

NIAGARA RIVER

REMEDIAL
ACTION PLAN

STAGE 2 REPORT

The Cleanup Connection



APRIL 1995

NIAGARA RIVER REMEDIAL ACTION PLAN

Stage 2 Report (Recommended Plan) *The Cleanup Connection*

April 1995



**Remedial Action Plan
Plan d'assainissement**

Canada  Ontario



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“ Nothing will be attempted if all possible objections must first be overcome. ”

The Official Rules
Paul Dickson

Dell Publishing Co. Inc.
1978

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LIST OF RECOMMENDATIONS

GENERAL

- 1) Establish an International RAP .
- 2) Provincial and federal governments develop an integrated ecosystem approach to management for its agencies.
- 3) Provincial and federal governments establish specific government funding programs for RAP implementation.
- 4) Secure recognition of the remedial action plan as having fulfilled some of the requirements of the environmental assessment process.
- 5) The Niagara River RAP endorse and encourage the process of multisectoral liaison committees as the vehicle to facilitate the satisfactory remediation of water quality in the Niagara River AOC.
- 6) Establish a Geographic Information System Repository for the Niagara River AOC.
- 7) Develop model 'terms of reference' for remediation projects by community liaison committees.
- 8) Initiate the Niagara River RAP Implementation Structure.

WATER QUALITY

Municipal

- 9) The Niagara River RAP become involved in Infrastructure Needs Studies.
- 10) Enforce the Regional Sewer Use Bylaw (Bylaw #3308).
- 11) The Region of Niagara continue to work towards implementing a water pollution control plant optimization program for all its plants.
- 12) Enforce the MISA Municipal Program for Municipal Sewage Treatment Plants upon the promulgation of the MISA Municipal Regulation.

Rural Non-Point Sources

- 13) Prepare and implement a rural non-point source pollution remediation strategy.
- 14) Farmers in the AOC be encouraged to follow sound farming practices such as recommended in the Environmental Farm Plan program.
- 15) Additional funding per farm business be given to the Environmental Farm Plan Incentive Program operating in the Niagara River AOC.

SEDIMENT QUALITY

- 16) The lower Welland River (downstream of the Welland Airport) be the priority focus of any sediment assessment.
- 17) Potentially contaminated locations be prioritized for review, assessment and remediation.
- 18) Test potentially contaminated sediment sites to confirm absence/presence of contamination.

BIOTA/HABITAT QUALITY

- 19) Prepare a natural heritage strategy for the Niagara River AOC.
- 20) The PAC will critically evaluate government review processes to ensure that they embody the principles and objectives of the Niagara River RAP.
- 21) A regulation requiring treatment or exchange (or some other technique) to ensure that ballast water cannot be a way for the introduction of exotic species into the Niagara River AOC be enacted.
- 22) Continue to protect habitat on both sides of the Niagara River as one ecosystem.
- 23) Municipal planning documents incorporate ecologically based policies and design criteria.

HUMAN HEALTH

- 24) Develop a Niagara River Fish Consumption Advisory.
- 25) Conduct research to determine if consumption of waterbased wildlife is harmful to human health.

SURVEILLANCE AND MONITORING

- 26) Continue monitoring municipal point sources (sewage treatment plants) including but not restricted to NRTMP point source monitoring program parameters.
- 27) Continue monitoring industrial point sources and publish results.
- 28) Landfills continue to be monitored regularly, as determined by monitoring results.
- 29) Develop and implement a Welland River and (Niagara River) tributaries monitoring program.
- 30) Taste and odour program (results) be monitored (drinking water).
- 31) Continue all monitoring programs for drinking water.
- 32) Implement a resident attitude monitoring program.
- 33) Support and encourage participation in Canadian Wildlife Services' community based wildlife monitoring programs.

STEWARDSHIP AND EDUCATION

- 34) The Ontario Ministry of Natural Resources develop an 'Introduction of Exotics' supplement to the 'Project Wild', 'Fishways' and 'Focus On Forests' programs.
- 35) Public education programs continue and new ones be developed as required.
- 36) Professional education programs continue and new ones be developed as required.
- 37) Boat owners retain and dispose of grey water at marinas.

PREFACE

The Niagara River has been designated by the federal and provincial governments in cooperation with International Joint Commission (IJC) as one of forty-three Areas of Concern (AOC) in the Great Lakes Basin. This designation is due to degraded water quality which impairs complete use of the river's resources.

In response to concerns over the health of the entire Niagara River ecosystem, this Remedial Action Plan (RAP) is being developed by a RAP Team comprised of engineers and scientists from Canada and Ontario environment and resource agencies with advice and assistance from a Public Advisory Committee (PAC), representing the community. All parties share a common interest in the Niagara River and its ecosystem.

The development of the Niagara River (Ontario) RAP is a dynamic three stage process based on the framework established in Annex 2 of the 1987 Protocol of the Great Lakes Water Quality Agreement (GLWQA).

The Stage One Report (*Environmental Conditions and Problem Definition*), completed in September 1993, described the current environmental conditions in the AOC, identified the sources of contamination, outlined the beneficial uses which are impaired and the extent of the impairments.

This Stage 2 Report, *'The Cleanup Connection' (Recommended Plan)*, identifies the goals and objectives developed by the Niagara RAP participants. The report identifies remedial activities, called Recommendations, necessary to restore the desired beneficial uses and achieve the environmental goals. In addition, the report outlines both the monitoring program necessary to track the effectiveness of the Recommendations and a Niagara River RAP implementation structure.

Within each of these Recommendations, responsibility for implementation as well as a schedule are proposed. Following discussions with those identified agencies, the responsibilities and schedules for implementing Recommendations will be formalized in a document called the Implementation Annex. The complete Stage 2 Report will consist of the Recommended Plan and the Implementation Annex.

In the third and final stage of the RAP, evidence presented will show that the impaired beneficial uses have been restored and the area is no longer an Area of Concern.

The Niagara River RAP relates only to the Canadian side of the Niagara River. Canada and Ontario support an international RAP for the Niagara River; however, New York State has chosen to develop a separate Remedial Action Plan for the U.S. side of the river. The Niagara River RAP (U.S.) released its document for discussion in January 1995.

