

**Ministry of Environment and Energy**

**Clean Up Rural Beaches (CURB) Program  
Interim Final Report**

Ecosystem Science Section  
Science and Technology Branch

March, 1996



## EXECUTIVE SUMMARY

This report was prepared by staff responsible for program administration of the Ecosystem Science Section, Science and Technology Branch. Input and advice was received from MOEE regional staff, Conservation Authority (CA) staff who assist in program delivery and local review committee members representing OMAFRA, OSCIA, Health Unit. MNR.

The Program achievements for the first 4 years are summarized in this report.

The rural environment has been steadily degraded over the past century. Due to the nature of rural non-point source pollution, response to environmental remediation is slow and environmental recovery requires many years after pollution sources have been eliminated. The CURB Program addressed water quality problems in 150 subwatersheds in Southern Ontario. Three watersheds have been remediated.

In 1991, the CURB Program was announced as a ten year program. As a result of the Ontario Economic Statement. November 1995, the CURB Program was terminated effective March 31, 1996.

Approximately \$20.0 million has been distributed as grants for 3,512 projects. Watershed-wide baseline monitoring data do not indicate substantial improvements in water quality, however the data indicates that significant local improvements have been achieved through implementation of CURB projects. Based on our experience, about one half of the total number of problems must be remediated before downstream beaches can be re-opened.

Through on-site research and full scale demonstrations of new and innovative technologies CURB provided effective education. extension, technology transfer to the client group.



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### APPENDICES



## **1.0 INTRODUCTION**

**The Clean Up Rural Beaches (CURB) Program was a technical assistance and financial incentive program to encourage improved rural land management practices to reduce the impact from upstream pollution sources on rural swimming beaches.**

This report was prepared by staff of the Ecosystem Science Section of the Science and Technology Branch who are responsible for program administration. Input and advice was received from MOEE regional staff. Conservation Authority (CA) staff who assist in program delivery and local review committee members representing OMAFRA, OSCIA, Health Unit, MNR.

### **1.1 Program History**

In 1983, pollution of public swimming beaches became a significant issue. The Grand Bend beach on Lake Huron was posted as being unsafe for swimming for the first time. In addition, approximately 10% of the 1,300 provincially monitored beaches failed the 100 Faecal Coliform/100mL guideline for body contact recreation. The government of the day expressed concern about the rapid increase in the number of closures, particularly in areas where urban pollution sources were not identified as the origin. and resolved to remedy the situation.

In the Fall of 1985, Cabinet provided a budget to establish a Provincial Beaches Strategy to assess the problem and to provide solutions for rural and urban beaches. The strategy was implemented through the Beaches Improvement Program which dealt with both urban and rural problems. The CURB Program focused on rural issues and was directed and co-ordinated by the Science and Technology Branch. The other component - Urban Beaches Improvement - was managed by the Program Development Branch.

#### Clean Up Rural Beaches (CURB) Development Program 1986 to 1990

The CURB Development Program carried out studies to identify the sources of pollution contributing to the degraded water quality observed at the beaches and to develop plans of action to eliminate or significantly reduce beach closures: This was to be completed within a 10 year time frame. Participating conservation authorities were contracted to undertake studies at the watershed level. By March of 1995, a total of 28 conservation authorities satisfactorily developed and completed watershed specific remedial action plans known as Clean Up Rural Beaches (CURB) Plans.

The CURB Plans identified two general categories of contamination that affect rural beaches. The first category included contamination from continuous sources such as livestock access to streams, inappropriate handling and disposal of milkhouse waste, and failed private on-site sewage systems. The second category included periodic contamination from runoff generated by rainfall and snowmelt from inadequate manure storage facilities, barnyards and feedlots, manure spills and spreading practices.

### Clean Up Rural Beaches (CURB) Program 1991 to March 31, 1996

The Clean Up Rural Beaches (CURB) Program was initiated to implement the recommendations of the CURB plans. The initial objective of the program was to eliminate or substantially to reduce the number of beach closures in eight Ontario watersheds which had plans prepared by the local CA.

CURB has sufficiently resolved the environmental problems to re-open the Binbrook Reservoir (Niagara Peninsula), Kelso (Halton Region), and Testa Heights (Lake Simcoe) beaches.

## **1.2 CURB Program Description**

The Clean Up Rural Beaches (CURB) Program was announced as a \$57 million capital grant assistance program, to run from September 1, 1991 to August 31, 2001, to clean up rural beaches in Ontario. Approximately \$50 million was made available to the farmers with the remaining funds addressed to implementing the Program through education, extension, and local awareness programs, and on-site research and demonstration of new and innovative technologies. Participating CAs operated within a 5-year window of eligibility to deliver the voluntary Program locally to rural landowners

The CURB program was targeted only to watersheds upstream of rural beaches. Funds were allocated to very specific areas of rural Ontario and directed to projects to achieve water quality improvement in local watercourses and to re-open downstream rural beaches.

## **2.0 STATEMENT OF PROGRAM GOALS**

In 1991, the goal of the CURB Program was to eliminate or substantially reduce the number of public beach closures by encouraging improved rural land management practices in order to reduce the impact of upstream pollution sources.

### **3.0 STATEMENT OF PROGRAM OBJECTIVES**

The six major CURB Program objectives to be achieved on a voluntary basis were:

- 1) To provide financial, operational and technical support and assistance to clients in watersheds with an MOEE approved CURB Plan;
- 2) To improve local surface water quality through improved rural land management practices;
- 3) To provide extension, education and technology transfer services;
- 4) To provide capital assistance grants to qualifying rural landowners who identify water pollution problems and propose acceptable solutions;
- 5) To provide guidelines for and technical support to local CURB review committees to receive, review, and recommend approval of project proposals from local participants; and,
- 6) To provide funds to participating conservation authorities for program delivery, promotion, on-farm research, demonstrations, evaluation, and water quality monitoring.

### **4.0 CURB PERSONNEL**

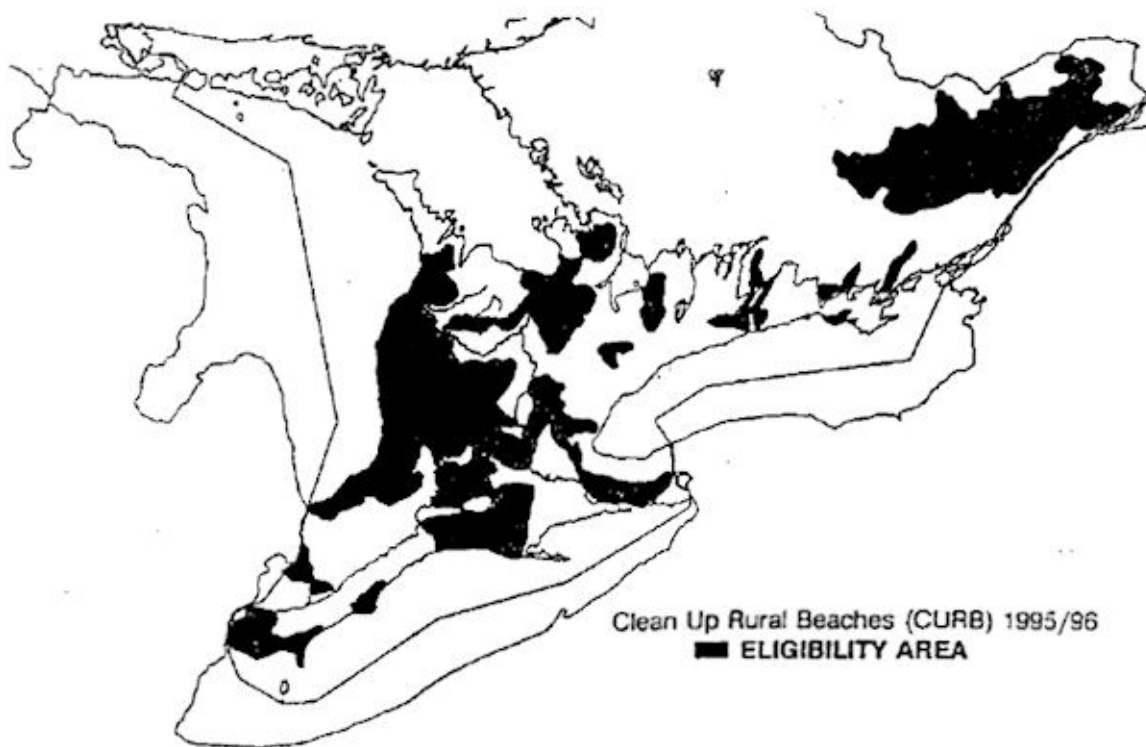
Since the commencement of the Clean Up Rural Beaches (CURB) Development Program in 1985, 78 technical staff have been employed at various times by conservation authorities and the Ministry of the Environment, now the Ministry of Environment and Energy, to deliver the CURB Program. The dedication and determination of these technical staff people as well as the administrative support of the local conservation authorities and the Ministry' is recognized and appreciated. The staff roster is included in Appendix 1.

## 5.0 PROGRAM ACTIVITIES

Details of the operational procedures of the CURB Program may be found in the 1995 CURB Program Guidelines for Eligibility and Funding (Appendix 1). These program guidelines, based on the OMAFRA LS II guidelines, were developed through a combination of experience gained during the 1986 to 1990 CURB development phase and consultation with OMAFRA staff. The guidelines were revised annually based on input from field staff in MOEE regional offices and from CA staff who assist in program delivery.

### 5.1 Area of Coverage

Figure 1 illustrates the area of CURB eligibility in Ontario. Eligibility grew from eight participating CAs in 1991 to 28 in 1995 representing approximately 34,000 sq. km. or 32%, of the land area (106,000 sq. km.) in Southern Ontario.



**Figure 1:** Area of CURB Eligibility FY 1995/96

## 5.2 Financial Activity

Table 1 summarizes the financial activity since the initiation of the CURB program in September 1991.

**TABLE 1:** Program Activity For Each Fiscal Year

	\$ Millions 91/92	S Millions 92/93	\$ Millions 93/94	\$ Millions 94/95	Feb 15 95/96	TOTAL
MOEE Capital	0.9876	3.4173	5.913	6.00	3 767	20.0849
Landowners Cost	2.4676	8.6458	14.959	15.38	9.643	51.0954
Projects Approved	228	871	1,134	1,185	1,112	4,269
Projects Completed	101	665	1.05B	1,011	968	3,512

The 3,512 completed projects account for 8.5% of the number of potential problem sites identified in all of the CURB plans; see Appendix 2. The 3,512 completed projects represent an 82% completion ratio on approved projects showing the effectiveness of CURB to maintain landowner interest in environmental clean up projects. The average total cost to the landowner per project was \$14,549 while the average grant cost was \$5,719.

Uptake and activity within the four main categories of project types is summarized in Table 2. This Table provides some insight into the willingness of landowners to address pollution sources as well as. to commit to solving th problems.

