0.005	0.0030	6.9		16.5
30-Aug-94	20	10	17	905	7.96	179.50	67.8	13.30	0.078	0.0020	0.980	0.316	0.020	0.0030	6.7		14.7
12-Sep-94	83	1	17	1153	8.14	272.00	75.7	13.20	0.110	0.0015	1.700	0.220	0.005	0.0030	6.3		16.0
Max	480	10	120	1153	8.21	272.00	126.0	28.30	0.500	0.0215	4.100	0.468	0.200	0.0030	6.9	8.4	26.0
3rd Quart	120	1	44	584	8.07	74.18	73.7	13.28	0.167	0.0154	1.688	0.246	0.019	0.0030	6.7	8.1	20.0
Median	64	1	30	496	7.94	17.80	50.9	9.92	0.105	0.0120	1.425	0.224	0.010	0.0030	6.4	7.9	17.0
Geom/Avg	56	1	35	566	7.97	66.83	52.6	10.66	0.146	0.0112	1.477	0.194	0.033	0.0025	6.4	8.0	18.2
1st Quart	28	1	20	375	7.89	17.38	25.7	6.23	0.079	0.0059	0.808	0.096	0.005	0.0020	6.2	8.0	16.0
Min	4	1	17	347	7.66	15.70	4.4	1.91	0.038	0.0015	0.500	0.002	0.005	0.0010	5.7	7.8	13.9

WEST TRIBUTARY HWY 24 - STATION 13																	
Date	E. coli	Ps. aer.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	DO	Temp.
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg.C
8-Jun-94	24	1	20	521	8.39	14.00	4.9	1.84	0.014	0.0010	0.520	0.002	1.340	0.0070	5.7	9.4	15.1
16-Jun-94	176	1	116	532	8.29	13.70	6.9	2.98	0.022	0.0010	0.580	0.018	1.810	0.0090	5.1	8.2	22.5
4-Jul-94	56	1	60	543	8.44	13.10	1.9	0.96	0.012	0.0010	0.480	0.022	2.480	0.0110	3.8	9.0	16.1
14-Jul-94	240	1	132	544	8.42	12.70	4.8	0.72	0.012	0.0055	0.420	0.016	3.040	0.0100	2.9	9.0	16.0
2-Aug-94	256	1	692	513	8.46	12.40	2.1	0.48	0.014	0.0035	0.420	0.028	2.100	0.0120	3.6		18.5
11-Aug-94	144	1	380	547	8.42	11.70	6.7	0.46	0.006	0.0020	0.320	0.006	3.160	0.0070	2.6		16.7
18-Aug-94	140	1	470	557	8.38	12.40	1.7	0.80	0.008	0.0010	0.340	0.002	3.410	0.0140	2.0		
23-Aug-94	1081	11	1560	558	8.38	11.501	4.0	1.57	0.014	0.0010	0.360	0.006	3.780	0.0150	2.0		14.1
30-Aug-94	292	1	62	566	8.31	10.60	2.8	1.43	0.036	0.0010	0.500	0.002	4.050	0.0150	2.1		12.7
12-Sep-94	120	1	252	563	8.41	11.00	43.2	7.48	0.008	0.0010	0.280	0.002	4.400	0.0090	1.9		11.4
Max	292	1	1560	566	8.46	14.00	43.2	7.48	0.036	0.0055	0.580	0.028	4.400	0.0150	5.7	9.4	22.5
3rd Quart	224	1	448	558	8.42	13.00	6.3	1.77	0.014	0.0018	0.495	0.018	3.688	0.0135	3.8	9.1	16.7
Median	140	1	252	544	8.41	12.40	4.0	0.96	0.012	0.0010	0.420	0.006	3.040	0.0110	2.9	9.0	16.0
Geom/Avg	127	1	188	544	8.39	12.31	7.9	1.87	0.015	0.0018	0.422	0.010	2.957	0.0109	3.2	8.9	15.9
1st Quart	111	1	76	535	8.38	11.55	2.3	0.74	0.009	0.0010	0.345	0.002	2.195	0.0090	2.0	8.8	14.1
Min	24	1	20	513	8.29	10.60	1.7	0.46	0.006	0.0010	0.280	0.002	1.340	0.0070	1.9	8.2	11.4