ACKNOWLEDGEMENTS

The remedial action plan process is a consultative, consensus building process involving many participants representing many jurisdictions. The production of the Stage 2 Report, is the result of a collaborative effort.

The RAP is a challenging process to work within due to a large number of participants, jurisdictions and its use of consensus as a decision making tool. Interestingly, it is this consensus component that makes it an empowering process - it can and did get things done. The RAP process was able to provide a forum that combined the efforts of a diverse group of individuals representing a wide range of knowledge, expectations, interests, commitment and patience. The Stage 2 Report is the product of this process.

Members of the PAC are community volunteers who are to be complimented and commended for their ability to articulate and work with the community perspective in this challenging process. Chairing such a body deserves a special thank you. Supporting the PAC, while an essential task, is never easy in a consensus process. The role of the PAC Community Liaison Coordinator needs to be recognized for the essential service it really is.

RAP Team members also deserve to be recognized for their efforts to move the RAP forward by integrating it into their agencies' agendas. The RAP Team Coordinator played a key role in meshing the RAP process with government policies and procedures.

The Technical Advisory Committee members are to be thanked for their review and comment on the Recommendations. Members contributed to both the comprehensiveness and detail of the Remedial Action Plan.

In addition to these Niagara River RAP participants, there is a diverse umbrella of agencies, organizations and individuals outside of the formal RAP process who, through their advice and comments, supported the cleanup efforts of the Niagara River RAP. In this sense, they were very much partners in the Niagara River RAP process working to make their environment better. This report was written by Jim Martin.

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INTRODUCTION

Annex 2 of the Great Lakes Water Quality Agreement outlines two general principles to guide the development of a RAP. These are:

- ...they shall embody a **systematic and comprehensive ecosystem approach**... (refer to Figure 1)
- They are to serve as an **important step toward virtual elimination of persistent toxic substances**...

In practice, it is the implementation of Recommendations or remedial actions, that determines whether or not the RAP reflects the ecosystem approach.

Where possible, Recommendations in the Niagara River RAP are consistent with and support an ecosystem approach to the AOC. The Recommendations will recreate or enhance ecological relationships.

In some Recommendations however, the limits of remedial technology preclude enhancement of ecological relationships (i.e. do not support an ecosystem approach). This could include any Recommendation which, for example, reduces ground water infiltration, alters surface water runoff, withdraws ground or surface waters, alters evaporation or evapotranspiration rates, or cross connects watersheds.

The Niagara River RAP participants agree that the problems being addressed are serious enough to require the implementation of all Recommendations, including those that preclude enhancement of ecological relationships.

However, there must be clear understanding and willing commitment to improve the Recommendations so that ecological relationships are enhanced. Over time this will ensure that the RAP reflects one of its general principles, the ecosystem approach.

By themselves however, the two principles of ecosystem approach and virtual elimination do not make a Remedial Action Plan.

A Remedial Action Plan is unique. Using an ecosystem approach that includes virtual elimination of persistent toxic substances, a RAP responds to the environmental and social conditions in a watershed area, in this case the Niagara River watershed, Canadian side. While many environmental concerns and impairments are Great Lakes basinwide issues and are shared among many RAP areas, it would be a mistake to assume a 'cookie cutter' approach could be used to develop specific Recommendations.

In the Niagara River AOC, much cleanup was already underway, through other programs. A record of ongoing cleanup is reflected in the identified remedial measures. Point sources were being addressed; citizen committees were actively addressing contaminated sediment issues; municipal infrastructure was being updated and improved; public education and outreach was already happening.

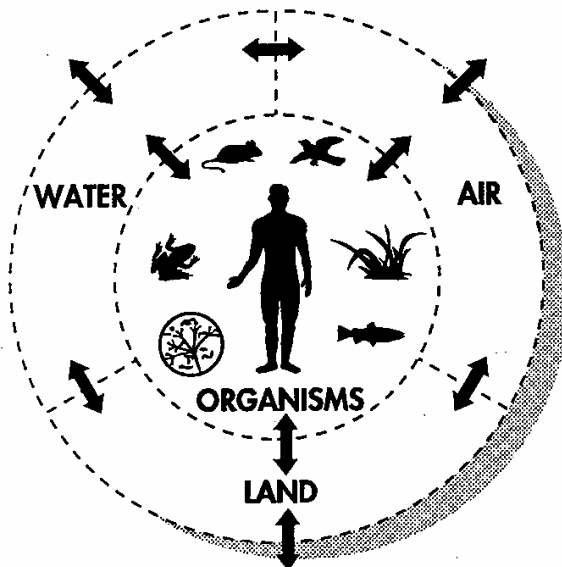


Figure 1. The Ecosystem Approach

(Clean Waters, Clear Choices - Metro Toronto and Region RAP)

The Ecosystem Approach

The ecosystem approach is both a way of doing things and a way of thinking, a renewal of values and philosophy. The Royal Commission on the Future of the Toronto Waterfront identified five fundamental themes of the ecosystem approach:

- the ecosystem as "home" (home is a special place providing more than shelter);
- everything is connected to everything else (examining the entire web of links among and within elements of ecosystems);
- sustainability (we have not inherited the earth from our ancestors, but are borrowing it from our grandchildren);
- understanding places (ecosystems may be understood on different scales); and
- integrating processes (overcoming the barriers of rigid bureaucratic systems and fragmented jurisdictions).

Environmental problems are only half of the picture; community attitudes, resources and history are the other half. While the environmental problems may be

Virtual Elimination

Virtual elimination is an overall strategy that will require different approaches to control different sources.

A virtual elimination strategy must apply to all sources: point and non-point.

A virtual elimination strategy must prevent the input of any additional quantities of persistent toxic substances to an already overburdened ecosystem (i.e., zero discharge), and cleanup programs should be undertaken wherever possible.

From: *Virtual Elimination Task Force of the IJC.*
July 1991.

similar throughout the Great Lakes Basin, the community's response to the problems will be unique. For example, the development of the RAP goals was a community driven process - the community defined an end point or 'how clean is clean'; they delineated the ecosystem as all the lands in the Area of Concern, not just the river valleys; and they defined Recommendations.