**TABLE 2:** Program Activity By Major Project Category

Project Category	# of Approved Projects	# of Completed Projects	% of Grant Budget	Total Grant (\$ millions)
Private On-Site Sewage Disposal	2,069	1,769	21	4.2178
Livestock Access	714	563	15	3.0127
Milkhouse. Parlour Washwater <sup>1</sup>	335	283	6	1.2052
Manure Storage: Barn Runoff	1,151	897	58	11.5492
Total	4,259	3,512	100	20.0849

Approximately half the number of projects approved and funded by CURB were for failed private on-site sewage disposal systems (POSDS) but a little over half of the available grant budget was expended on manure management facilities.

The difference between the numbers of Approved Projects and Completed Projects in the above table is related to the availability of contractors, the ease of construction and costs. POSDS are relatively inexpensive, quick to complete (a week or less) and there are many licensed installers available. Concrete manure systems are expensive, labour intensive and are installed by a small number of qualified contractors.

CURB provided effective incentives for high cost remediation projects such as manure management systems as well as providing the necessary financial incentives to remediate on-site sewage disposal systems.

### **5.3 Projects**

41,343 potential problem sites were identified by all CURB plans received. This number was determined through a combination of site visits, questionnaire response, air photo interpretation, roadside windshield survey, and mathematical modelling (Appendix 2). Appendix 3 provides a detailed breakout by CA. of the 4,269 approved and 3,512 completed projects (current to February 15, 1996).

### **5.4 Beach Use**

Appendix 4 lists bathing beaches addressed through the CURB Program. There are approximately 1300 beaches monitored by the local Medical Officers of Health. For the 150 CURB Program beaches, the number of closure days ranged from zero to 91 per swimming season (June 1 to September 1). A total of 39, or 26%, of these beaches have been posted as being unsafe for swimming for at least 10% of the season during the last four years. The 91 day value indicates a beach that is permanently posted as unsafe for swimming. Bathing beaches posted for more than three years often are not sampled by the MOH but are maintained on the list as "91".

### **5.5 Water Quality**

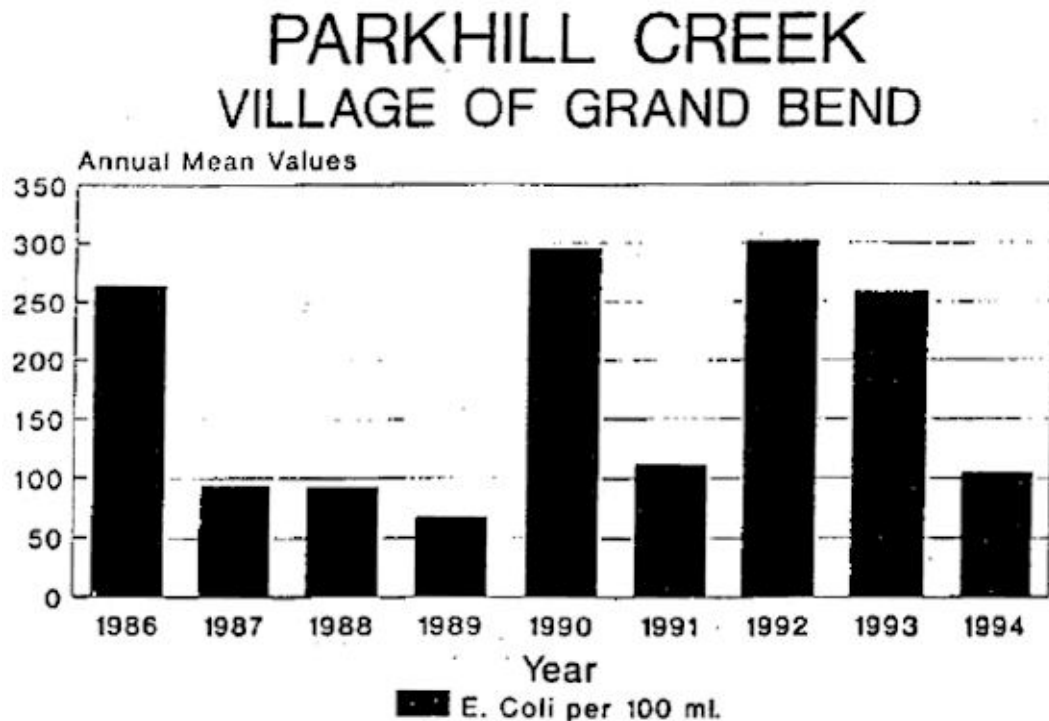
It is difficult to show general watershed water quality improvements. Cattle watering is a form of rural non point source pollution and may impact upon a length of stream over a long distance whereas urban point sources of pollution such as discharge pipe outfalls impact a stream at a specific location. There are approximately 3,100 problem sites in the Ausable-Bayfield CA which have a detrimental impact upon the river (Appendix 2). To date, 646 of these locations have completed remediation projects (21%), however the baseline monitoring station data at Grand Bend do not indicate any conclusive improvement trend

which can be definitively attributed to CURB.

The data trends in Figures 2 and 3, although positive in terms of program effectiveness (declining levels in Bacteria and phosphorus) may be attributable to meteorological conditions. Although pollution sources are being remediated, there is a time lag before the cumulative effects of environmental improvement become measurable.

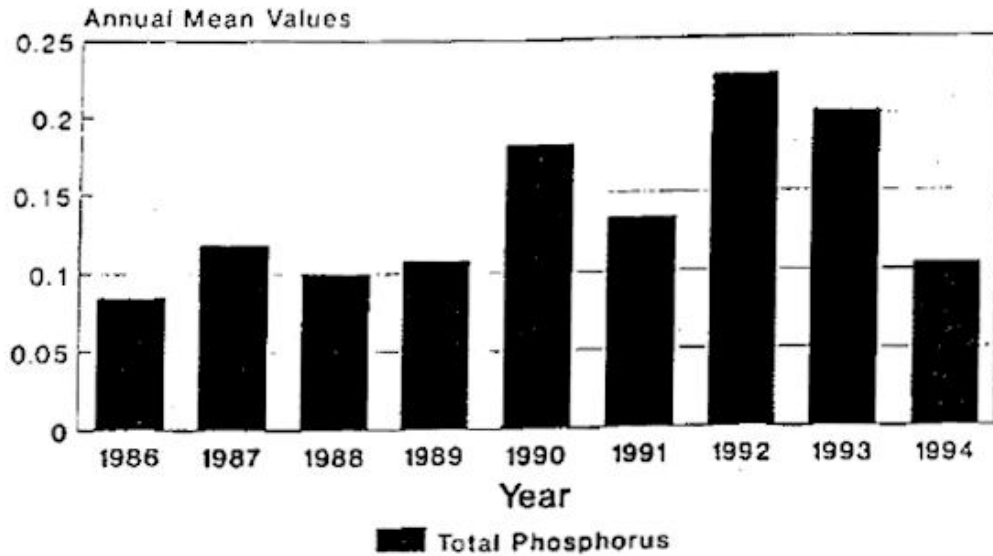
Preliminary analysis of site specific program monitoring data indicates that significant local water quality improvements have been realized. Figures 4 and 5 are typical examples of the changes in local stream water quality associated with implementing remedial projects under CURB. Prior to the CURB project in 1992, a farm located in the Maitland Valley at site B-16 was discharging milkhouse washwater directly to a tile drain which discharged to a receiving stream. The manure pile was also contributing runoff to the receiving stream.

The 1993 and 1994 monitoring results illustrate the improvements in the water quality in terms of bacterial and nutrient quality directly associated with remediation of this site in 1992. The bacterial quality improved and now meets the Provincial Water Quality Objective for swimming at this location.



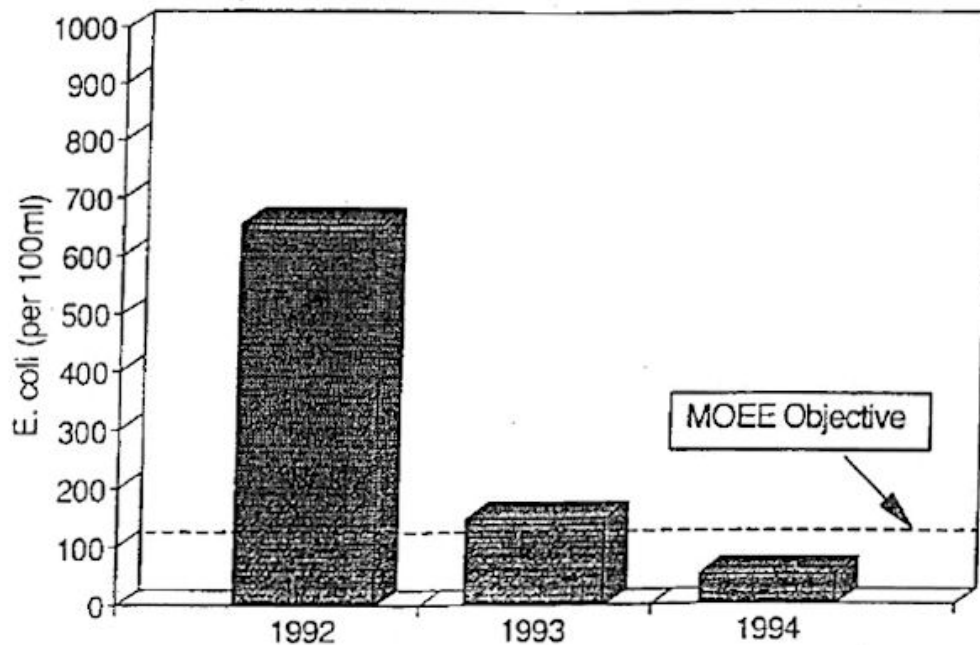
**Figure 2:** E. coli / 100 mL Water Quality Monitoring Results Parkhill Creek in Grand Bend (Hocking 1995)