9TH LINE TRIBUTARY - STATION 9																	
Date	E. coli	Ps. aer.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	DO	Temp.
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg.C
8-Jun-94	12	1	27	640	8.23	55.20	3.8	1.18	0.032	0.0040	0.520	0.080	1.140	0.0330	3.6	9.4	15.9
16-Jun-94	588	1	212	642	8.11	52.70	4.4	1.61	0.038	0.0110	0.520	0.108	1.390	0.0710	3.1	8.8	18.0
4-Jul-94	60	1	64	500	8.46	41.10	5.9	1.90	0.044	0.0200	0.600	0.116	1.520	0.0760	3.0		
14-Jul-94	140	1	108	620	8.23	39.80	5.0	1.24	0.038	0.0250	0.460	0.084	1.520	0.0770	2.3	9.0	16.7
2-Aug-94	110	1	220	628	8.08	42.40	3.4	1.13	0.046	0.0170	0.600	0.148	0.935	0.0690	3.2		16.0
11-Aug-94	50	1	70	617	8.18	36.70	2.5	0.72	0.028	0.0155	0.460	0.136	1.420	0.0710	2.4		13.7
18-Aug-94	48	1	104	615	8.28	35.10	4.6	0.90	0.028	0.0040	0.420	0.048	1.450	0.0690	1.9		
23-Aug-94	204	1	92	612	8.32	33.80	2.6	0.77	0.028	0.0050	0.380	0.054	1.420	0.0550	2.0		16.2
30-Aug-94	24	1	60	607	8.31	32.20	2.4	1.17	0.042	0.0050	0.440	0.064	1.540	0.0670	2.0		16.2
12-Sep-94	32	1	56	614	8.24	32.20	2.2	1.06	0.030	0.0120	0.380	0.090	1.640	0.0570	1.6		11.6
Max	588	1	220	642	8.46	55.20	5.9	1.90	0.046	0.0250	0.600	0.148	1.640	0.0770	3.6	9.4	18.0
3rd Quart	133	1	107	626	8.30	42.08	4.6	1.23	0.041	0.0166	0.520	0.114	1.520	0.0710	3.1	9.2	16.3
Median	55	1	81	616	8.24	38.25	3.6	1.15	0.035	0.0115	0.460	0.087	1.435	0.0690	2.4	9.0	16.1
Geom/Avg	69	1	85	610	8.24	40.12	3.7	1.17	0.035	0.0119	0.478	0.093	1.398	0.0645	2.5	9.1	15.5
1st Quart	36	1	61	613	8.19	34.13	2.5	0.94	0.029	0.0050	0.425	0.068	1.398	0.0595	2.0	8.9	15.4
Min	12	1	27	500	8.08	32.20	2.2	0.72	0.028	0.0040	0.380	0.048	0.935	0.0330	1.6	8.8	11.6

HWY 24-ERIN - STATION 5																	
Date	E. coli	Ps. aer.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	DO	Temp.
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg.C
8-Jun-94	80	1	116	508	8.32	29.60	5.5	2.81	0.018	0.0010	0.400	0.014	1.020	0.0120	3.5	9.4	15.3
16-Jun-94	372	1	168	526	8.21	35.80	8.0	2.59	0.028	0.0040	0.500	0.044	1.070	0.0220	3.4	8.0	23.0
4-Jul-94	132	1	104	501	8.37	34.50	7.0	2.88	0.024	0.0015	0.540	0.036	0.625	0.0150	3.9	8.4	20.0
14-Jul-94	260	1	208	479	8.39	26.40	62.1	11.70	0.082	0.0055	1.020	0.030	0.910	0.0270	3.1	8.4	21.0
2-Aug-94	55	5	560	493	8.16	27.60	7.3	2.55	0.028	0.0045	0.480	0.062	0.495	0.0170	3.8		20.5
11-Aug-94	410	1	350	511	8.17	28.70	6.5	2.42	0.020	0.0070	0.440	0.054	0.705	0.0140	3.6		16.6
18-Aug-94	480	1	190	526	8.26	29.00	6.5	2.37	0.020	0.0010	0.460	0.014	0.730	0.0120	3.5		
23-Aug-94	300	1	196	519	8.26	29.40	6.3	2.48	0.020	0.0015	0.440	0.038	0.670	0.0100	3.6		17.3
30-Aug-94	420	1	184	509	8.23	28.50	4.5	2.21	0.016	0.0010	0.380	0.016	0.720	0.0080	3.5		16.2
12-Sep-94	200	1	208	512	8.33	27.10	4.2	2.05	0.016	0.0010	0.380	0.024	1.040	0.0100	3.0		13.0
Max	480	5	560	526	8.39	35.80	62.1	11.70	0.082	0.0070	1.020	0.062	1.070	0.0270	3.9	9.4	23.0
3rd Quart	401	1	208	517	8.33	29.55	7.2	2.76	0.027	0.0044	0.495	0.043	0.993	0.0165	3.6	8.7	20.5
Median	2801	1	193	510	8.26	28.85	6.5	2.52	0.020	0.0015	0.450	0.033	0.725	0.0130	3.5	8.4	17.3
Geom/Avg	221	1	203	508	8.27	29.66	11.8	3.41	0.027	0.0028	0.504	0.033	0.799	0.0147	3.5	8.6	18.1
1st Quart	149	1	172	503	8.22	27.83	5.7	2.38	0.019	0.0010	0.410	0.018	0.679	0.0105	3.4	8.3	16.2
Min	55	1	104	479	8.16	26.40	4.2	2.05	0.016	0.0010	0.380	0.014	0.495	0.0080	3.0	8.0	13.0