The communities will continue to play an active remedial role in the environment of the Niagara River area. Active citizens in the Niagara River AOC will ensure the RAP process continues to address the unique requirements of the area. Active citizens will work with those charged with cleanup to ensure remedial measures are implemented. Active citizens will ensure that the essential process of dialogue continues among the many stakeholders.

The Recommendations are based on what is unique about the Niagara River Area of Concern. This uniqueness has been translated into premise statements. An understanding of the premises is essential to understanding the Niagara River RAP. These premises are outlined below.

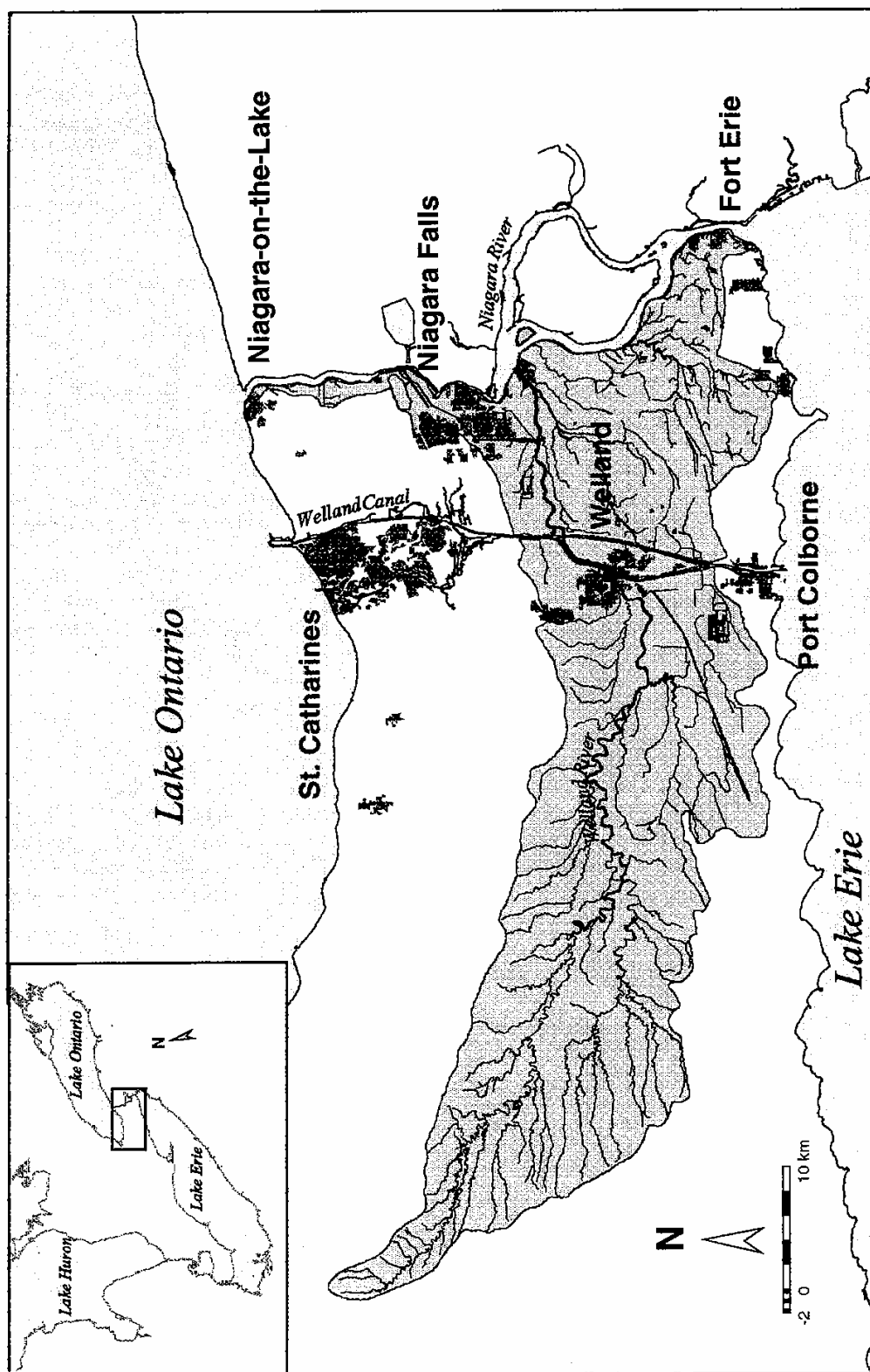
Premises of the Niagara River Remedial Action Plan

- The role of the RAP process is to encourage and support community liaison committee cleanup activities. It is the community that will implement the RAP, and has the power to apply political pressure for funding and enforcement.
- Community liaison committees, composed of government, non-government and public organizations and individuals are responsible for developing and implementing 'on the ground' cleanup plans.
- Delisting the Niagara River is a different process than remediating impaired beneficial uses under Canadian jurisdiction. While there is no overall timetable for delisting the Niagara River, there is a firm commitment to clean up the Canadian impairments. Delisting the Niagara River is dependent on developing international delisting criteria for the Niagara River.
- Studies designed to fill in information gaps of the Niagara River itself are the responsibility of an International RAP. To undertake a 'Canadian' study would only perpetuate the artificial division of the Niagara River.
- Pollution inputs to the Niagara River (e.g., bacteria from septic systems and farming practices in relation to contaminated sediments) have not been ranked. Hence,

the Recommendations have not been ranked or judged in relation to each other. All sources of pollution need to be addressed and remediated. What gets done when and at what speed will depend on a number of factors, including: availability of funding, political priorities, availability of information, community commitment, etc.

- Recommendations support a watershed approach to water quality remediation. In practical terms this means that the Recommendations must encompass more than the rivers and riverbanks, they must address the connection between the rivers and the surrounding lands.
- A Remedial Action Plan must include both remediation and pollution prevention strategies.
- The focus of Stage 2 has been to both develop and implement Recommendations.
- Success of cleanup will be marked by progress towards meeting the RAP goals, rather than meeting specific timetables.
- Words like ecosystem have not been defined in operational terms. That is the task of the community liaison committees at the time they are working on the rivers.

Niagara River Watershed (Ontario)



Data Source: Watershed digitized from Water Resources of the Niagara Frontier and the Welland River Drainage Basin (Gartner Lee Ltd., 1987). Rivers extracted from Natural Resources Canada 1:50 000 mapsheets.