# PARKHILL CREEK VILLAGE OF GRAND BEND

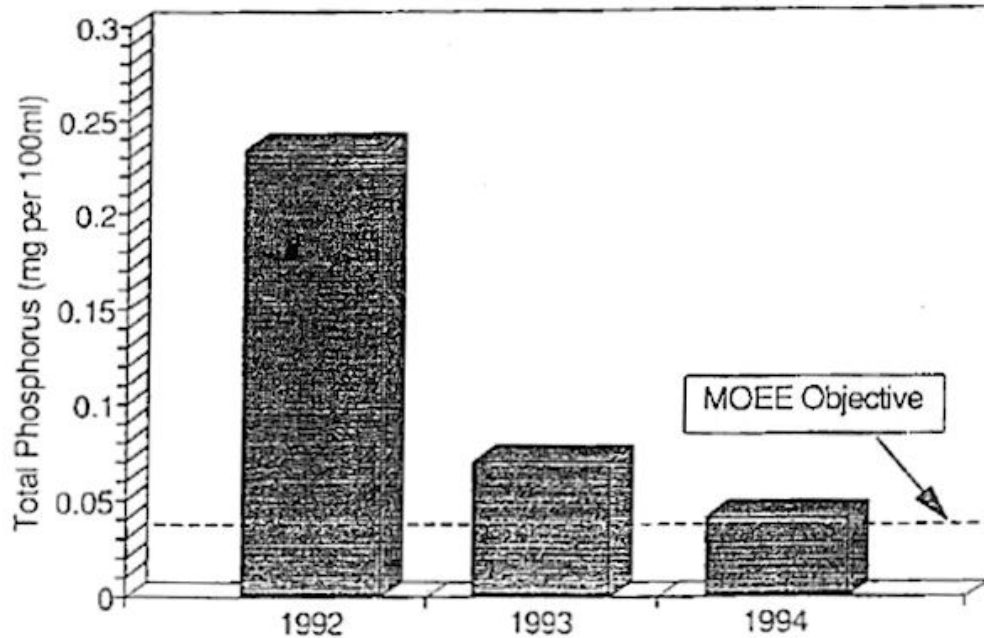


**Figure 3:** Total Phosphorus Water Quality Monitoring Results Parkhill Creek in Grand Bend (Hocking 1995)

## GEOMETRIC MEANS 1992-1994



**Figure 4:** E. coli / 100 mL Water Quality Monitoring Results Site B-16, McKenzie Drain (Loeffler 1995).



**Figure 5:** Total Phosphorus, Water Quality Monitoring Results Site B-16, McKenzie Drain (Loeffler 1995)

Stream benthic surveys along short sections of the Grand River where CURB projects have been implemented were conducted during the summer of 1994. The surveys involved sampling a one metre square section of the stream bottom every ten metres along the stream. Invertebrate animals were collected, identified and enumerated. The data were summarized and analyzed using the Beck's Biotic Index method. The results reveal a more diverse invertebrate community indicative of a more stable and natural environment in comparison to non project sites (De Goes & Hartman, 1994). In addition, the stream banks were also surveyed to identify the types and abundance of vegetation. The results show a clear revitalization of the natural environment in terms of greater species diversity.

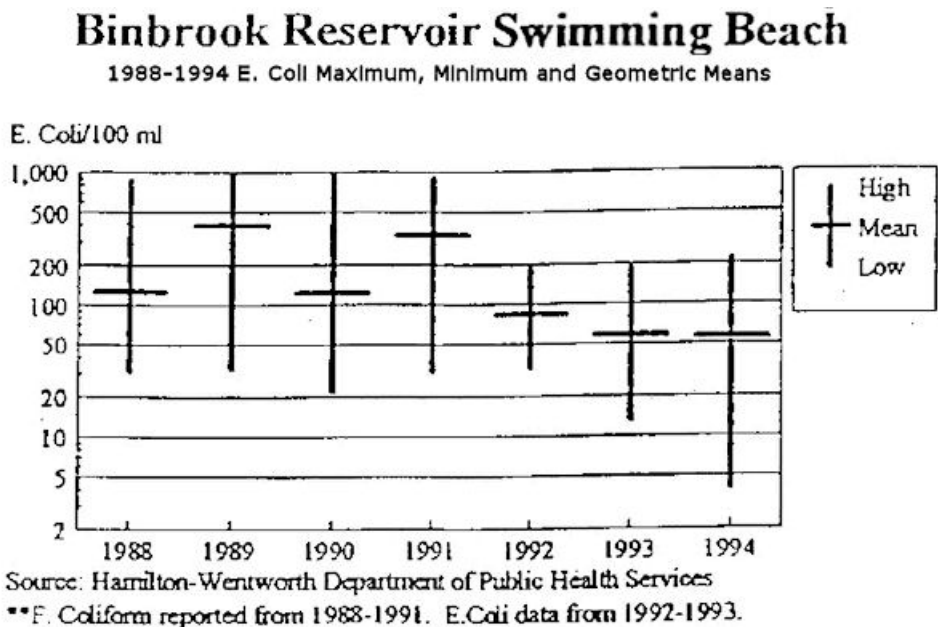
Stream benthic surveys provide valuable quantitative information and are relatively quick and inexpensive to carry-out compared to routine chemical and bacteriological sampling. A Province-wide benthic surveys report in CURB project areas will be completed by March 31, 1996.

Three beaches in small watersheds: Testa Heights: Binbrook Reservoir and, Kelso Reservoir show significant reduction in the number of closure days. The beaches are now open and generate revenue through gate receipts for the local authorities.

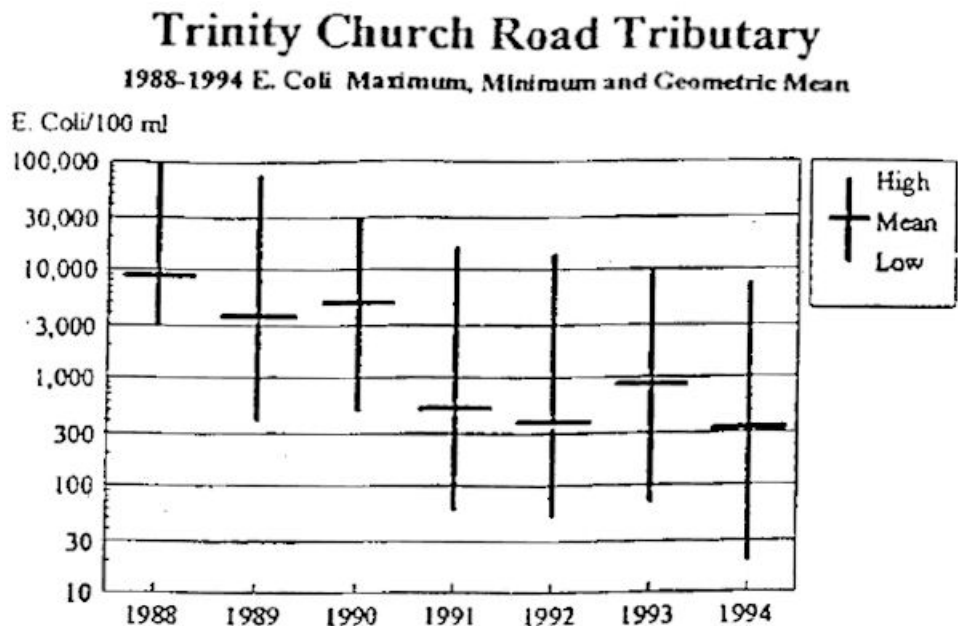
The bacterial quality changes observed at the Binbrook Reservoir in the Niagara Peninsula are illustrated in Figure 6. The Ministry criteria for beach closure is 100 *E. Coli* per 100 mL of water.

Prior to the CURB Program, the conservation authority had considered permanently closing the beach and associated park area due to frequent poor water quality.

By 1994, substantial water quality improvements had been achieved at this beach resulting in the authority receiving \$30,000 as gate receipts from a bathing beach which had been considered for permanent closure.



**Figure 6:** Changes in Beach Water Quality At Binbrook Reservoir (Attema 1994)



**Figure 7:** Changes in Water Quality in the Trinity Church Road Tributary (Attema 1994)

The changes in water quality in a small subwatershed upstream of the Binbrook Reservoir are depicted in Figure 7. Through a co-operative effort between the local Medical Officer of Health and the CA CURB staff, 54 problem sites or 45% of the total. in this subwatershed were remediated, at a cost to CURB of \$77,434 by the end of the summer of 1994.

Figure 7 illustrates the cumulative improvements in environmental quality associated with implementing multiple projects in a small subwatershed as well as the time delay between project completion and environmental quality improvement.

## **5.6 Administration**

The CURB Program was delivered in association with CAs through annual agreements. The details of the administrative procedures are outlined in Appendix 1. As part of its effort to minimize administrative overhead MOEE annually examined the effectiveness of local delivery. Program efficiencies have been achieved through consolidation of delivery in adjacent CAs by a single agent. The Full Time Employee (FTE) complement for fiscal year 1995/96 is 8.0 Person Years (PY) from MOEE (head office and Regions) and 34.3 PY at the CAs.

The following consolidations of delivery resulted in staff savings:

- Otonabee Region CA delivered Indian River, Rice Lake North, Rice Lake South (1.0 PY reduction)
  
- Halton Region CA delivered Halton and Hamilton (1.0 PY reduction)
  
- Prince Edward Region CA delivered Prince Edward, Moira, Napanee, Lower Trent (1.5 PY reduction)
  
- Kettle Creek CA delivered Kettle, Catfish and Lower Thames Valley (1.0 PY reduction)

In 1995-96. these consolidations reduced the FTE of CURB by 4.5 PYs, and associated administrative costs were reduced by \$225,000.

Additional savings were achieved by reducing the approved FTE and cost share for program delivery in areas where project uptake did not warrant a full PY. The FTE at the Raisin Region CA was reduced to 0.25 PY as a result of the low level of uptake in the area. During FY 1995/96 the FTE at both the Niagara Peninsula and Lake Simcoe Region CAs was reduced to 0.5 PY each and the cost share was reduced from 75% MOEE to 50% MOEE. This produced a savings of \$62,500 to MOEE CURB and 1.75 FTE reduction.

## **6.0 PROGRAM DELIVERABLES**

### **6.1 Local Economic Benefits (Jobs and \$ Invested) of Bathing Beaches**

CURB Program projects had a positive impact upon the local economy of rural Ontario as well as the local environment Utilizing a factor of 17 Person Years (PYs) of employment per million dollars of capital investment (Treasury Board estimate), it is projected that the CURB Program provided for 869 PYs of direct employment in rural Ontario by February 15, 1996.

The multiplier effects are larger when secondary and spin-off benefits are considered. such as employment related to manufacture and supply of project materials, and the direct local economic benefits from the beaches remaining open longer.

Ontario bathing beaches are an important recreational attraction for Ontario residents and out-of-Province tourists and are estimated to contribute in the order of \$240.0 million annually (1995) to the provincial economy. Each beach visitor spends in the order of \$26 per visit or about \$116 per year in 1995 dollars (calculated according to Anthony Usher Planning Consultant *et al*, 1987).

From a survey of participating conservation authorities, the estimated total contribution to local economies from the 150 CURB Program beaches is over \$232 million in 1995 (Appendix 4). The Village of Grand Bend estimates that visitors may bring over \$1 million per day to local business (Doug Hocking, pers. comm. 1995). In the report titled "Economic Development Opportunities in the Village of Grand Bend" (1983), annual revenues for beach dependent businesses are projected to be reduced by 1.25 percent for each day the beach is posted as unsafe for swimming. Thus, if the beach were posted for more than 10 days, the businesses could lose the anticipated annual profit margin (assumed to be 12%).

### **6.2 Research**

Local CURB Programs in every participating conservation authority had ongoing research projects ranging from continuing long term research initiated in the preceding CURB development phase, to investigating innovative technologies, methodologies and management practices to reduce or to eliminate non point source pollution to receiving waters.

The research is primarily full scale testing and evaluation of new technologies and management strategies.

The following research list is divided into two phases. CURB Development (1906-1991) and CURB Program (1991-1995) The projects are summarized in Appendix 5.