17 TH SIDEROAD - STATION 6																	
Date	E. coli	Ps. aer.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	DO	Temp.
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg.C
8-Jun-94	84	1	57	486	8.33	25.70	4.3	1.43	0.014	0.0010	0.340	0.002	1.380	0.0070	3.1	9.2	16.0
16-Jun-94	180	1	108	487	8.25	26.50	6.1	1.55	0.018	0.0010	0.380	0.002	1.370	0.0080	2.9	7.9	23.0
4-Jul-94	88	1	52	484	8.35	25.40	4.9	2.07	0.018	0.0010	0.440	0.010	1.290	0.0130	3.0	9.7	17.0
14-Jul-94	148	1	300	469	8.29	25.60	7.4	1.73	0.018	0.0010	0.420	0.022	1.180	0.0080	2.8	8.6	18.0
2-Aug-94	150	1	610	479	8.26	24.50	6.1	1.62	0.022	0.0035	0.380	0.010	0.800	0.0080	3.4		20.0
11-Aug-94	110	1	360	495	8.29	24.70	3.2	0.88	0.010	0.0020	0.030	0.004	1.240	0.0070	2.9		16.1
18-Aug-94	84	1	200	506	8.27	24.50	3.5	1.07	0.012	0.0010	0.320	0.002	1.330	0.0040	2.5		
23-Aug-94	120	1	272	496	8.32	25.10	3.6	1.24	0.014	0.0010	0.340	0.004	1.270	0.0040	2.6		16.6
30-Aug-94	136	1	288	488	8.35	24.80	3.2	1.30	0.012	0.0010	0.360	0.002	1.310	0.0040	2.5		16.0
12-Sep-94	96	1	208	495	8.33	24.50	3.4	1.57	0.010	0.0010	0.280	0.002	1.660	0.0030	2.1		11.4
Max	180	1	610	506	8.35	26.50	7.4	2.07	0.022	0.0035	0.440	0.022	1.660	0.0130	3.4	9.7	23.0
3rd Quart	145	1	297	495	8.33	25.55	5.8	1.61	0.018	0.0010	0.380	0.009	1.360	0.0080	3.0	9.3	18.0
Median	115	1	240	488	8.31	24.95	4.0	1.49	0.014	0.0010	0.350	0.003	1.300	0.0070	2.9	8.9	16.6
Geom/Avg	116	1	192	489	8.30	25.13	4.6	1.45	0.015	0.0014	0.329	0.006	1.283	0.0066	2.8	8.9	17.1
1st Quart	90	1	131	485	8.28	24.55	3.4	1.26	0.012	0.0010	0.325	0.002	1.248	0.0040	2.5	8.4	16.0
Min	84	1	52	469	8.25	24.50	3.2	0.88	0.010	0.0010	0.030	0.002	0.800	0.0030	2.1	7.9	11.4

HWY 25 - NORTH, HILLSBURGH - STATION 8																	
Date	E. coli	Ps. aer.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	DO	Temp.
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg.C
8-Jun-94	200	1	188	525	8.38	15.20	10.3	2.26	0.028	0.0015	0.360	0.002	3.450	0.0220	1.8	10.4	12.1
16-Jun-94	284	1	460	528	8.30	15.20	17.0	3.88	0.038	0.0030	0.044	0.002	3.330	0.0240	1.8	8.4	19.5
4-Jul-94	160	1	200	530	8.37	15.20	8.1	2.10	0.030	0.0060	0.440	0.016	3.630	0.0200	1.7	9.5	15.0
14-Jul-94	404	1	260	531	8.32	15.20	10.9	1.93	0.032	0.0075	0.460	0.006	3.710	0.0150	1.5	9.0	14.9
2-Aug-94	450	1	650	521	8.30	14.80	10.1	2.09	0.028	0.0040	0.440	0.002	2.670	0.0140	1.9		16.5
11-Aug-94	340	1	230	527	8.31	14.80	7.1	2.10	0.020	0.0040	0.340	0.002	3.650	0.0120	1.6		13.8
18-Aug-94	120	1	240	530	8.30	15.10	6.2	1.97	0.018	0.0010	0.340	0.002	3.520	0.0070	1.5		
23-Aug-94	160	1	280	526	8.36	15.10	7.0	2.45	0.016	0.0010	0.320	0.002	3.550	0.0070	1.6		13.7
30-Aug-94	212	1	230	527	8.33	15.10	4.8	1.21	0.014	0.0010	0.280	0.002	3.670	0.0080	1.6		12.2
12-Sep-94	68	1	228	537	8.36	15.20	4.51	1.39	0.010	0.0010	0.260	0.002	3.990	0.0070	1.3		11.4
Max	450	1	650	537	8.38	15.20	17.0	3.88	0.038	0.0075	0.460	0.016	3.990	0.0240	1.9	10.4	19.5
3rd Quart	326	1	275	530	8.36	15.20	10.3	2.22	0.030	0.0040	0.420	0.002	3.665	0.0188	1.8	9.7	15.0
Median	206	1	235	528	8.33	15.15	7.6	2.10	0.024	0.0023	0.340	0.002	3.590	0.0130	1.6	9.3	13.8
Geom/Avg	209	1	274	528	8.33	15.09	8.6	2.14	0.023	0.0030	0.328	0.004	3.517	0.0136	1.6	9.3	14.3
1st Quart	160	1	228.5	526	8.30	15.10	6.4	1.94	0.017	0.0010	0.290	0.002	3.468	0.0073	1.5	8.9	12.2
Min	68	1	188	521	8.30	14.80	4.5	1.21	0.010	0.0010	0.044	0.002	2.670	0.0070	1.3	8.4	11.4

HWY 25, SOUTH - STATION 7																	
Date	E. coli	Ps. aer.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	DO	Temp.
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg.C
8-Jun-94	40	1	20	482	8.36	27.30	15.4	3.03	0.032	0.0010	0.480	0.002	1.570	0.0110	3.0	8.2	20.0
4-Jul-94	36	1	32	476	8.42	26.80	8.5	2.60	0.020	0.0010	0.520	0.016	1.410	1.4100	3.0		
14-Jul-94	120	1	460	460	8.38	27.00	8.9	1.81	0.018	0.0010	0.420	0.024	1.290	0.0090	2.7	8.0	20.0
2-Aug-94	52	1	388	469	8.39	25.70	5.9	1.90	0.022	0.0035	0.460	0.140	0.900	0.0070	3.2		22.0
11-Aug-94	120	1	240	488	8.39	25.80	5.9	1.10	0.012	0.0035	0.340	0.004	1.350	0.0130	2.7		18.2
18-Aug-94	100	1	132	497	8.39	25.60	6.4	1.99	0.016	0.0010	0.420	0.002	1.450	0.0090	2.5		
23-Aug-94	148	1	260	488	8.43	26.20	12.6	2.68	0.022	0.0010	0.580	0.004	1.370	0.0060	2.6		20.5
30-Aug-94	84	1	204	482	8.34	26.00	6.3	1.88	0.014	0.0010	0.360	0.002	1.390	0.0080	2.5		18.1
12-Sep-94	160	1	156	491	8.40	25.70	12.8	1.84	0.012	0.0010	0.460	0.002	1.820	0.0060	2.2		16.0
Max	160	1	460	497	8.43	28.00	15.4	3.33	0.032	0.0035	0.580	0.140	1.820	1.4100	3.2	8.2	25.5
3rd Quart	120	1	255	488	8.40	26.95	11.8	2.66	0.022	0.0010	0.510	0.015	1.533	0.0125	3.0	8.1	20.9
Median	92	1	180	482	8.39	26.10	8.7	1.95	0.019	0.0010	0.460	0.004	1.400	0.0090	2.7	8.0	20.0
Geom/Avg	82	1	144	481	8.38	26.41	9.2	2.22	0.019	0.0015	0.456	0.021	1.411	0.1493	2.8	7.9	20.0
1st Quart	56	1	129	477	8.37	25.73	6.3	1.85	0.015	0.0010	0.420	0.002	1.355	0.0073	2.5	7.8	18.2
Min	36	1	20	460	8.32	25.60	5.9	1.10	0.012	0.0010	0.340	0.002	0.900	0.0060	2.2	7.6	16.0