Map created by Water Issues Division
 Environment Canada
 Environnement Canada

Map 1

THE WHOLE PICTURE

The Niagara River watershed is presently split between two RAPs - New York State (USA) and Ontario (Canada). Each jurisdiction is pursuing the development of its RAP by addressing its own pollution contribution to the Niagara River.

Upon close examination of the mission statements for the two Niagara River RAPs, they are very similar in content. The U.S. RAP's mission is to "restore the chemical, physical and biological integrity of the Niagara River ecosystem in a manner that reflects the community's concern for the remediation, preservation and protection of the river." The Ontario RAP uses similar words in its mission statement, "to re-establish, protect and maintain the integrity of the ecosystem in the Niagara River." As the two mission statements indicate, both RAPs are directing their efforts to the same end - the health of the Niagara River.

The respective goal statements are important because they indicate how the different RAPs intend to achieve their missions.

The U. S. RAP developed a general goal statement to focus the development of the U.S. RAP — "Specific goals of the RAP are the protection and enhancement of human health, fish and wildlife, aesthetics and recreation, and the economy of the Niagara River Area of Concern." In contrast, the Canadian RAP developed 16 goals to guide the selection of remedial actions.

One of the long term goals of the Ontario Niagara River RAP is to create an International RAP. This position was stated by Canada and Ontario at the onset of the program and continues to be shared and supported by the International Joint Commission today.⁽¹⁾ It should be noted that within the two RAP programs, there was a formal link through the International Advisory Committee.

The Niagara River carries an annual average flow of 5,700 cubic meters per second from Lake Erie to Lake Ontario. The vast majority of the flow comes from the basins of the four Great Lakes upstream of the Niagara River; *the Niagara-Welland basin contributes less than 0.1% of the total flow.* Consequently, Canadian remediation efforts will have a negligible impact on the Niagara River. Or, as was stated in the 'Environmental Conditions and Problem Definition' report (Executive Summary), there is a concern that

the efforts undertaken by the Ontario RAP to restore beneficial uses will have limited impact unless significant U.S. sources are addressed.

The Niagara River (Ontario) RAP addresses the water quality issues of the Welland River and the Ontario tributaries of the Niagara River. The discussion of the individual Recommendations, delisting criteria and goal

attainment in this Stage Two Report reflects the split between the Niagara River and the Welland River and (Niagara River) tributaries. Unlike the tributaries, restoration of impaired beneficial uses in the Niagara River will require addressing sources of contamination originating outside of the Area of Concern.

In fact, there are a number of Great Lakes Basin programs, connected to the Niagara River RAP, that are addressing sources of contamination originating outside of the Area of Concern. These include: the Niagara River Toxics Management Plan, the Canada Ontario Agreement 1994, and Lakewide Management Plans.

The **Niagara River Toxics Management Plan (NRTMP)** is composed of two parts: (1) a Four Party Work Plan, which establishes timetables and a set of specific activities to be undertaken, and (2) the Niagara River Declaration of Intent (DOI). The four Parties include: Environment Canada, Ontario Ministry of Environment and Energy, U.S. Environmental Protection Agency and New York State Department of

⁽¹⁾ In its review of the Niagara River RAP Stage One Report, the IJC notes "The division between the two halves of the AOC is an artificial one and is inconsistent with the ecosystem approach."

The Niagara-Welland basin contributes less than 0.1% of the total flow in the Niagara River. There is concern that the efforts undertaken by the Ontario RAP to restore beneficial uses will have limited impact unless significant U.S. sources are addressed.

Energy, U.S. Environmental Protection Agency and New York State Department of Environmental Conservation.

The goal of the DOI is to achieve significant reductions in toxic chemical pollutants in the Niagara River. Within this broad objective, the Parties committed to a more specific goal of a 50% reduction in loadings of certain (10) persistent toxic "chemicals of concern" from point and non-point sources in Ontario and New York, by 1996. NRTMP is currently looking at its mandate beyond the 1996 date. A commitment has been made to include a public consultation component in future plans.

The Niagara River RAP and NRTMP are linked both formally and informally through agency staff and data generation. Both Federal and Provincial agency staff work in both RAP and NRTMP programs. Consequently, the work carried out is complimentary to each individual program.

The Niagara River RAP and NRTMP are linked both formally and informally through agency staff and data generation.

NRTMP's focus of toxics is a subset of the Remedial Action Plan's ecosystem focus. Consequently, the RAP program incorporates much of the information generated through NRTMP.

At this time, both programs are reviewing their future plans. The RAPs have identified remedial measures for their respective jurisdictions. The Ontario RAP includes an action calling for the establishment of an International RAP for the Niagara River. Its delisting criteria, with its separate Canadian Cleanup Criteria, supports this position. The Ontario RAP also contains a goal that is directly related to the work of NRTMP "Seek extensions to the NRTMP goal of a 50% reduction of 10 chemicals..."⁽²⁾

Canada and Ontario recently (July 1994) signed a six year **Canada-Ontario Agreement (COA)** calling for coordinated action among governments and Great Lakes communities, to restore, protect and sustain the Great Lakes Basin ecosystem.

The Agreement's guiding principles are: ecosystem approach; pollution prevention and conservation; partnerships; and public accountability.

Within this framework, the Agreement sets firm targets for environmental priorities for the Great Lakes by outlining three main objectives:

- restore degraded areas;
- prevent and control pollution; and
- conserve human and ecosystem health.

Within the first objective, Canada and Ontario have a target of restoring 60% of impaired beneficial uses across all 17 AOCs, which should lead to the delisting of 9 AOCs by the year 2000. The Agreement specifies actions to address this priority, under the headings: capital works; rehabilitation; contaminated sites; contaminated sediments; groundwater; and human health.

As outlined in both the Great Lakes Water Quality Agreement and the Canada Ontario Agreement, **Lakewide Management Plans (LaMPs)** for critical pollutants will serve as frameworks for coordinating and cooperating, integrating existing land and water-based planning, programming and conservation activities, including, Toxic Management Plans where they exist (e.g., NRTMP.) There are four stages to a LaMP: problem definition; strategy development; implementation; and monitoring results. COA identifies LaMPs for Lakes Erie, Ontario and Superior to be developed and implemented as a priority in the next six years. Development of these LaMPs is underway.