**CURB Development 1986-1991**

**The CURB Program 1991-1995**

CURB Plan Reports	Large and Small Scale Surface Water Quality Monitoring
Extensive Water Quality Monitoring	Artificial Constructed Wetlands for Treating Runoff and Milkhouse Washwater
Target Sub Basin Study	Vegetative Filter Strips for Treating Runoff
Faulty Rural Private On Site Sewage Disposal System	Alternate Milkhouse Washwater Treatment began
Liquid Manure Spreading on Tiled Fields	Alternate Livestock Access Restriction Systems
<i>In situ</i> Bacterial Survival Studies	Private Sewage Disposal Systems
In-Stream Bacterial Tracer Studies	Manure and Nutrient Management Study
Milkhouse Washwater Studies	<i>Cryptosporidium</i> Study
Modified Tank and Treatment Trench Disposal System	
Impacts of Livestock Access to Watercourses	

**6.3 Media Coverage**

During the CURB Development phase from 1986 to 1991, media coverage was limited to reporting on research conducted by staff into identified surface water quality problems. Local newspaper articles were the primary form of media coverage.

In 1991, with the introduction of the CURB Program, media coverage increased substantially. Television news reports became commonplace, beginning with the filming of MPP Irene Mathysen on the beach near Grand Bend announcing the CURB Program. This was followed by several CBC Radio interviews with MOEE and local conservation authority staff.

By 1992 the first CURB Projects began to be completed. Almost immediately, the first press clippings with photographs of completed projects were issued. The articles were very positive and often had photos of the landowner receiving a CURB grant cheque from the local CURB Program facilitator. All staff were aware that this was a good form of media attention and took advantage of this whenever possible.

Demonstration and experimental projects received the greatest share of media attention since 1993. At that time, innovative ideas were being implemented. The local CAs were very quick to send out media releases about these projects in order to obtain maximum exposure for CURB.

A 1995 media report containing media releases, press clippings, CURB Program tours, and CURB beach signs, has been completed (Appendix 7).

## 6.4 Partnerships

MOEE had partnerships with the CAs to deliver the CURB Program locally. The CAs were very supportive of the program and appreciated the profile that CURB Program delivery brought to them.

At the 1995 Annual General Meeting, the Association of Conservation Authorities of Ontario (ACAO) passed a resolution supporting the development of a new joint program to be funded in partnership between the MOEE and ACAO.

Membership on the local CURB Review Committee was drawn from: MOEE Region: Medical Officer of Health; OMAFRA County; OSCIA County representative; and local CA which resulted in strong partnerships being developed between the MOEE head office CURB staff and the local CURB Program review committee members.

The CURB Program concepts and administrative structure have been copied by several RAP areas and CAs. For example the Bay of Quinte, Niagara, and Severn Sound RAPs have implemented "look alike" programs similar to CURB. The South Nation, Metropolitan Toronto and Region, Mississippi Valley, Grey Sauble and Lake Simcoe CAs have implemented "CURB like" programs in support of residents outside of the targeted CURB areas within their jurisdictional boundaries. These similar programs provide financial assistance at similar rates as CURB for most projects generally based on CURB Program Guidelines.

"Look alike" programs have been created to provide funding support for problem sites which do not meet the current CURB Program criteria of beach impact. Limited funding was available from other financial sources but the small amount restricts the level of remediation activity. The RAP parallel programs are more active since funding is available from the Federal Great Lakes Clean Up Fund.

The CURB program developed linkages with many Provincial and Federal programs. To assist the RAP program, CURB provided technical assistance and, where beaches existed, CURB eligibility was extended to the RAP area. The Federal Capital Cost Reduction Program, a joint Environment Canada-Revenue Canada program allowed accelerated capital tax depreciation on approved environmental improvement projects. This Federal Program accepted CURB funded projects without requiring further information or audit.

CURB was involved with a federally funded Green Plan project to evaluate the effectiveness of artificial constructed wetlands for treating barnyard runoff. CURB had provided partial funding and technical input to seven of the ten wetland sites being evaluated, and provided funding for all site monitoring and lab analyses at all ten sites.

CURB began a working partnership with OMAFRA staff to develop computer programs for optimizing the use of manure on farms. OMAFRA provided the technical (soils, crops) and programming expertise while CURB staff provided in field manure testing and on farm testing of the computer program.

The OMAFRA courses on Agricultural Pollution Control, Custom Manure Application, and Concrete Manure Storage Design (mandatory training for CURB staff) were revised based on the practical in-field experience which CURB staff gained through site visits and post construction audit inspections.

CURB staff evaluated the performance of several OMAFRA designed grass filter strips for treating barnyard runoff. CURB had actively participated with OMAFRA and the Ontario Milk Marketing Board to revise and to promote the design standards for milkhouse waste treatment trench systems. There were approximately fifteen systems which have been in use for at least five years and were intensively monitored by the local CURB staff.

CURB assisted the evaluation of the performance of an experimental phosphorus precipitation system to separate the solid and liquid portions of the milkhouse waste. An experimental raised bed treatment trench system was also evaluated.

CURB supported the Ontario Farm Environmental Coalition (OFEC) led Environmental Farm Plan (EFP) process. While not requiring an EFP as a prerequisite for CURB funding. CURB required that a farm manure management plan meet a good or better rating in the EFP workbook. Some of the local CURB staff were actively involved with the EFP training and plan development process when the local EFP Committees allowed participation.

The Ontario Federation of Agriculture (OFA) and Ontario Soil and Crop Improvement Associations (OSCIA) expressed public support for CURB and stated a desire to see an expanded program in the future.

Alternative private sewage treatment systems were investigated in partnership with the Ministry of Health, MOEE Approvals Branch and District MOEE offices. These systems include peat beds, wood fibre beds. Waterloo biofilter systems and wetland systems. They were all designed to augment the sedimentation achieved in the septic tank and to further purify the waste water prior to the tile bed.

## **6.5 Client Support**

MOEE was successful in efficiently providing financial, operational and technical support and assistance to clients in targeted watersheds through:

- toll free hotline, 1 800 563 2872, to the CURB Program headquarters in Toronto;
- providing continuous professional development to maintain well trained CA CURB staff;
- efficient administration system for approving projects;
- rapid grant processing system (average time of three weeks between a site inspection and the grant cheque arrival);
- achieving budgeted financial targets without annual overages.

MOEE was able to provide necessary financial and technical support through efficient and effective management of the Program even though there was an increase from eight participating conservation authorities in 1991 to 28 in 1995.

## **7.0 CURB ACHIEVEMENTS**

- 1) Appendix 5 indicates that the CURB beaches generated approximately \$240 million per year in revenue for the local economies.
- 2) The CURB Program addressed water quality problems in 150 priority subwatersheds in Southern Ontario. Three subwatersheds (2% of total) have recovered and can be removed from the CURB Program priority list. An additional 12 subwatersheds (8%) have achieved at least 30% completion of identified projects.
- 3) The rural environment has been steadily degraded over the past century. Due to the nature of rural non-point source pollution, response to remediation is slow and environmental quality improvement takes many years once the pollution sources have been eliminated. The 3,512 completed projects account for 8.5% of the total number of potential sites identified.

Figures 4 to 7 do indicate that significant local improvements were achieved through implementation of CURB projects and that given sufficient time and numbers of projects whole subwatersheds and beaches can be cleaned up.

Although approximately \$20.0 million was given out in grants for 3,512 projects, the baseline monitoring data do not indicate substantial watershed improvement in water quality (Figures 2, 3).

- 4) CURB provided effective education, extension, transfer of technology to its client group through the on site research and full scale demonstrations of new and innovative technologies.
- 5) The CURB Program was announced as a ten year program for application to approved Gas for 5 years. Based on experience, 45-50% of problem areas have to be remediated (Figure 7) to permit the re-opening of beaches. The data in Appendix 4 indicates that 101 beaches were closed for five or fewer days, while an additional 29 were closed for less than 50 days out of the 364 days considered to be available for swimming during four swimming seasons (1991-1994).
- 6) MOEE STB staff maintained close scrutiny of program administration costs and consolidated local delivery to maximize program efficiency.

## **8.0 THE FUTURE**

As a result of the Ontario Economic Statement in the fall of 1995 a decision was made to discontinue transfer payment programs as part of the ongoing business of the Government. The Ministry of Environment and Energy announced on November 30, 1995 that the Clean Up Rural Beaches Program would be terminated on March 31, 1996.

Although the CURB Program funding component has ended, the leadership and education components will continue to be provided to the residents of Ontario.

The research begun under CURB will continue in an effort to advance the knowledge and understanding of rural pollution issues. The continuance of this research will also enhance the ability of the MOEE to deliver technical guidance and field support to Ministry staff and colleagues from other agencies and Ministries.

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## **Appendix 1**

### **CURB Program Staff Chronology**

The following is the list of program staff who involved with the Rural Beaches and CURB Programs between 1985 and 1996.

## THE CLEAN UP RURAL BEACHES (CURB) PROGRAM STAFF CHRONOLOGY

<b>NAME</b>	<b>DATE</b>	<b>AFFILIATION</b>
Paul Albanese	1990 - 1991	Halton Region
Tracy Annett	1995 - 1995	Grand River
John Antoszek	1986 - 1989	Lake Simcoe Region
Chris Attema	1991 - 1996	Niagara Peninsula
Dave Balint	1985 - 1985	Ausable-Bayfield
	1988 - 1988	Grand River
	1990 - 1991	Long Point Region
Ron Beirnes	1989 - 1992	Grey-Sauble
Sameer Bishay	1990 - 1992	Lake Simcoe Region
John Bittorf	1992 - 1996	Grey-Sauble
Ted Briggs	1986 - 1996	Upper Thames
Alex Broadbent	1993 - 1994	Mississippi Valley
Randy Brunatti	1991 - 1994	Moira/Trent/Napanee
Julie Cayley	1992 - 1996	Severn Sound
Joan Chamberlain	1986 - 1988	Otonabee Region
Robin Charette	1994 - 1996	South Nation River
Kirby Childerhose	1991 - 1996	Prince Edward/Moira/Trent/Napanee
Rose-Marie Chretien	1990 - 1991	Raisin Region
Kevin Cincurak	1992 - 1994	Lower Thames Valley
	1994 - 1996	Essex Region
Beth McGrath (Cockburn)	1986 - 1996	Otonabee Region
Brian Colville	1994 - 1996	Lake Simcoe Region
Terry Davidson	1990 - 1996	Rideau Valley
Donna Dean	1988 - 1989	Ausable-Bayfield
Don Depuydt	1993 - 1996	Kettle and Catfish Creeks
	1994 - 1996	Lower Thames Valley
Dennis Draper	1985 - 1987	MOEE
Jim Eddie	1985 - 1996	MOEE
Rick Etherington	1991 - 1996	Ausable-Bayfield
Peggy Evans	1986 - 1989	Maitland Valley
Arnie Fausto	1991 - 1995	Long Point Region
	1994 - 1995	Grand River
Mary Ellen Foran	1986 - 1989	Maitland Valley
Bob Fuller	1986 - 1989	Maitland Valley
David Gale	1991 - 1996	Halton Region
	1994 - 1996	Hamilton Region
Trish Gillman	1992 - 1993	Kawartha Region
	1993 - 1995	Ganaraska Region
Lori Armstrong (Gordon)	1993 - 1994	Grand River
	1995 - 1996	Long Point Region
Sue Johnson (Grigg)	1991 - 1996	Upper Thames