10TH LINE BELOW FARMS																	
Date	E. coli	Ps. aer.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	DO	Temp.
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg.C
8-Jun-94																	
16-Jun-94																	
4-Jul-94																	
14-Jul-94																	
2-Aug-94																	
11-Aug-94																	
18-Aug-94	820	1	640	471	8.28	16.00	66.5	31.10	0.285	0.0045	2.100	0.002	0.385	0.0010	4.1		
23-Aug-94																	
30-Aug-94																	
12-Sep-94																	
Max	820	1	640	471	8.28	16.00	66.5	31.10	0.285	0.0045	2.100	0.002	0.385	0.0010	4.1		
3rd Quart	820	1	640	471	8.28	16.00	66.5	31.10	0.285	0.0045	2.100	0.002	0.385	0.0010	4.1		
Median	820	1	640	471	8.28	16.00	66.5	31.10	0.285	0.0045	2.100	0.002	0.385	0.0010	4.1		
Geom/Avg	820	1	640	471	8.28	16.00	66.5	31.10	0.285	0.0045	2.100	0.002	0.385	0.0010	4.1		
1st Quart	820	1	640	471	8.28	16.00	66.5	31.10	0.285	0.0045	2.100	0.002	0.385	0.0010	4.1		
Min	820	1	640	471	8.28	16.00	66.5	31.10	0.285	0.0045	2.100	0.002	0.385	0.0010	4.1		

8TH LINE HILLSBURGH																	
Date	E. coli	Ps. aer.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	DO	Temp.
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg.C
8-Jun-94																	
16-Jun-94																	
4-Jul-94																	
14-Jul-94																	
2-Aug-94																	
11-Aug-94																	
18-Aug-94																	
23-Aug-94																	
30-Aug-94	100	1	204	518	8.18	13.30	1.4	0.43	0.014	0.0010	0.220	0.002	2.750	0.0130	1.8		12.6
12-Sep-94	44	1	148	529	8.29	13.40	5.2	1.27	0.018	0.0010	0.300	0.002	3.150	0.0090	1.4		11.8
Max	100	1	204	529	8.29	13.40	5.2	1.27	0.018	0.0010	0.300	0.002	3.150	0.0130	1.8		12.6
3rd Quart	86	1	190	526	8.26	13.38	4.3	1.06	0.017	0.0010	0.280	0.002	3.050	0.0120	1.7		12.4
Median	72	1	176	524	8.24	13.35	3.3	0.85	0.016	0.0010	0.260	0.002	2.950	0.0110	1.6		12.2
Geom/Avg	66	1	174	524	8.24	13.35	3.3	0.85	0.016	0.0010	0.260	0.002	2.950	0.0110	1.6		12.2
1st Quart	58	1	162	521	8.21	13.33	2.4	0.64	0.015	0.0010	0.240	0.002	2.850	0.0100	1.5		12.0
Min	44	1	148	518	8.18	13.30	1.4	0.43	0.014	0.0010	0.220	0.002	2.750	0.0090	1.4		11.8

ERIN HEIGHTS STORM SEWER																	
Date	E. coli	Ps. aer.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	DO	Temp.
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg.C
8-Jun-94																	
16-Jun-94																	
4-Jul-94																	
14-Jul-94																	
2-Aug-94																	
11-Aug-94																	
18-Aug-94																	
23-Aug-94																	
30-Aug-94	12	1	52	849	7.84	76.40	1.4	0.05	0.010	0.0010	0.140	0.002	6.080	0.0150	1.0		9.2
12-Sep-94																	
Max	12	1	52	849	7.84	76.40	1.4	0.05	0.010	0.0010	0.140	0.002	6.080	0.0150	1.0		9.2
3rd Quart	12	1	52	849	7.84	76.40	1.4	0.05	0.010	0.0010	0.140	0.002	6.080	0.0150	1.0		9.2
Median	12	1	52	849	7.84	76.40	1.4	0.05	0.010	0.0010	0.140	0.002	6.080	0.0150	1.0		9.2
Geom/Avg	12	1	52	849	7.84	76.40	1.4	0.05	0.010	0.0010	0.140	0.002	6.080	0.0150	1.0		9.2
1st Quart	12	1	52	849	7.84	76.40	1.4	0.05	0.010	0.0010	0.140	0.002	6.080	0.0150	1.0		9.2
Min	12	1	52	849	7.84	76.40	1.4	0.05	0.010	0.0010	0.140	0.002	6.080	0.0150	1.0		9.2