These programs provide a framework for governments and Great Lakes communities to work cooperatively in partnerships to restore and protect water quality in the Niagara River.

⁽²⁾ Refer to Appendix E for more information about NRTMP.

Before the Recommendations can be examined, it is necessary to briefly review the beneficial use impairments and the goals and objectives of the Niagara River RAP. For more information about the beneficial use impairments, refer to the Stage One Report, 'Environmental Conditions and Problem Definition'. Table 1 was developed so the reader could directly relate the beneficial use impairments to the Niagara River RAP goals and objectives.

⁽³⁾ DFO is currently undertaking a liver tumour and diseases study of white suckers caught in the Niagara Bar area (mouth of the Niagara River in Lake Ontario). The purpose of the study is to: one, establish a baseline of tumor frequency for white suckers and two, compare relative frequency of liver tumours and diseases in white suckers with other Lake Ontario locations. A descriptive report is anticipated for summer 1995. For more information, please contact Vic Cairns at the Great Lakes Laboratory for Fisheries and Aquatic Science (DFO) at (905) 336-4862.

BENEFICIAL USE IMPAIRMENTS AND GOALS AND OBJECTIVES

BENEFICIAL USE IMPAIRMENTS

Beneficial Use Impairments are summarized in Table 1.

In its review of the *Environmental Conditions and Problem Definition* report, the IJC suggested that the Niagara River RAP reconsider the status of two of its beneficial use impairments. It was suggested that both the "Fish Tumors and Deformities" and "Degradation of Aesthetics" classifications of "Not Impaired" be reconsidered.

With respect to the "Fish Tumors and Deformities" beneficial use impairment, DFO noted that there has been no recent testing for tumors in Niagara River fish.⁽³⁾ Based on this information, the RAP Team changed the impairment status of "Fish Tumors and Other Deformities" to "Not Known".

The impairment status of "Degradation of Aesthetics" was not changed. A review of material in the *Environmental Conditions and Problem Definition* report indicated that the brown foam referred to by the IJC reviewer was natural in origin and so was not attributable to human activity. For this reason, the status of "Degradation of Aesthetics" was left as "Not Impaired".

GOALS AND OBJECTIVES

The PAC developed goals and objectives for the Niagara River RAP. In preparation for the Options Selection Workshops (1993), the Niagara River RAP goals were consolidated into a concise set of 16 goals. These goals have been used to guide the development of Recommendations. The goals are listed below.

Goals

- 1) To preserve and restore a good quality sustainable habitat in the Niagara River through the virtual elimination of the discharge of pollutants, with the ultimate goal of zero discharge of persistent bio-accumulative toxics.
- 2) Seek extensions to the NRTMP goal of a 50% reduction of 10 chemicals, for further reductions by the year 2000, with eventual complete elimination of toxic discharges.
- 3) Continually improve the quality of treated discharges of municipal and industrial sewage effluent, with no spills or discharges causing fish kills or other undesirable impacts.
- 4) Reduction and virtual elimination of Combined Sewer Overflows.
- 5) To improve environmental quality so that there are no adverse effects or risks to human, animal and plant life so that consumption guidelines are eliminated, and water can be used without restriction for all desired uses.
- 6) Remediate and restore the Niagara River ecosystem so that human health is protected from deterioration from persistent toxins and pathogens.

- 7) *Control nutrient loading levels to a point that excessive weed and algal growth do not occur.*
- 8) *Reduce and maintain bacterial, visibility, and toxic chemical levels to permit safe swimming.*
- 9) *Ensure water quality is sufficiently free of contaminants to be suitable for potable water after treatment in a modern plant, for industrial uses with minimal treatment, and for agricultural use.*
- 10) *Identify and correct high erosion areas so that non-storm suspended solids are less than 80 mg/l, sedimentation is reduced on fish spawning beds, and all life levels of desirable fish species are unimpeded.*
- 11) *Maintain and improve fish and wildlife habitat to encourage populations at healthy, contaminant free, self-sustaining levels with out fear of bio-accumulation.*
- 12) *To sustain and improve the compatible Niagara River recreational and scenic resources.*
- 13) *Maintain and improve the recreational and scenic resources through enhancements to the existing paths along the Niagara River and its tributaries, controls on the placement of fill along the gorge face, reduction of debris and litter on shore and in the water, the encouragement of natural regrowth, and the restoration of avian and other habitat along watercourses.*
- 14) *Aesthetic impact issues to be clearly addressed in any development in the AOC.*
- 15) *To reduce non-point sources of pollutants, including sediments, and eventually eliminate discharges of persistent bio-accumulative toxics.*
- 16) *Identify and correct contaminated sediment sites so that benthic community structure and toxicity is similar to unimpacted sites.*

Table 1
Updated Beneficial Use Impairments - Summary Table
IJC Area of Concern: Niagara River

GLWQA Criterion	Beneficial Use Impairment	Status of Impairment
1(a)	Restrictions on Fish Consumption	Impaired
1(b)	Restrictions on Wildlife Consumption	Not Known
2(a)	Tainting of Fish Flavour	Not Impaired
2(b)	Tainting of Wildlife Flavour	Not Impaired
3(a)	Degradation of Fish Populations	Impaired
3(b)	Degradation of Wildlife Populations	Not Known
4(a)	Fish Tumors ⁽⁴⁾	Not Known
4(b)	Fish Deformities ⁽⁵⁾	Not Known
5(a)	Bird or Animal Deformities	Impaired
5(b)	Bird or Animal Reproductive Problems	Not Known
6	Degradation of Benthos	Impaired
7	Restriction on Dredging Activities	Impaired
8(a)	Eutrophication	Impaired
8(b)	Undesirable algae	Not Impaired
9(a)	Restrictions on Drinking Water Consumption	Not Impaired
9(b)	Taste and Odour Problems (drinking water) ⁽⁶⁾	Not Impaired
10	Beach Closings	Impaired
11	Degradation of Aesthetics ⁽⁷⁾	Not Impaired
12(a)	Added Costs To Agriculture	Not Impaired
12(b)	Added Costs To Industry	Not Impaired
13(a)	Degradation of Phytoplankton Populations	Not Known
13(b)	Degradation of Zooplankton Populations	Not Known
14(a)	Loss of Fish Habitat	Impaired
14(b)	Loss of Wildlife Habitat	Impaired

⁽⁴⁾ IJC suggested reconsideration of this Beneficial Use Impairment. Impairment status changed from "Not Impaired" to "Not Known".