## THE CLEAN UP RURAL BEACHES (CURB) PROGRAM STAFF CHRONOLOGY

NAME	DATE	AFFILIATION
Laurel Grills	1992 - 1996	Mississippi Valley
Chris Hallahan	1990 - 1990	Maitland Valley
Dave Hayman	1986 - 1989	Upper Thames
Doua Hocking	1986 - 1996	Ausable-Bayfield
Anne Hoffarth	1994 - 1995	Saugeen Valley
Rick Hubbard	1986 - 1988	Metro Toronto
Chris Jones	1993 - 1996	Nottawasaga Valley
Karen Jones	1993 - 1995	MOEE
Steve Karl	1991 - 1993	Raisin Region
Kevin Laidley	1986 - 1991	Niagara Peninsula
Anne Loeffler	1990 - 1991	Essex Region
	1991 - 1996	Maitland Valley
Heather MacDonald	1986 - 1986	Grey-Sauble
Peter Mar	1985 - 1991	Metro Toronto
	1991 - 1996	MOEE
Nancy Marshall	1984 - 1995	MOEE
Scott McCairns	1994 - 1995	Long Point Region
Carrie McIntyre	1992 - 1995	Severn Sound
Lori McMaster	1993 - 1996	Kettle and Catfish Creeks,
	1994 - 1996	Lower Thames Valley
Lloyd Mousseau	1986 - 1989	Ausable-Bayfield
Neils Munk	1986 - 1988	Grey-Sauble
	1988 - 1990	Saugeen Valley
Sabina Murray	1988 - 1989	Grey-Sauble
Richard Pilon	1990 - 1996	Raisin Region
Cathy Quinlan	1991 - 1996	St. Clair Region
Don Robertson	1993 - 1996	Otonabee Region
Brent Robinson	1991 - 1994	Maitland Valley
Tracey Ryan	1985 - 1987	Ausable-Bayfield
	1987 - 1988	Metro Toronto
	1988 - 1996	Grand River
Guy Santoro	1995 - 1996	Prince Edward/Moira/Trent/Napanee
Jackie Schottroff	1989 - 1990	Ausable-Bayfield
Christine Murray (Shantz)	1991 - 1996	Grand River
Janette Smiderle	1990 - 1996	Saugeen Valley
Marta Soucek	1992 - 1996	Credit Valley
Margaret Steel	1992 - 1993	Kettle and Catfish Creeks
Ron Strome	1994 - 1995	Maitland Valley
Heather Taylor	1991 - 1992	Ausable-Bayfield
Lee Timmins	1995 - 1996	Mississippi Valley
Peter Van Adrichem	1995 - 1996	Rideau Valley
Leslie Vanclief	1992 - 1996	South Nation River

## THE CLEAN UP RURAL BEACHES (CURB) PROGRAM STAFF CHRONOLOGY

<b>NAME</b>	<b>DATE</b>	<b>AFFILIATION</b>
Tanya Van Hoeckel	1993 - 1993	Otonabee Region
	1994 - 1994	Mississippi Valley
	1995 - 1995	South Nation River
Mike Walters	1986 - 1989	Lake Simcoe Region
Ann Marie Weselan	1989 - 1991	St. Clair Region
	1991 - 1996	Metro Toronto
Byron Wesson	1992 - 1996	Nottawasaga Valley
Andrew Westwood	1991 - 1994	Lake Simcoe Region
Randy Whalen	1989 - 1989	Grey-Sauble
Karen Wheeler	1994 - 1995	Prince Edward/Moira/Trent/Napanee
Keith Willson	1985 - 1996	MOEE
Mary-Anne Koekkoek (Wilson)	1986 - 1988	Grand River

## Appendix 2

### Total potential problem sites within each CURB area

The number of potential problem sites identified in each of the CURE plans by category. These numbers were determined through a combination of site visits, questionnaire response, air photo interpretation, roadside windshield survey, and mathematical modelling. It is evident from this table that the rural watersheds of Ontario have a very high number of problem sites.

**Table Appendix 2: CURB Plan Findings - Number of Problem Sites**

CURB AREA	SEPTIC-SYSTEMS	LIVESTOCK ACCESS	MILKHOUSE /PARLOUR	MANURE STORAGE	TOTAL
Metro Toronto	1,222	26	3	29	1,280
Otonabee Region	394	70	15	25	504
Lake Simcoe	24	73	10	115	222
Niagara Peninsula	100	5	5	10	120
Grand River	57	168	218	446	889
Upper Thames	815	154	313	215	1,496
Maitland	2,772	423	501	527	4,223
Ausable-Bayfield	2,204	46	114	380	3,144
Grey-Sauble	1000	500	50	1000	376
Raisin Region	150	19	5	30	204
Rideau Valley	100	383	109	438	1,030
Halton Region	10	3	0	2	15
Long Point	593	40	10	35	678
Saugeen alley	4,350	800	250	520	5,920
St. Clair	675	48	52	250	1,025
Essex Region	2,640	55	22	22	2,739
Severn Sound RAP	145	132	42	114	433
Moira/Trent/Napanee	86	53	4	71	214
Prince Edward Region	1,043	40	46	196	1,325
South Nation	5,564	767	490	1,924	8,745
Mississippi	356	130	3	322	851
Ganaraska	****	****	****	****	****
Credit Valley	75	16	1	12	104
Kettle/Catfish	1,143	67	57	101	1,368
Lower Thames	584	13	4	40	641
Rice Lake South	419	87	7	93	606
Hamilton Region	4	9	2	5	20
Rice Lake Noth	357	168	23	102	650
Nottawasaga	1,800	259	107	307	2,473
TOTAL	27,815	4,514	2,486	6,529	41,343

\*\*\*\* The CURB Plan for his area has not received MOEE approval as of August 1995 and is therefore not yet eligible for program participation

## Appendix 3

### Total number of approved and completed projects within each CURB area

The number of approved/completed projects within each CURB area by category current to February 15, 1996 and can be used to compare against the potential number identified in Appendix 2.

**TABLE Appendix 3:** Project Approvals and Completions

Legend: Approved/Completed

CURB AREA	SEPTIC SYSTEMS	LIVESTOCK ACCESS	MILKHOUSE /PARLOUR	MANURE STORAGE	TOTAL
Metro Toronto	7/4	5/3	0/0	1/0	13/7
Indian River	12/11	2/2	2/2	2/2	18/17
Lake Simcoe	7/7	24/19	9/7	15/11	55/44
Niagara Peninsula	60/48	3/2	1/0	6/5	70/55
Grand River	66/61	49/45	36/33	98/80	249/219
Upper Thames	180/172	25/22	39/38	111/102	355/334
Maitland	335/300	161/138	102/92	348/281	946/811
Ausable-Bayfield	495/417	49/32	40/28	227/169	811/646
Grey-Sauble	92/75	80/68	1/1	63/41	236/185
Raisin Region	5/4	12/11	3/3	3/3	23/21
Rideau Valley	98/87	60/43	17/14	24/19	199/163
Halton Region	1/1	1/1	0/0	0/0	2/2
Long Point	14/12	8/6	8/8	16/13	46/39
Saugeen Valley	203/191	87/70	19/16	89/68	398/345
St. Clair	21/15	16/10	7/6	23/17	67/48
Essex Region	135/98	2/2	3/2	6/3	146/105
Severn Sound RAP	41/33	2/2	4/4	18/14	65/53
Moira/Trent/Napanee	24/21	33/26	6/4	19/16	82/67
Prince Edward Region	48/41	16/14	9/6	12/9	85/70
South Nation	43/39	18/13	7/5	17/13	85/70
Mississippi	15/12	8/7	6/4	7/5	36/28
Ganaraska	****	****	****	****	****
Credit Valley	11/5	9/5	0/0	1/0	21/10
Kettle/Catfish	54/34	5/5	11/8	16/10	86/57

CURB AREA	SEPTIC SYSTEMS	LIVESTOCK ACCESS	MILKHOUSE /PARLOUR	MANURE STORAGE	TOTAL
Lower Thames	30/22	1/0	0/0	11/9	42/31
Rice Lake South	45/36	6/3	0/0	0/0	51/39
Hamilton Region	0/0	5/4	1/1	5/4	11/9
Rice Lake North	23/21	4/2	1/0	2/1	30/24
Nottawasaga	4/2	23/8	3/1	11/2	41/13
TOTAL	2,069/1,769	714/563	335/283	1,151/897	4,269/3,512

\*\*\*\* The CURB Plan for this area has not received MOEE approval as of February 1996 and is therefore not yet eligible for program participation.

The 1993 census data (OMAFRA 1993) indicate that there are approximately 68,000 farms in the Province of Ontario. If 25% of these are contributing to a water quality problem, then the current 4,269 approved projects is a long way short of the 17,000 potential sites. This 25% estimate could be low as farms historically tend to be conveniently close to watercourses. Although the CURB plans have identified approximately 13,500 priority sites (sum of columns 3,4,5 in Appendix 2) many of these sites experience multiple problems so that the true number of locations is significantly lower.

In addition, Approvals Branch estimates the number of known septic systems to be in the 700,000 range. Not all these systems fall into a true rural category as many small communities are serviced through septic systems. The Municipal Assistance Program (MAP) has funding available to resolve community based septic system problems. Comparing this against the 27,800 sites identified in Appendix 2 and the fact that CURB eligibility represents only 32% of Southern Ontario, it is not hard to realize from these statistics that a huge pollution potential exists and that the CURB program has a long way to go to solve the problems in rural Ontario.

## Appendix 4

### Posting Days for CURB Program Beaches

Below is a list of beaches currently being addressed through the CURB program. There are approximately 1300 beaches monitored by health agencies in the Province. The number of closure days for the 150 beaches included below was taken directly from the database maintained by staff at Program Development Branch. A value of 0 indicates that either there were no posting days reported or that the beach was not monitored. The four entry numbers are for 1991, 1992, 1993 and 1994 respectively. It is important to note that the swimming season in Ontario is usually June 1 to September 1 which represents a 91 day period of use.