1994 -WET WEATHER DATA																
BELFOUNTAIN BEACH - STATION 1																
Date	E. coli	P. aerug.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	Temp
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg C.
27-Jul-94	960	19	1440	524	8.23	32.20	9.2	4.39	0.032	0.0010	0.500	0.026	1.310	0.0120	3.2	16.0
14-Sep-94	1450	1	1550	559	8.32	34.00	5.6	1.53	0.016	0.0010	0.480	0.014	1.600	0.0050	3.1	15.0
Max	1450	19	1550	559	8.32	34.00	9.2	4.39	0.032	0.0010	0.500	0.026	1.600	0.0120	3.2	16.0
3rd Quart	1328	15	1523	550	8.30	33.55	8.3	3.68	0.028	0.0010	0.495	0.023	1.528	0.0103	3.2	15.8
Median	1205	10	1495	542	8.28	33.10	7.4	2.96	0.024	0.0010	0.490	0.020	1.455	0.0085	3.2	15.5
Geom/Avg	1180	4	1494	542	8.28	33.10	7.4	2.96	0.024	0.0010	0.490	0.020	1.455	0.0085	3.2	15.5
1st Quart	1083	6	1468	533	8.25	32.65	6.5	2.25	0.020	0.0010	0.485	0.017	1.383	0.0068	3.1	15.3
Min	960	1	1440	524	8.23	32.20	5.6	1.53	0.016	0.0010	0.480	0.014	1.310	0.0050	3.1	15.0
UPSTREAM OF BELFOUNTAIN - STATION 2																
Date	E. coli	P. aerug.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	Temp
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg C.
26-Jul-94	1060	17	1340	532	8.28	33.00	11.7	5.51	0.034	0.0010	0.540	0.012	1.300	0.0110	3.3	16.0
14-Sep-94	1340	1	1760	537	8.34	33.30	8.5	2.51	0.018	0.0010	0.460	0.004	1.550	0.0050	3.4	15.0
Max	1340	17	1760	537	8.34	33.30	11.7	5.51	0.034	0.0010	0.540	0.012	1.550	0.0110	3.4	16.0
3rd Quart	1270	13	1655	536	8.33	33.23	10.9	4.76	0.030	0.0010	0.520	0.010	1.488	0.0095	3.4	15.8
Median	1200	9	1550	535	8.31	33.15	10.1	4.01	0.026	0.0010	0.500	0.008	1.425	0.0080	3.4	15.5
Geom/Avg	1192	4	1536	535	8.31	33.15	10.1	4.01	0.026	0.0010	0.500	0.008	1.425	0.0080	3.4	15.5
1st Quart	1130	5	1445	533	8.30	33.08	9.3	3.26	0.022	0.0010	0.480	0.006	1.363	0.0065	3.3	15.3
Min	1060	1	1340	532	8.28	33.00	8.5	2.51	0.018	0.0010	0.460	0.004	1.300	0.0050	3.3	15.0

5TH LINE WEST - STATION 3																
Date	E. coli	P. aerug.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	Temp
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg C.
26-Jul-94	1300	15	1820	538	8.18	34.30	12.2	7.81	0.034	0.0010	0.540	0.002	1.310	0.0120	3.3	15.9
14-Sep-94	1430	10	1460	531	8.26	33.60	6.5	1.68	0.016	0.0010	0.460	0.006	1.500	0.0070	3.5	15.0
Max	1430	15	1820	538	8.26	34.30	12.2	7.81	0.034	0.0010	0.540	0.006	1.500	0.0120	3.5	15.9
3rd Quart	1398	14	1730	536	8.24	34.13	10.8	6.28	0.030	0.0010	0.520	0.005	1.453	0.0108	3.5	15.7
Median	1365	13	1640	535	8.22	33.95	9.4	4.75	0.025	0.0010	0.500	0.004	1.405	0.0095	3.4	15.5
Geom/Avg	1363	12	1630	535	8.22	33.95	9.4	4.75	0.025	0.0010	0.500	0.004	1.405	0.0095	3.4	15.5
1st Quart	1333	11	1550	533	8.20	33.78	7.9	3.21	0.021	0.0010	0.480	0.003	1.358	0.0083	3.4	15.2
Min	1300	10	1460	531	8.18	33.60	6.5	1.68	0.016	0.0010	0.460	0.002	1.310	0.0070	3.3	15.0
WEST CREDIT - 10TH LINE - STATION 4																
Date	E. coli	P. aerug.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	Temp
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg C.
26-Jul-94	1200	7	1800	537	8.21	37.20	16.9	6.56	0.046	0.0010	0.660	0.008	1.120	0.0130	4.0	17.0
14-Sep-94	2100	11	2700	537	8.13	34.40	11.6	3.02	0.032	0.0030	0.540	0.008	1.390	0.0090	3.3	15.0
Max	2100	11	2700	537	8.21	37.20	16.9	6.56	0.046	0.0030	0.660	0.008	1.390	0.0130	4.0	17.0
3rd Quart	1875	10	2475	537	8.19	36.50	15.6	5.68	0.043	0.0025	0.630	0.008	1.323	0.0120	3.8	16.5
Median	1650	9	2250	537	8.17	35.80	14.3	4.79	0.039	0.0020	0.600	0.008	1.255	0.0110	3.7	16.0
Geom/Avg	1587	9	2205	537	8.17	35.80	14.3	4.79	0.039	0.0020	0.600	0.008	1.255	0.0110	3.7	16.0
1st Quart	1425	8	2025	537	8.15	35.10	12.9	3.91	0.036	0.0015	0.570	0.008	1.188	0.0100	3.5	15.5
Min	1200	7	1800	537	8.13	34.40	11.6	3.02	0.032	0.0010	0.540	0.008	1.120	0.0090	3.3	15.0