⁽⁵⁾ IJC suggested reconsideration of this Beneficial Use Impairment. Impairment status changed from "Not Impaired" to "Not Known".

⁽⁶⁾ While there are taste and odour problems with drinking water, they are not considered a beneficial use impairment as the source of the problem is natural and originates outside the AOC.

⁽⁷⁾ IJC suggested reconsideration of this Beneficial Use Impairment. Use Impairment status not changed.

Table 2
Niagara River Impaired Uses and Goals Matrix

	BENEFICIAL USE IMPAIRMENTS											
NIAGARA RIVER RAP GOALS	1 Restricted Fish/ Wildlife Consumption	2 Tainting of Fish/ Wildlife Flavour	3 Degraded Fish/ Wildlife Populations	4 Fish Tumors/ Deformities	5 Bird/Animal Deformities/ Reproductive Problems	6 Benthos Degradation	7 Dredging Restrictions	8 Eutrophic ation	10 Beach Closings	13 Degradation of Phytoplankton and Zooplankton Populations	14 Loss of Fish and Wildlife Habitat	
1 Virtual Elimination	x	x	x	x	x	x	x	x	x	x	x	
2 NRTMP	x			x	x	x						
3 Sewage Effluent	x	x	x	x	x	x	x	x	x	x		
4 CSOs	x	x	x	x	x	x	x	x	x	x	x	
5 Use of Water	x	x	x	x	x	x				x	x	
6 Human Health	x								x			
7 Nutrient Loadings		x						x				
8 Safe Swimming									x			
9 Water Quality												
10 Erosion			x			x	x			x	x	
11 Fish/Wildlife Habitat	x		x	x	x	x				x		
12 Scenic/Recreation Resources (1)												
13 Scenic/Recreation Resources (2)											x	
14 Aesthetics												
15 Non-Point Sources	x	x	x	x	x	x				x		
16 Contaminated Sediments						x	x					

Notes: 1. Niagara River RAP goals #12, #13 and #14 are not related to any Beneficial Use Impairments.
2. Table includes only 'impaired' or 'unknown' Beneficial Use Impairments. For a complete listing of Beneficial Use Impairments, please refer to Table 1 "Updated Beneficial Use Impairments - Summary Table."
3. Goal #9 (water quality) is being met.

The purpose of this section is to briefly outline the development process of Stage 2.

STAGE 2 DEVELOPMENT PROCESS

◆ Development of Niagara River RAP Goals (1990-1993)

An initial set of goals and objectives was developed by the PAC at a Stage I Workshop in January, 1990. Over time an extensive list was produced as the PAC further developed its goals and objectives. In March, 1992, a condensed version of the goals and objectives was adopted in principle by the PAC. The shortened version of the goals and objectives formed the basis for discussion at the 1993 Option Selection Workshops.

◆ Report On Options for the Remediation of Environmental Problems in the Niagara River (Ontario) Area of Concern

Phase I: Preliminary Identification of Recommendations

Phase II: Screening of Recommendations (1992-1993)

The report (available from MOEE) was prepared in consultation with the PAC and RAP Team. The intent of Phase I was to provide an inventory of generic Recommendations, which were evaluated in Phase II to match problems with solutions and to link Recommendations with the PAC goals.

◆ Option Selection Workshops (April 1993)

In order to expedite the selection of Recommendations for the Niagara River RAP, as agreed to by the PAC and RAP Team, consensus building workshops were conducted in April, May and June, 1993. A report⁽⁸⁾, outlining the preferred options, was prepared.

◆ Niagara River RAP Working Groups Established (Fall 1993)

Following the Option Selection Workshops, the Niagara River RAP developed a Stage 2 working group structure (that included PAC and RAP Team members) and secured agency commitment to the process. The Working Groups were: Water Quality; Sediment; Biota/Habitat; Surveillance and Monitoring; and Stewardship and Education.

◆ Working Groups Develop Comprehensive Set of Recommendations (Winter and Spring 1994)

The Working groups developed a comprehensive set of Recommendations for the Niagara River RAP. Wherever possible, the Working Groups also initiated the implementation of those Recommendations (e.g., Sediment Working Group, Biota/Habitat Working Group). The Working Groups also reviewed their material in draft form prior to its inclusion in the draft Stage 2 Report.

◆ Networking with local environmental liaison committees in the Niagara River AOC. (Ongoing)

The Niagara River RAP continues to work to implement the Recommendations, during this development stage. For example, PAC has been approached on occasions to provide support in principle for proposed remedial measures within the AOC. Some of these requests have come from local citizens' liaison groups, which have been established in the AOC in response to public concern over environmental issues.

⁽⁸⁾ Niagara River RAP Stage 2 - Summary Report of Option Selection Process. MOEE. 1993.

◆ **Production of the Niagara River RAP draft Stage 2 Report, (Recommended Plan) (Winter, Spring 1994)**

The RAP Assistant, working with Niagara River RAP participants and others in the Niagara Peninsula community, prepared the Niagara River RAP draft Stage 2 Report, (Recommended Plan).

◆ **Niagara River Public Advisory Committee Open House (June 1994)**

In June 1994, the PAC hosted an Open House. Its purpose was to provide an opportunity for the general public to review the Recommendations that had been developed since the Spring 1993 Option Selection Workshops - some options were new, others were revised.

◆ **PAC/RAP Team Review of Niagara River RAP draft Stage 2 Report, (Recommended Plan) Stage One Update (Summer 1994)**

During the summer, PAC and RAP Team and Technical Advisory Committee members reviewed the draft Stage 2 Report, (Recommended Plan) and Stage One Update Report, for content and completeness of information.

◆ **Submission to COA RAP Steering Committee, RAP Team and PAC for Review (October 1994)**

The draft Stage 2 Report, (Recommended Plan) and the draft Stage One Update Report were submitted to COA RAP Steering Committee, the RAP Team and the PAC for review.