**BEACHES UNDER REMEDIATION THROUGH CURB**

<b>BEACH NAME</b>	<b>CONSERVATION AUTHORITY</b>	<b>MOEE REGION</b>	<b>YEAR ELIGIBLE FOR CURB</b>	<b>STATUS OR NUMBER OF POSTED DAYS</b>
GRAND BEND	AUSABLE-BAYFIELD	SW	1991	0,7,8,5
GUELPH RESERVOIR	GRAND RIVER	WC	1991	42,15,0,0
CONESTOGO RESERVOIR	GRAND RIVER	WC	1991	21,31, 27, 1
NITH RIVER	GRAND RIVER	WC	1991	+ + + + + + + +
ELGIN POND	LAKE SIMCOE REGION	MO	1991	70,49,28,43
TESTA HEIGHTS	LAKE SIMCOE REGION	MO	1991	OPENED
PEFFERLAW	LAKE SIMCOE REGION	MO	1991	0, 0, 0, 0
ESTONIA CAMP	LAKE SIMCOE REGION	MO	1991	+ + + + + + + +
PORT BOLSTER	LAKE SIMCOE REGION	MO	1991	0, 0, 0, 0
WAGNER	LAKE SIMCOE REGION	MO	1991	+ + + + + + + +
BEAVERTON NORTH	LAKE SIMCOE REGION	MO	1991	0,0,28,14
BEAVERTON SOUTH	LAKE SIMCOE REGION	MO	1991	0,21,45,26
GODERICH	MAITLAND VALLEY	SW	1991	91,91,91 91
PORT ALBERT	MAITLAND VALLEY	SW	1991	91,91,91,91
ALBION HILLS	METRO TORONTO	CE	1991	0,0,0,0
BOYD	METRO TORONTO	CE	1991	+ + + + + + + +
BRUCE'S MILLS	METRO TORONTO	CE	1991	0,0,0,0
BINSBROOK	NIAGARA PENINSULA	WC	1991	OPENED
WARSAW CAVES	OTONABEE REGION	E	1991	27,15,1,0

<b>BEACH NAME</b>	<b>CONSERVATION AUTHORITY</b>	<b>MOEE REGION</b>	<b>YEAR ELIGIBLE FOR CURB</b>	<b>STATUS OR NUMBER OF POSTED DAYS</b>
DOURO	OTONABEE REGION	E	1991	18,11,2,1
HOPE MILL	OTONABEE REGION	E	1991	0,0,0,0
LANG MILL	OTONABEE REGION	E	1991	41,21,5,1
PITTOCK	UPPER THAMES RIVER	SW	1991	35,22,15,91
FANSHAWE	UPPER THAMES RIVER	SW	1991	0,0,0,0
WILDWOOD	UPPER THAMES RIVER	SW	1991	33,0,0,0
BELLE RIVER	ESSEX REGION	SW	1992	0,39,55,14
SAND POINT	ESSEX REGION	SW	1992	+ + + + + + + +
HOLIDAY	ESSEX REGION	SW	1992	0,0, 0, 7
SAUBLE	GREY-SAUBLE	SW	1992	0,0 0,0
KELSO	HALTON REGION	C	1992	OPENED
BACKUS HERITAGE	LONG POINT REGION	SW	1992	0,5,0,0
HAY CREEK	LONG POINT REGION	SW	1992	0,0,4,0
CRYSLER PARK	RAISIN REGION	E	1992	0,0,0,0
NAIRNE ISLAND	RAISIN REGION	E	1992	+ + + + + + + +
FARRAN PARK	RAISIN REGION	E	1992	0,0,0,0
WOODLANDS PARK	RAISIN REGION	E	1992	0,0,2,0
MILLE ROCHE	RAISIN REGION	E	1992	+ + + + + + + +
LAKEVIEW HEIGHTS	RAISIN REGION	E	1992	+ + + + + + + +
CHARLOTTESBURGH	RAISIN REGION	E	1992	0,0,0,0

<b>BEACH NAME</b>	<b>CONSERVATION AUTHORITY</b>	<b>MOEE REGION</b>	<b>YEAR ELIGIBLE FOR CURB</b>	<b>STATUS OR NUMBER OF POSTED DAYS</b>
LANCASTER	RAISIN REGION	E	1992	0,0,2,0
GLENGARRY	RAISIN REGION	E	1992	0,0,2,0
ALEXANDRIA	RIDEAU VALLEY	E	1992	0,0,1,0
HYDRO PARK	RIDEAU VALLEY	E	1992	+ + + + + + + +
MERRICKVILLE	RIDEAU VALLEY	E	1992	0,0,0,0
RIDEAU PROV. PARK #1	RIDEAU VALLEY	E	1992	0,0,0,0
RIDEAU PROV. PARK #2	RIDEAU VALLEY	E	1992	0,0,0,0
RIDEAU PROV. PARK #3	RIDEAU VALLEY	E	1992	0,0,0,0
RIDEAU PROV. PARK #4	RIDEAU VALLEY	E	1992	0,0,0,0
BAXTER	RIDEAU VALLEY	E	1992	0,0,0,0
W. A. TAYLOR	RIDEAU VALLEY	E	1992	0,0,0,0
DURHAM	SAUGEEN VALLEY	SW	1992	0,0,0,0
PENETANGORE	SAUGEEN VALLEY	SW	1992	+ + + + + + + +
SOUTHAMPTON	SAUGEEN VALLEY	SW	1993	0,0,0,0
KINCARDINE	SAUGEEN VALLEY	SW	1993	+ + + + + + + +
BRIGHTS GROVE	ST. CLAIR REGION	SW	1992	0,0,0,0
WARWICK	ST. CLAIR REGION	SW	1992	45 91,91,0
RIVERA	KAWARTHA REGION	E	*1	URBAN
WELLINGTON STREET	KAWARTHA REGION	E	*1	URBAN
WATER STREET	KAWARTHA REGION	E	*1	URBAN

<b>BEACH NAME</b>	<b>CONSERVATION AUTHORITY</b>	<b>MOEE REGION</b>	<b>YEAR ELIGIBLE FOR CURB</b>	<b>STATUS OR NUMBER OF POSTED DAYS</b>
NAYORO PARK	KAWARTHA REGION	E	*1	URBAN
RAILROAD BRIDGE	KAWARTHA REGION	E	*1	URBAN
WABI BAY	NORTH BAY-MATTAWA	NO	*1	URBAN
MENTAL HEALTH CENTRE	SEVERN SOUND RAP	MO	1992	+ + + + + + + +
HURONIA PARK	SEVERN SOUND RAP	MO	1992	0,0,00
BAYFIELD PARK	SEVERN SOUND RAP	MO	1992	+ + + + + + + +
GAWLEY PARK	SEVERN SOUND RAP	MO	1992	0,0,0,0
PETTERSON PARK	SEVERN SOUND RAP	MO	1992	+ + + + + + + +
GRANDVIEW BEACH	SEVERN SOUND RAP	MO .	1992'	+ + + + + + + +
PATTERSON PARK	SEVERN SOUND RAP	MO.	1992	+ + + + + + + +
TIFFIN	SEVERN SOUND RAP	MO	1992	+ + + + + + + +
GFC TRAILER PARK	SEVERN SOUND RAP	MO	1992	+ + + + + + + +
MCKENZIE PARK	SEVERN SOUND RAP	MO	1992	0,0,0,0
ROBINS POINT	SEVERN SOUND RAP	MO	1992	+ + + + + + + +
CAMP NEEKAUNIS	SEVERN SOUND RAP	MO	1992	+ + + + + + + +
WAUBAUSHENE	SEVERN SOUND RAP	MO	1992	0,0,0,0
COLDWATER TOWN DOCK	SEVERN SOUND RAP	MO	1992	+ + + + + + + +
BASS LAKE PROV. PARK	SEVERN SOUND RAP	MO	1992	0,0,0,0
2ND CONC. BEACH 3	SEVERN SOUND RAP	MO	1992	+ + + + + + + +
FLOS-MEDONTE PARK	SEVERN SOUND RAP	MO	1992	+ + + + + + + +

<b>BEACH NAME</b>	<b>CONSERVATION AUTHORITY</b>	<b>MOEE REGION</b>	<b>YEAR ELIGIBLE FOR CURB</b>	<b>STATUS OR NUMBER OF POSTED DAYS</b>
FRANKFORD PARK	MOIRA, TRENT, NAPANEE	E	1993	21,0,4,60
RIVERSIDE PARK EAST	MOIRA, TRENT, NAPANEE	E	1993	0,74, 91,91
RIVERSIDE PARK WEST	MOIRA, TRENT, NAPANEE	E	1993	0,74, 91,91
NEWBURGH	MOIRA TRENT, NAPANEE	E	1993	0,34,16,0
KINGSFORD	MOIRA, TRENT, NAPANEE	E	1993	0,0,0,0
FOREST MILLS	MOIRA, TRENT, NAPANEE	E	1993	+ + + + + + + +
SAND BANKS	PRINCE EDWARD REGION	E	1993	4,0,3,0
PRESQUILLE	PRINCE EDWARD REGION	E	1993	0,0,2,0
LAKE WHITTAKER	KETTLE-CATFISH	SW	1994	0,0,0,0
PORT STANLEY	KETTLE-CATFISH	SW	1994	0,26,4,0
LITTLE	KETTLE-CATFISH	SW	1994	0,0,0,0
MAIN	KETTLE-CATFISH	SW	1994	+ + + + + + + +
SPRINGWATER	KETTLE-CATFISH	SW	1994	0,0,0,0
DALEWOOD RESERVOIR	KETTLE-CATFISH	SW	1994	+ + + + + + + +
PORT BRUCE	KETTLE-CATFISH	SW	1994	0,5,0 ,0
BELFOUNTAIN	CREDIT VALLEY	C	1994	+ + + + + + + +
HARWOOD	RICE LAKE SOUTH	E	1994	0,28,18,0
VICTORIA	RICE LAKE SOUTH	E	1994	8,1,13,0
Y DAY CAMP	RICE LAKE SOUTH	E	1994	0,0,0,0
BEWDLEY	RICE LAKE SOUTH	E	1994	0,0,0,0

<b>BEACH NAME</b>	<b>CONSERVATION AUTHORITY</b>	<b>MOEE REGION</b>	<b>YEAR ELIGIBLE FOR CURB</b>	<b>STATUS OR NUMBER OF POSTED DAYS</b>
GORES LANDING	ICE LAKE SOUTH	E	1994	0,0,5,0
HAMILTON TWP.	RICE LAKE SOUTH	E	1994	+ + + + + + +
GARDEN HILL	GANARASKA REGION	E	*2	0,0,9,18,0
COBOURG	GANARASKA REGION	E	*2	+ + + + + + + +
PORT HOPE EAST	GANARASKA REGION	E	*2	0,0,6,0
PORT HOPE WEST	GANARASKA REGION	E	*2	0,0,13,0
INNISVILLE NORTH	MISSISSIPPI VALLEY	E'	1994	35,33,8,34
INNISVILLE SOUTH	MISSISSIPPI VALLEY	E	1994	49 22,22,63
MCCREARYS	MISSISSIPPI VALLEY	E	1994	0,0,0,0
MCCULLOUGHES	MISSISSIPPI VALLEY	E	1994	0,0,0,0
LAKE PARK	MISSISSIPPI VALLEY	E	1994	+ + + + + + + +
MISSISSIPPI CAMPING	MISSISSIPPI VALLEY	E	1994	0,6,0,0
CANOE CLUB	MISSISSIPPI VALLEY	E	1994	30,2,8,0
RIVERSIDE PARK	MISSISSIPPI VALLEY	E	1994	+ + + + + + + +
JOSEPH STREET	MISSISSIPPI VALLEY	E	1994	0,7,14,14
MISSISSIPPI WONDERLAND	MISSISSIPPI VALLEY	E	1994	29,0,0,0
APPLETON	MISSISSIPPI VALLEY	E	1994	23,0,0,8
ALMONTE	MISSISSIPPI VALLEY	E	1994	0,7,0,7
BLAKENEY	MISSISSIPPI VALLEY	E	1994	17,0,0,16
PAKENHAM PARK	MISSISSIPPI VALLEY	E	1994	0,0,26 16