10TH LINE TRIBUTARY - STATION 10																
Date	E. coli	P. aerug.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	Temp
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg C.
26-Jul-94	216	1	524	477	8.26	15.60	5.7	2.75	0.030	0.0010	0.620	0.040	0.790	0.0130	5.5	20.5
14-Sep-94	450	1	1160	473	8.31	11.20	5.5	1.54	0.024	0.0030	0.500	0.052	2.070	0.0210	2.9	17.5
Max	450	1	1160	477	8.31	15.60	5.7	2.75	0.030	0.0030	0.620	0.052	2.070	0.0210	5.5	20.5
3rd Quart	392	1	1001	476	8.30	14.50	5.7	2.45	0.029	0.0025	0.590	0.049	1.750	0.0190	4.9	19.8
Median	333	1	842	475	8.29	13.40	5.6	2.15	0.027	0.0020	0.560	0.046	1.430	0.0170	4.2	19.0
Geom/Avg	312	1	780	475	8.29	13.40	5.6	2.15	0.027	0.0020	0.560	0.046	1.430	0.0170	4.2	19.0
1st Quart	275	1	683	474	8.27	12.30	5.6	1.84	0.026	0.0015	0.530	0.043	1.110	0.0150	3.6	18.3
Min	216	1	524	473	8.26	11.20	5.5	1.54	0.024	0.0010	0.500	0.040	0.790	0.0130	2.9	17.5
WEST TRIBUTARY - STATION 14																
Date	E. coli	P. aerug.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	Temp
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg C.
26-Jul-94	260	1	360	511	8.37	14.20	3.1	0.68	0.022	0.0010	0.520	0.016	4.690	0.0190	4.5	18.0
14-Sep-94	1360	1	1560	516	8.39	11.20	5.8	1.74	0.026	0.0010	0.520	0.002	2.970	0.0110	3.21	17.0
Max	1360	1	1560	516	8.39	14.20	5.8	1.74	0.026	0.0010	0.520	0.016	4.690	0.0190	4.5	18.0
3rd Quart	1085	1	1260	515	8.39	13.45	5.1	1.48	0.025	0.0010	0.520	0.013	4.260	0.0170	4.2	17.8
Median	810	1	960	514	8.38	12.70	4.5	1.21	0.024	0.0010	0.520	0.009	3.830	0.0150	3.9	17.5
Geom/Avg	595	1	749	514	8.38	12.70	4.5	1.21	0.024	0.0010	0.520	0.009	3.830	0.0150	3.9	17.5
1st Quart	535	1	660	512	8.38	11.95	3.8	0.95	0.023	0.0010	0.520	0.006	3.400	0.0130	3.5	17.3
Min	260	1	360	511	8.37	11.20	3.1	0.68	0.022	0.0010	0.520	0.002	2.970	0.0110	3.2	17.0

EAST TRIBUTARY - STATION 11																
Date	E. coli	P. aerug.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	Temp
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg C.
26-Jul-94	1540	1	2180	462	8.10	27.10	22.9	1.90	0.036	0.0065	0.560	0.016	0.015	0.0090	6.0	16.0
Max	1540	1	2180	462	8.10	27.10	22.9	1.90	0.036	0.0065	0.560	0.016	0.015	0.0090	6.0	16.0
3rd Quart	1540	1	2180	462	8.10	27.10	22.9	1.90	0.036	0.0065	0.560	0.016	0.015	0.0090	6.0	16.0
Median	1540	1	2180	462	8.10	27.10	22.9	1.90	0.036	0.0065	0.560	0.016	0.015	0.0090	6.0	16.0
Geom/Avg	1540	1	2180	462	8.10	27.10	22.9	1.90	0.036	0.0065	0.560	0.016	0.015	0.0090	6.0	16.0
1st Quart	1540	1	2180	462	8.10	27.10	22.9	1.90	0.036	0.0065	0.560	0.016	0.015	0.0090	6.0	16.0
Min	1540	1	2180	462	8.10	27.10	22.9	1.90	0.036	0.0065	0.560	0.016	0.015	0.0090	6.0	16.0
HWY 24 - WEST TRIBUTARY - STATION 13																
Date	E. coli	P. aerug.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	Temp
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg C.
26-Jul-94	236	1	360	534	8.39	13.60	2.5	1.09	0.020	0.0010	0.540	0.020	2.390	0.0120	4.4	16.5
14-Sep-94	1220	1	1500	536	8.14	15.60	3.7	1.34	0.022	0.0070	0.640	0.030	2.330	0.0120	6.3	15.0
Max	1220	1	1500	536	8.39	15.60	3.7	1.34	0.022	0.0070	0.640	0.030	2.390	0.0120	6.3	16.5
3rd Quart	974	1	1215	536	8.33	15.10	3.4	1.28	0.022	0.0055	0.615	0.028	2.375	0.0120	5.8	16.1
Median	728	1	930	535	8.27	14.60	3.1	1.22	0.021	0.0040	0.590	0.025	2.360	0.0120	5.4	15.8
Geom/Avg	537	1	735	535	8.27	14.60	3.1	1.22	0.021	0.0040	0.590	0.025	2.360	0.0120	5.4	15.8
1st Quart	482	1	645	535	8.20	14.10	2.8	1.15	0.021	0.0025	0.565	0.023	2.345	0.0120	4.9	15.4
Min	236	1	360	534	8.14	13.60	2.5	1.09	0.020	0.0010	0.540	0.020	2.330	0.0120	4.4	15.0