◆ **Final Review of the draft Stage 2 Report, (Recommended Plan), Summary and draft Stage One Update Report by COA RAP Steering Committee, RAP Team and PAC. (February 1995)**

The reports were revised following their October review. They were resubmitted to COA RAP Steering Committee (Ad Hoc Group), RAP Team and PAC (Executive) for final review and endorsement/approval.

◆ **Summer 1995 "Kick-Off" Event**

The Stage 2 Report, (Recommended Plan) will be formally submitted to the federal and provincial governments by the Niagara River RAP at a Summer 1995 "Kick-Off" event for their review and response.

◆ **Next Steps**

- Secure commitments to Recommended Plan.
- Establish implementation framework.
- Prepare Implementation Annex.

Formal submission of Stage 2 Report, (Recommended Plan and Implementation Annex) by the Minister of Foreign Affairs to IJC for review and comment.

RECOMMENDATIONS

Recommendations are the measures identified by the Niagara River RAP participants that are considered necessary to restore and protect Niagara River water quality, from Canadian sources of pollution. Collectively, these Recommendations form a comprehensive set of actions called the Niagara River Remedial Action Plan.

In some cases, the Recommendations are already in place and have been assessed by the Niagara River RAP participants to be working (e.g., Infrastructure Needs Study, NRTMP). In other cases, the Recommendations need to be implemented or are in various stages of implementation (e.g., develop a natural heritage strategy, establish a rural non-point source remediation strategy).

Criteria were developed in December 1992⁽⁹⁾ for evaluating and selecting preferred Recommendations. These include:

- feasibility;
- effectiveness;
- goal attainment;
- linkage and timing;
- ecosystem approach; and
- cost.

These criteria reflect the application of a 'value-based' system whereby the advantages, disadvantages and positive and negative impacts of implementing a particular Recommendation are listed and then its merits are decided based on the scan of these impacts and an overall judgement of their acceptability.

The Recommendations are arranged in nine categories:

- general;
- urban sewage and stormwater collection and treatment systems;
- industrial discharges to a waterbody;
- rural non-point sources;
- contaminated sediment;
- biota/habitat;
- human health;
- monitoring and surveillance; and
- education and stewardship.

These categories are for the convenience of the reader. It must be remembered that in practice, the ecosystem is not separated into distinct units.

The **General Recommendations** category refers to those Recommendations that support the implementation of all other Recommendations - they are not applicable to any one subcategory of the Niagara River RAP. These Recommendations do not directly address sources of pollution.

The **Urban Sewage and Stormwater Collection and Treatment Systems** category refers to environmental issues associated with the treatment and disposal of sewage and stormwater collected through the municipal and regional 'pipes-in-the-ground' systems.

⁽⁹⁾ These evaluation criteria are discussed in "Summary Report of Option Selection Process", Niagara River RAP Stage 2, July 1993.

Public Information Office

The Ontario Ministry of Environment and Energy maintains a Public Information Centre. The purpose of the Centre is to handle all general inquiries, provide a reading area for reference copies of MOEE publications and distribute MOEE publications. The Centre can also provide sources and contacts for environmental and energy information in MOEE offices, other ministries, government and non-government organizations.

All MOEE reports cited in this report are available to the public through the Public Information Centre.

For calls outside of Toronto, the Centre can be reached at 1-800-565-4923. The Centre is located at 135 St. Clair Avenue West, 1st Floor, Toronto, Ontario M4V 1P5.

The **Industrial Discharges to a Waterbody** category refers to the environmental issues resulting from the direct discharge of effluent from industrial plants to waterbodies.

The **Rural Non-Point Sources** category refers to the environmental issues stemming from agricultural and other (e.g., construction practices, residential septic systems) practices in the rural areas.

The **Contaminated Sediment** category refers to the environmental issues associated with contaminated sediments in the rivers.

The **Biota/Habitat** category refers to biota and habitat that have been damaged and are in need of remediation. Biota and habitat have been included because water quality is directly related to the river's surrounding environment.

While all these categories have an impact on human health, the **Human Health** section identifies Recommendations related to reducing human exposure to contaminants by eliminating the "pathway" of that exposure.

The **Monitoring and Surveillance** category describes the mechanism for identifying and understanding what is happening in the environment - information that will allow us to influence change positively. Monitoring is not an environmental problem itself but a tool for identifying and understanding environmental problems.

The **Education and Stewardship** category, like monitoring, is not an environmental problem in itself. The Education category is directed towards implementing educational activities that share a goal of first, making people aware of environmental issues, and secondly, giving them the tools necessary to do something about those problems.

Within each category, the individual Recommendations are discussed under the following headings: Rationale, Evaluation, Proposed Lead, Proposed Partners, Timing, Cost and Status. The evaluation section of each Recommendation contains a box which addresses the pertinent goals and beneficial use impairments and their relationship to either the Niagara River specifically or the balance of the AOC. Where the information was available, it was included. In many cases however, information was not available at this time. When it does become available, it will be the responsibility of the Niagara Partners in Cleanup Committee to include this information during a later review of the Remedial Action Plan.

Please note that only the following categories directly address the Niagara River RAP goals and beneficial use impairments: urban sewage and stormwater infrastructure, industrial discharges, rural non-point sources, contaminated sediment, and biota/habitat. The remainder of the categories (i.e., general, human health, monitoring/surveillance and education/stewardship) support the remediation efforts of the previously noted categories of Recommendations.

General Recommendations are those actions that were considered useful and helpful to the process of achieving the Niagara River RAP goals. These Recommendations do not directly address the beneficial use impairments. The Recommendations support the implementation of all other categories of Recommendations.

GENERAL RECOMMENDATIONS

RATIONALE

The Niagara River is an international trans-boundary river between Canada (Ontario) and the United States (New York State). The RAP program in the Niagara River AOC reflects these national jurisdictions, with Niagara River (Ontario) RAP and the Niagara River (New York State) RAP 'sharing' the identical waterbody of the Niagara River.

This Recommendation calls for the merger of both national RAPs into an International Niagara River RAP. Stage 2 presents a window of opportunity to move in this direction. Both RAPs have identified remedial actions and are moving towards implementation. An International RAP could have the role of monitoring the implementation of the Recommendations and reporting progress in the remediation of the Niagara River, something that the national RAP will not be able to do. An International RAP would also allow RAP Teams / PACs to reach a consensus on delecting criteria; facilitate the development of a coordinated implementation strategy; and a coordinated monitoring and surveillance program which would provide the data required to demonstrate that the Niagara River RAP goals had been met.