<b>BEACH NAME</b>	<b>CONSERVATION AUTHORITY</b>	<b>MOEE REGION</b>	<b>YEAR ELIGIBLE FOR CURB</b>	<b>STATUS OR NUMBER OF POSTED DAYS</b>
SHARON CREEK	LOWER THAMES VALLEY	SW	1994	0,0,0,0
THAMES GROVE	LOWER THAMES VALLEY	SW	1994	0,0,0,0
WHEATLEY HARBOUR	LOWER THAMES VALLEY	SW	1994	0,0,0,0
RONDEAU HARBOUR	LOWER THAMES VALLEY	SW	1994	0,0,0,0
WASAGA	NOTTAWASAGA VALLEY	MO	1995	0,0,0,0
EARL ROWE	NOTTAWASAGA VALLEY	MO	1995	+ + + + + + + +
TOTTENHAM	NOTTAWASAGA VALLEY	MO	1995	0,0,0,0
UTOPIA	NOTTAWASAGA VALLEY	MO	1995	0,0,0,0
NEW LOWELL	NOTTAWASAGA VALLEY	MO	1995	0,0,0,0
SERPENT MOUNDS	OTONABEE REGION	E	1994	0,0,0,0
RICE LAKE NORTH SHORE	OTONABEE REGION	E	1994	+ + + + + + + +
RICE LAKE SOUTH SHORE	GANARASKA, LOWER TRENT	E	1994	+ + + + + + + +
CHRISTIE RESERVOIR	HAMILTON REGION	WC	1994	0,0,0,0
VALENS RESERVOIR	HAMILTON REGION	WC	1994	0,0,0,0
PORT BURWELL	GREY-SAUBLE	SW	1992	0,32,2,0
SANDHILLS PARK	GREY-SAUBLE	SW	1992	0,0,6,0
HIGHLAND GLEN	ST. CLAIR REGION	SW	1992	10,2,0,10
CAMPERS GROVE	LOWER THAMES VALLEY	SW	1994	0,0,0,0
ERIEAU	LOWER THAMES VALLEY	SW	1994	0,0,0,0
KENT COUNTY PARK	LOWER THAMES VALLEY	SW	1994	+ + + + + + + +

<b>BEACH NAME</b>	<b>CONSERVATION AUTHORITY</b>	<b>MOEE REGION</b>	<b>YEAR ELIGIBLE FOR CURB</b>	<b>STATUS OR NUMBER OF POSTED DAYS</b>
WILDWOOD PARK	LOWER THAMES VALLEY	SW	1994	0,0 0, 0
ORFORD TWP. PARK	LOWER THAMES VALLEY	SW	1994	+ + + + + + +
PORT GLASGOW	LOWER THAMES VALLEY	SW	1994	0,7,21, 0
DULTONA	LOWER THAMES VALLEY	SW	1994	+ + + + + + + +
HOLIDAY HARBOUR	LOWER THAMES VALLEY	SW	1994	0,0,0,0
C. M. WILSON	LOWER THAMES VALLEY	SW	1994	0,0,0,0
JESSUPS FALLS	SOUTH NATION RIVER	E	1994	+ + + + + + + +
HIGH FALLS	SOUTH NATION RIVER	E	1994	+ + + + + + + +
RUSSELL	SOUTH NATION RIVER	E	1994	+ + + + + + + +
PORT BURWELL	LONG POINT REGION	SW	1992	0,36,4,0
SANDHILLS	LONG POINT REGION	SW	1992	0,0,6,0
MOONEYS BAY	RIDEAU VALLEY	E	1992	8,1,0,0
GLEN	RIDEAU VALLEY	E	1992	+ + + + + + + +
TAY	RIDEAU VALLEY	E	1992	+ + + + + + + +
LAST DUEL PARK	RIDEAU VALLEY	E	1992	51,0,0,0

\*1 Study determined that the beach was primarily impacted by urban sources

\*2 CURB Plan has not been completed and eligibility has not been determined

+ + + + + + + + Beach not identified in PDB database

## APPENDIX 5

### Economic Value of CURB Program Beaches

The following table was compiled from data provided by the Conservation Authorities.

The estimated value of the beaches and associated parks are based upon a per person attendance figure. The method of determining the economic value of each beach varied throughout the Province.

In some cases the revenue was based upon gate receipts of the Conservation Authority park facility such as the \$3 per person figure at the Credit Valley CA's Belfountain Conservation Area. The Rideau Valley Conservation Authority used higher per person figures based upon estimated total excursion expenditures including meals, lodging, other discretionary expenses in addition to gate receipts utilizing the methodology developed by Anthony Usher Planning Consultants 1987.

The data in the following table show that the five largest CURB beaches, Pinery, Ipperwash, Grand Bend, Wasaga, Sandbanks, are estimated to generate in excess of \$200 million per year in local economic benefit. The estimates at three of these beaches, Pinery, Ipperwash and Sandbanks are based on attendance and gate receipts while the estimates at Grand Bend and Wasaga utilize the Anthony Usher methodology.

ECONOMIC VALUE OF BEACHES (1994)		VISITORS		REVENUE		TOTAL
CONS. AUTH	BEACH AREAS	#/YEAR	WEEKEND	VISITOR	\$/DAY	\$/YEAR
AUSABLE-BAYFIELD	Pinery & Ipperwash	750,000				15,750,000
	Grand Bend	450,000	40,000	21	1,000,000	91,000,000
CREDIT VALLEY	Belfountain	17,491		3		43,728
ESSEX REGION	All Essex County	100,000		56		5,600,000
GRAND RIVER	New Hamburg	55,000				
	Lake Conestoga	52,275				181,170
	Guelph Lake	75,800				270,695
GREY-SAUBLE	Sauble Beach		35,000			
HALTON REGION	Kelso CA	115,000		53		300,000
HAMILTON REGION	Valens CA	115,000		53		399,000
	Christie CA	75,000		4		319,000
KETTLE CREEK. CATFISH CREEK. LOWER THAMES	Port Stanley	289,800				
	Springwater	4,000				
LAKE SIMCOE REGION	Beaver North & South				6,120	556,920
	Elgin Pond				1,788	162,708
LONG POINT REGION	Long Point	110,000		59		363,366
METRO TORONTO REGION	Boyd CA	79,156		20		1,583,120
	Albion Hills	45,000		20		900,000
	Bruce's Mill	35,000		20		700,000
MISSISSIPPI VALLEY	Mississippi Watershed	10,000		520		200,000
NIAGARA PENINSULA	Binbrook Reservoir					30,000
NOTTAWASAGA VALLEY	Wasaga Beach		100,000			90,000,000
OTONABEE REGION	Rice Lake North					7,600,000
	Indian River (5)					145,000
PRINCE EDWARD REGION	Sand Banks	300,000		20		6,000,000
RAISIN REGION	Long Sault Parkway			1		2,900,000
RIDEAU VALLEY	Rideau Ferry	8,000		550		400,000
	Foley Mountain	5,550		550		277,500
	Baxter CA	5,760		550		288,000
	Rideau River Park	13,875		550		693,750
	Mooney's Bay	50,000		50		2,500,000
SAUGEEN VALLEY	Durham CA					71,800
	Saugeen Bluffs CA					65,800
	Brucedale CA					20,253

SEVERN SOUND RAP	Severn Sound	130,000				1,186,900
SOUTH NATION RIVER	South Nation River	10,000		20		200,000
ST. CLAIR REGION	Lake Huron		10,000			7,000,000
UPPER THAMES RIVER	Fanshawe	75,831		20		1,516,620
	Wildwood	45,290		20		905,800
	Pittock	24,507		20		490,100
TOTAL		2,992,335	185,000	578	1,007,908	240,621,264

## **Appendix 6**

### **CURB Program Research**

## **CURB Program Research**

The CURB Program is a capital grant assistance program, through which environmental improvements are achieved. Local CURB Programs in every participating conservation authority have ongoing research projects ranging from continuing long term research initiated in the preceding CURB development phase. to investigating new technologies, methodologies and management practices to reduce or to eliminate non point source pollution to receiving waters.

It is important to highlight the research carried out during the CURB development phase (1986-1991) because much of the current work is based on this earlier research.

This section is chronologically divided into CURB Development (1986-1991) and the CURB Program (1991-1995). Annual reports from each CURB Development were in part. research documents outlining the local program findings. Most of the research identified in the following section can be referenced directly to these reports. All CURB Development culminated in the production of a CURB Plan report that summarizes the research conducted during the CURB Development. The CURB Plan also identifies all rural pollution sources and their impact on downstream swimming beaches. and provides remedial options and cost estimates.

## **CURB Development 1986-1991**

### **Extensive Water Quality Monitoring**

This was the first Ontario program to conduct water monitoring on a large scale to determine pollution sources affecting rural water quality and to verify improvements made by subsequent remedial measures. Earlier OMAFRA financial assistance programs focused on building structures without evaluating the water quality impacts before or after construction. Approximately 4,000 water samples were analyzed annually between 1986 and 1991. The initial water quality monitoring results were used to establish specific projects to focus on specific problem sources and types where knowledge was lacking.

### **Target Sub Basin Study (Ausable-Bayfield Conservation Authority [ABCA], 1988)**

\$240,000 of remedial measures on every farm in the upper Desjardin Drain, Huron County, concluded statistically significant improvements to water quality at the subwatershed level. It was also found that faulty septic systems and liquid manure spreading on tiled fields have severe impacts even after all previously determined pollution sources were corrected. Bacteria were demonstrated to travel from farm sources in the headwaters of the Desjardin Drain to the Grand Bend beach 16 km downstream, These findings encouraged the

following additional research.

### **Faulty Rural Septic Systems**

The findings from Target Sub Basin Study (ABCA, 1988) led to further investigations of private on-site sewage disposal system problems in all watersheds. All CURB Plan reports in 1990 concluded that faulty rural septic systems contribute from 5 to 30 percent of all bacterial pollution to surface waters. Other investigators have since concluded this to be a major problem, culminating *in* the **Royal Commission on the... (Sewell) Report**

### **Liquid Manure Spreading on Tiled Fields**

Concerns with liquid manure applications on tiled fields were first investigated at CURB Development sites (Palmateer *et al.*, 1989). These studies are now widespread in Canada with requests for information from the United States and Europe.