HWY 24 - EAST TRIBUTARY - STATION 12																
Date	E. coli	P. aerug.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	Temp
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg C.
26-Jul-94	352	1	96	362	7.85	16.90	214.0	31.20	0.410	0.0030	3.300	0.038	0.005	0.0050	6.4	20.0
14-Sep-94	2800	1	260	1195	8.21	273.00	67.1	31.30	0.160	0.0065	2.000	0.280	0.040	0.0080	5.9	15.0
Max	2800	1	260	1195	8.21	273.00	214.0	31.30	0.410	0.0065	3.300	0.280	0.040	0.0080	6.4	20.0
3rd Quart	2188	1	219	987	8.12	208.98	177.3	31.28	0.348	0.0056	2.975	0.220	0.031	0.0073	6.3	18.8
Median	1576	1	178	779	8.03	144.95	140.6	31.25	0.285	0.0048	2.650	0.159	0.023	0.0065	6.2	17.5
Geom/Avg	993	1	158	779	8.03	144.95	140.6	31.25	0.285	0.0048	2.650	0.159	0.023	0.0065	6.2	17.5
1st Quart	964	1	137	570	7.94	80.93	103.8	31.23	0.223	0.0039	2.325	0.099	0.014	0.0058	6.0	16.3
Min	352	1	96	362	7.85	16.90	67.1	31.20	0.160	0.0030	2.000	0.038	0.005	0.0050	5.9	15.0
9TH LINE TRIBUTARY - STATION 9																
Date	E. coli	P. aerug.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	Temp
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg C.
26-Jul-94	580	10	1680	626	8.10	46.90	8.6	3.85	0.058	0.0060	0.680	0.088	1.150	0.0520	3.7	15.5
14-Sep-94	592	1	380	632	8.11	43.10	5.1	1.90	0.042	0.0175	0.520	0.068	1.420	0.0870	3.2	14.0
Max	592	10	1680	632	8.11	46.90	8.6	3.85	0.058	0.0175	0.680	0.088	1.420	0.0870	3.7	15.5
3rd Quart	589	8	1355	631	8.11	45.95	7.7	3.36	0.054	0.0146	0.640	0.083	1.353	0.0783	3.6	15.1
Median	586	6	1030	629	8.11	45.00	6.9	2.88	0.050	0.0118	0.600	0.078	1.285	0.0695	3.5	14.8
Geom/Avg	586	3	799	629	8.11	45.00	6.9	2.88	0.050	0.0118	0.600	0.078	1.285	0.0695	3.5	14.8
1st Quart	583	3	705	628	8.10	44.05	6.0	2.39	0.046	0.0089	0.560	0.073	1.218	0.0608	3.3	14.4
Min	580	1	380	626	8.10	43.10	5.1	1.90	0.042	0.0060	0.520	0.068	1.150	0.0520	3.2	14.0

HWY 24 - ERIN - STATION 5																
Date	E. coli	P. aerug.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	Temp
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg C.
26-Jul-94	1470	16	2800	477	8.14	28.50	25.4	6.30	0.048	0.0010	0.720	0.032	0.680	0.0190	4.8	18.1
14-Sep-94	1400	13	2700	501	8.12	29.90	12.6	3.89	0.032	0.0025	0.480	0.026	1.010	0.0180	3.7	18.0
Max	1470	16	2800	501	8.14	29.90	25.4	6.30	0.048	0.0025	0.720	0.032	1.010	0.0190	4.8	18.1
3rd Quart	1453	15	2775	495	8.14	29.55	22.2	5.70	0.044	0.0021	0.660	0.031	0.928	0.0188	4.5	18.1
Median	1435	15	2750	489	8.13	29.20	19.0	5.10	0.040	0.0018	0.600	0.029	0.845	0.0185	4.3	18.1
Geom/Avg	1435	14	2750	489	8.13	29.20	19.0	5.10	0.040	0.0018	0.600	0.029	0.845	0.0185	4.3	18.1
1st Quart	1418	14	2725	483	8.13	28.85	15.8	4.49	0.036	0.0014	0.540	0.028	0.763	0.0183	4.0	18.0
Min	1400	13	2700	477	8.12	28.50	12.6	3.89	0.032	0.0010	0.480	0.026	0.680	0.0180	3.7	18.0
17TH SIDEROAD - STATION 6																
Date	E. coli	P. aerug.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	Temp
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg C.
26-Jul-94	288	1	650	468	8.20	25.90	15.4	3.46	0.045	0.0010	0.600	0.002	1.010	0.0060	3.8	19.0
14-Sep-94	500	1	630	494	8.18	25.00	8.0	2.10	0.016	0.0010	0.480	0.002	1.260	0.0030	3.8	18.0
Max	500	1	650	494	8.20	25.90	15.4	3.46	0.045	0.0010	0.600	0.002	1.260	0.0060	3.8	19.0
3rd Quart	447	1	645	488	8.20	25.68	13.6	3.12	0.038	0.0010	0.570	0.002	1.198	0.0053	3.8	18.8
Median	394	1	640	481	8.19	25.45	11.7	2.78	0.031	0.0010	0.540	0.002	1.135	0.0045	3.8	18.5
Geom/Avg	379	1	640	481	8.19	25.45	11.7	2.78	0.031	0.0010	0.540	0.002	1.135	0.0045	3.8	18.5
1st Quart	341	1	635	475	8.19	25.23	9.9	2.44	0.023	0.0010	0.510	0.002	1.073	0.0038	3.8	18.3
Min	288	1	630	468	8.18	25.00	8.0	2.10	0.016	0.0010	0.480	0.002	1.010	0.0030	3.8	18.0