### **In situ Bacterial Survival Studies**

Further studies were conducted by the ABCA, UTRCA, MVCA, MTRCA and LSRCA into the die-off rates of bacterial indicator organisms. General findings were that bacteria will survive for weeks in surface waters and months in stream bed and pond sediments. The mathematical algorithms derived from this research were the basis for the CURB Plan report bacterial transport models.

### **Milkhouse Washwater Studies**

Initial research revealed that milkhouse washwater illegally disposed through field tiles contributed an average 35 kg of phosphorus per dairy farm per year into surface waters. Bacterial studies indicated that the field tile proved to be a viable medium for bacterial regrowth. Concentrations of the pathogenic bacterium *Pseudomonas aeruginosa* were found to increase by 500 times between the milkhouse drain and the outlet to the watercourse (Miller *et al.*, 1987). The CURB Program considers this to be a serious environmental hazard and created a category specifically for remediating this problem.

### **Modified Tank and Treatment Trench Disposal System**

CURB Development has actively participated with OMAFRA and the Ontario Milk Marketing Board to revise and promote the design standards for milkhouse waste treatment trench systems. There are approximately fifteen of these systems which have been in use for at least five years and continue to be intensively monitored by the local CURB staff.

## **Livestock Access to Watercourses**

CURB Development staff were the first in Ontario to evaluate the effect of livestock access on surface water quality. Upstream and downstream monitoring showed significant increases in indicator organisms, stream bank and stream bed erosion, and sedimentation. All CURB Plans (1990) concluded that restricting cattle from watercourses was the most cost effective way to reduce bacterial pollution in rural watersheds.

## **The CURB Program 1991-1995**

### **Large and Small Scale Surface Water Quality Monitoring**

All CURB Program areas maintain a surface water quality monitoring network to evaluate the large scale changes due to remedial measures. Staff also utilize upstream and downstream water monitoring on a micro scale to evaluate local impacts from pollution sources or remediated sites. The following activities are also being conducted.

### **Artificial Constructed Wetlands**

One of the primary concerns associated with livestock farms is the runoff of liquid manure into surface waters because it is a very expensive problem to correct. Typically, the solution requires building a very large liquid runoff containment facility. In some instances the farmer may build a roof over the existing solid manure storage to keep the rain out of the manure which will reduce the runoff. However, unless the larger barnyard was also roofed (also expensive), or eliminated (not practical), a runoff problem still existed. If runoff could be contained, there is an inevitable financial and environmental cost of land applying the contaminated liquid.

To solve this problem, artificial constructed wetlands have been proposed as a solution to treat runoff. At present, nine artificial constructed wetlands sites in Ontario are in various stages of operation. The premise is to treat the effluent to a quality that is acceptable for surface water discharge or to land apply lower volumes of treated effluent.

### **Vegetative Filter Strips**

CURB is evaluating the performance of at least one OMAFRA designed grass filter strip for treating barnyard runoff. These are similar to the artificial constructed wetlands in concept, however, there is no potential for treatment under cold weather conditions or high rainfall conditions, and processing of effluent is predicted to be much less effective. The risk of groundwater contamination is high in some circumstances.

## **Milkhouse Washwater Treatment Systems**

Several technologies are being evaluated for disposing of milkhouse washwater. The most technical is the OMAFRA, Alfred College developed flocculator. This is a miniature primary clarifier that utilizes agricultural grade lime as a precipitant. The flocculator theoretically precipitates phosphorus from the washwater and separates the nutrient rich sludge for land application and clearer supernatant for potential surface water discharge or recycling back into the wash system.

CURB is continuing to monitor and evaluate the milkhouse waste treatment trench systems initiated under CURB Development.

An experimental grease trap/raised bed treatment trench system is also under development at this time. This promises to be one of the most economical systems in heavy soils due to its passive nature and low maintenance requirement. One system is operating with another to be started up in the Autumn of 1995.

## **Alternate Livestock Access Restriction Systems**

Considerable research on innovative fencing and alternate watering systems is ongoing. Solar powered watering devices and electric fence units are being monitored to produce a technical document for designing and installing DC powered livestock water stations and electric fencers. Higher current and voltage units are being evaluated for deterrence value when temporary fence is used in locations where river ice may damage permanent fences.

## **Private Sewage Disposal Systems**

Alternative private sewage treatment systems being investigated include peat beds, wood fibre and sand media beds, the Waterloo Biofilter system, and surface and subsurface flow artificial wetland systems. They are all designed to augment the anaerobic processing and sedimentation achieved in the septic tank and further purify the waste water prior to discharge to the tile bed., The potential applications are: an effluent of superior water quality, and the ability to install these systems where conventional class IV systems typically fail. ie. on small lots with heavy clay soils. Sites have CURB Program staff monitoring influent and effluent water quality.

## **Nutrient Management Study**

In the 1970's and 80's livestock manure was considered by many livestock farmers as a waste that was difficult to dispose of. Today, manure is generally recognized as a resource.

However, not enough information is available to properly utilize the nutrient and soil enhancement qualities of manure.

The Engineering Services Staff from OMAFRA have developed a Nutrient Management Program (NMANPC) for microcomputers. The CURB Program provided extensive support by conducting on farm assessments with CURB Program applicants,

CURB staff concluded that the accuracy of the NMANPC program is contingent upon the quality of manure nutrient data. Since sufficient data was unavailable at the beginning of the study. CURB Program staff have gathered and analyzed manure samples from over two hundred different sites to improve the database. Continuing research is expected to finalize the software and database as a tool for CURB Program staff,

The ultimate goal of this research is to develop a methodology for a pro-active nutrient based, low cost, water quality management system, rather than the current reactive, high cost, physical structure based remedial action approach.

### **Cryptosporidium Study**

*Cryptosporidium* is a protozoan parasite which causes gastroenteritis in healthy subjects and can be fatal to immuno-compromised individuals. Infection is common in humans and livestock, primarily cattle and sheep. *Cryptosporidium* oocysts are shed from faeces of young calves and sheep and may enter surface waters through runoff from inadequate manure management practices. The parasites are resistant to conventional disinfectants and are difficult to detect. Outbreaks in Milwaukee, Wisconsin in 1991 and Waterloo, Ontario in 1992, caused loss of life when it entered water treatment and distribution systems.

The CURB Program is assisting in research to assess the applicability of a microfiltration method to detect *Cryptosporidium* oocysts in finished drinking water.

## **Additional Research by Individual CURB Program Area**

In addition to large and small scale surface water quality monitoring, current research and experimental activities are summarized by Conservation Authority.

### **Ausable Bayfield**

1. Lakeshore subdivision surface and subsurface drainage projects to enhance operation of existing class IV septic systems in heavy clay soils with high water tables along Lake Huron shoreline subdivisions. Lakewood Gardens South and Highlands II. Hay Township, Huron County, north of Grand Bend.
2. Alternate private sewage systems: Waterloo Biofilter, Lucan, Biddulph Township, and Middlesex County.
3. Rapid Detection Study in Grand Bend. Currently evaluating high speed indicator organism analysis in 6-8 hours (as opposed to the standard 30 hours). Potential applications to all public bathing beaches in Ontario (or the world). May decrease the number of days a beach would be posted due to turn around time.

### **Credit Valley**

1. Biotracer study on malfunctioning septic systems. Village of Erin, Wellington County.
2. Correlation study with BIOMAP invertebrate monitoring, fisheries inventory, and surface water quality.

### **Essex Region**

1. Artificial constructed wetland, for barnyard runoff and milkhouse washwater treatment.
2. Malden Valley Farms, Maidstone Township, Essex County.
3. Alternate private sewage system with organic media beds.

### **Grand River**

1. Stream benthic assessment on impaired and rehabilitated watercourses (1994).
2. Nutrient management study (1994).

## **Grey Sauble**

1. High powered electric fence systems.

## **Lake Simcoe Region**

1. Solar powered livestock watering project study 1995-97.

## **Maitland Valley**

1. Milkhouse washwater tank and treatment trench study to investigate the effects of septic tank treatment on faecal indicator organisms and nutrients. Dutch Dream Farms, Elma Township, Perth County.

## **Metropolitan Toronto and Region**

1. Vegetated Filter Strip, for barnyard runoff treatment, Livingston farm, Region of Peel.
2. Artificial Constructed Wetland, for barnyard, manure storage runoff, and milkhouse washwater treatment, Ted Dean farm, Town of Caledon.
3. Livestock access restriction water quality studies.
4. Nutrient management study (1994).

## **Mississippi Valley**

1. Milkhouse Washwater treatment in a grease trap and modified filter bed system, Harold McPhail Farm, Ramsey Township, Lanark County.

## **Niagara Peninsula**

1. Artificial Constructed Wetland, for barnyard, manure storage runoff, and milkhouse washwater treatment, Bill Mitchell farm, Glanbrook Township, Niagara Region,
2. Artificial Constructed Wetland, for barnyard runoff treatment, Norm Johnson farm, West Lincoln Township, Niagara Region.
3. Alternate private sewage system with recycling grey water system.

## **Nottawasaga Valley**

1. Artificial constructed wetland. for treatment of barnyard and manure runoff, and milkhouse washwater, Grumble Hill Farm, Essa Township, Simcoe County.
2. Collingwood/Wasaga Beach Sanitary Survey
3. Batteaux River benthic and aquatic habitat assessment

## **Otonabee Region**

1. Alternate private sewage system, huge Waterloo Biofilter system, for multiple units at Southview Cottages, S. Monaghan Township, Peterborough County.
2. Benthic community and surface water quality study.

## **Prince Edward Region**

1. Artificial constructed wetland, for treating barnyard runoff, Oskar Schnaithmann, Sydney Township, Hastings County.
2. Milkhouse Washwater flocculator system, Jacob Earl and Anna Vandermullen, Thurlow Township, Hastings County.
3. Bioengineering livestock access restriction study.

## **Raisin Region**

1. Milkhouse Washwater flocculator system. Donald Thompson, Glen Springs Farm. Charlottenburgh Township, Glengarry County.

## **Rideau Valley**

1. Solar powered watering facilities for livestock, partnership with the UTRCA and LSRCA, 1995-97.
2. Bentonite lined earthen manure storage. evaluating long term feasibility.
3. Artificial constructed wetland, for barnyard runoff treatment, Jim Peaker Farm, Rideau Township, Regional Municipality of Ottawa Carleton.
4. Milkhouse washwater precipitation (flocculator) system, John Hill Farm, City of Nepean, Regional Municipality of Ottawa Carleton.

## **Appendix 7**

### **1995 CURB Program Media Report**

In order to provide some background into the media activities that were conducted and reported upon, a 1995 only media report is being compiled.

It will contain primarily media releases, tour announcements, and press clippings. Radio and television reporting is identified and can be obtained on VHS tape upon request from Science and Technology Branch.1