HWY 25 - NORTH, HILLSBURGH - Station 8																
Date	E. coli	P. aerug.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	Temp
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg C.
26-Jul-94	670	2	1070	515	8.26	14.10	11.9	2.74	0.030	0.0010	0.480	0.004	3.020	0.0190	2.3	15.0
14-Sep-94	1470	1	1500	507	8.21	14.40	10.7	3.56	0.034	0.0105	0.600	0.002	2.180	0.0060	5.1	19.0
Max	1470	2	1500	515	8.26	14.40	11.9	3.56	0.034	0.0105	0.600	0.004	3.020	0.0190	5.1	19.0
3rd Quart	1270	2	1393	513	8.25	14.33	11.6	3.36	0.033	0.0081	0.570	0.004	2.810	0.0158	4.4	18.0
Median	1070	2	1285	511	8.24	14.25	11.3	3.15	0.032	0.0058	0.540	0.003	2.600	0.0125	3.7	17.0
Geom/Avg	992	1	1267	511	8.23	14.25	11.3	3.12	0.032	0.0032	0.537	0.003	2.566	0.0107	3.4	16.9
1st Quart	870	1	1178	509	8.22	14.18	11.0	2.95	0.031	0.0034	0.510	0.003	2.390	0.0093	3.0	16.0
Min	670	1	1070	507	8.21	14.10	10.7	2.74	0.030	0.0010	0.480	0.002	2.180	0.0060	2.3	15.0
HWY 25 - SOUTH - STATION 7																
Date	E. coli	P. aerug.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	Temp
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg C.
26-Jul-94	220	1	740	455	8.30	25.40	16.5	3.10	0.035	0.0010	0.650	0.012	1.160	0.0120	3.3	21.0
14-Sep-94	280	1	248	485	8.33	25.50	14.7	2.84	0.026	0.0010	0.540	0.002	1.600	0.0030	2.9	
Max	280	1	740	485	8.33	25.50	16.5	3.10	0.035	0.0010	0.650	0.012	1.600	0.0120	3.3	21.0
3rd Quart	265	1	617	478	8.32	25.48	16.1	3.04	0.033	0.0010	0.623	0.010	1.490	0.0098	3.2	21.0
Median	250	1	494	470	8.32	25.45	15.6	2.97	0.031	0.0010	0.595	0.007	1.380	0.0075	3.1	21.0
Geom/Avg	248	1	428	470	8.32	25.45	15.6	2.97	0.031	0.0010	0.595	0.007	1.380	0.0075	3.1	21.0
1st Quart	235	1	371	463	8.31	25.43	15.2	2.91	0.028	0.0010	0.568	0.005	1.270	0.0053	3.0	21.0
Min	220	1	248	455	8.30	25.40	14.7	2.84	0.026	0.0010	0.540	0.002	1.160	0.0030	2.9	21.0

8TH LINE HILLSBURGH																
Date	E. coli	P. aerug.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	Temp
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg C.
14-Sep-94	368	1	544	500	8.18	12.40	2.0	0.48	0.016	0.010	0.420	0.010	1.820	0.010	4.2	15.0
Max	368	1	544	500	8.18	12.40	2.0	0.48	0.016	0.010	0.420	0.010	1.820	0.010	4.2	15.0
3rd Quart	368	1	544	500	8.18	12.40	2.0	0.48	0.016I	0.010	0.420	0.010	1.820	0.010	4.2	15.0
Median	368	1	544	500	8.18	12.40	2.0	0.48	0.016	0.010	0.420	0.010	1.820	0.010	4.2	15.0
Geom/Avg	368	1	544	500	8.18	12.40	2.0	0.48	0.016	0.010	0.420	0.010	1.820	0.010	4.2	15.0
1st Quart	368	1	544	500	8.18	12.40	2.0	0.48	0.016	0.010	0.420	0.010	1.820	0.010	4.2	15.0
Min	368	1	544	500	8.18	12.40	2.0	0.48	0.016	0.010	0.420	0.010	1.820	0.010	4.2	15.0
10TH LINE BELOW FARMS																
Date	E. coli	P. aerug.	F. Strep.	Cond.	pH	Chloride	RSP	Turb.	T. phos.	R. phos.	TKN	Amm.	Nitrate	Nitrite	DOC	Temp
	/100ml	/100ml	/100ml	µmho/cm		mg/L	mg/L	FTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	deg C.
14-Sep-94	2200	2200	3600	507	8.18	21.40	5.0	1.59	0.028	0.007	0.460	0.014	0.515	0.0040	5.6	
Max				507	8.18	21.40	5.0	1.59	0.028	0.007	0.460	0.014	0.515	0.0040	5.6	
3rd Quart	2200	1	3600	507	8.18	21.40	5.0	1.59	0.028	0.007	0.460	0.014	0.515	0.0040	5.6	
Median	2200	1	3600	507	8.18	21.40	5.0	1.59	0.028	0.007	0.460	0.014	0.515	0.0040	5.6	
Geom/Avg	2200	1	3600	507	8.18	21.40	5.0	1.59	0.028	0.007	0.460	0.014	0.515	0.0040	5.6	
1st Quart	2200	1	3600	507	8.18	21.40	5.0	1.59	0.028	0.007	0.460	0.014	0.515	0.0040	5.6	
Min	2200	1	3600	507	8.18	21.40	5.0	1.59	0.028	0.007	0.460	0.014	0.515	0.0040	5.6	