This Recommendation describes one mechanism for increasing cooperation between the two Niagara River RAPs. Both RAPs are encouraged to pursue this and other cooperative actions that will help to restore and protect the Niagara River watershed.

The International Joint Commission has consistently called for an International RAP in international boundary waters. Their review of the Niagara River (Ontario) RAP Stage One report reiterated the call for the establishment of an International RAP.

RECOMMENDATION #1

Establish an International RAP.

EVALUATION

RAP participants agreed that an International Niagara River RAP would provide a mechanism for the Ontario RAP to influence remediation activities on the Niagara River. Presently, the Niagara River (Ontario) RAP addresses only Ontario's inputs to the Niagara River. **Since the Ontario AOC contributes 0.1% of the flow in the Niagara River, the Ontario RAP by itself can do little to achieve its goals for the Niagara River.** Creating an International RAP would help to overcome this severe limitation.

Recommendation #1 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg. 18-19)	All (Indirectly)	All (Indirectly)
Beneficial Use Impairments (Table 1)	All (Indirectly)	All (Indirectly)

PROPOSED LEAD:

Environment Canada / MOEE

PROPOSED PARTNERS:

EPA, NYSDEC

TIMING:

Immediately

COST:

Provincial and federal agency staff time.

STATUS:

It is Ontario and Canada's position that an International RAP should be established. Niagara River RAP participants have consistently supported and called for the creation of an International RAP for the Niagara River. New York State has opposed the creation of an International Niagara River RAP.

RATIONALE

Recommendation #2 directs the federal and provincial governments to develop a coordinated approach to policy and program delivery. A coordinated approach, it is suggested, would support

and promote the application of the ecosystem approach 'in the field'. How will the agencies ensure that the implementation of their mandates results in a coordinated effort that benefits the environment as opposed to being at cross purposes with each other?

Presently the public finds that policies from the different agencies, at worst are contradictory, and at best, confusing. In these situations, it is the community liaison committees that have the task of sorting out which agencies should be approached, which funding programs will help, which policies support their goals?

In practical terms, the lack of an integrated ecosystem approach to management requires that the public provide that integration 'on-the-ground' when undertaking specific remedial actions.

RECOMMENDATION #2

Provincial and federal governments develop an integrated ecosystem approach to management for its agencies.

EVALUATION

Implementing Recommendation #2 would help to achieve the goals by facilitating access to government resources required to move cleanup forward. The time consuming process of identifying, locating and sorting government resources, currently undertaken by the public could be streamlined. Putting the cleanup teams together and implementing remedial actions could be accelerated.

PROPOSED LEAD:

Management Board of
Cabinet (Ontario) /
Federal Cabinet

PROPOSED PARTNERS:

Government agencies

TIMING:

Immediately

COST:

Provincial and federal
agency staff time.

STATUS:

The provincial government's Environmental Bill of Rights, with its Statements of Environmental Values (SEV), could indirectly promote Ontario's efforts to develop an integrated ecosystem approach. The Ministries are responsible for ensuring that the SEV is considered whenever decisions that might significantly affect the environment are made by the Ministries. It is certainly the expectation of the public that the SEVs of the Ministries will be consistent with each other and the ecosystem approach. MOEE sets the tone with its SEV - the following guiding principles will be among the tools used by MOEE to apply the environmental values...when making decisions that might significantly affect the environment: the ecosystem approach, environmental protection, and resource conservation.

Integration of government mandates and policies currently occurs at the working level, that is 'in the streams' in the form of watershed planning. The province currently has two policies for encouraging watershed planning: 'Provincial Watershed Management Planning Initiative and the RAP' (page 70); and "Comprehensive Policy Statements" as part of Ontario's Planning Reform. Both documents encourage consideration of water quality and water quantity issues through the land use planning process.

Recommendation #2 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	All (Indirectly)	All (Indirectly)
Beneficial Use Impairments (Table 1)	All (Indirectly)	All (Indirectly)

Environmental Bill of Rights (EBR)

The Ontario EBR was proclaimed in February 1994. The purposes of the Act are:

- a) to protect, conserve and, where reasonable, restore the integrity of the environment;
- b) to provide sustainability of the environment;
- c) to protect the right to a healthful environment.

In order to fulfil these purposes the Act provides: means by which the residents of Ontario may participate in the making of environmentally significant decisions by the Government of Ontario; increased accountability of the Government of Ontario for its environmental decision-making; increased access to the courts by residents of Ontario for the protection of the environment; and enhanced protection for employees who take action in respect of environmental harm.

Statements of Environmental Values are a means for government ministries to record their commitment to the environment and be accountable for ensuring consideration of the environment in their decisions.

For more information on the EBR, contact the Public Information Centre at 1-800-565-4923.

RECOMMENDATION #3

Provincial and federal governments establish specific government funding programs for RAP implementation.

RATIONALE

Existing provincial government funding programs and most federal government

programs, are not targeted for use in specific geographic areas. If RAP implementation is to proceed in a timely manner, it will be necessary to ensure that the AOCs receive priority funding. This can best be accomplished by establishing a separate RAP implementation funding program.

EVALUATION

Establishing funding dedicated to the Remedial Action Plan program will help to ensure the availability of funding for implementation of remedial or cleanup actions, including those in the Niagara River AOC.

PROPOSED LEAD:

Governments of Canada / Ontario

PROPOSED PARTNERS:

Government agencies

TIMING:

Immediately

COST:

Provincial and federal agency staff time.

STATUS:

Ontario does not have RAP dedicated funding programs. The federal government's Great Lakes 2000 Cleanup Fund is dedicated funding for RAP areas. It should be noted that each government has a number of programs that can and are being used by the RAPs to implement their Recommendations.

Recommendation #3 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	All (Indirectly)	All (Indirectly)
Beneficial Use Impairments (Table 1)	All (Indirectly)	All (Indirectly)

RATIONALE

The purpose of the Environmental Assessment (EA) Act is the betterment of the people of the whole or any part of Ontario by providing for the protection, conservation and wise management of the

environment through planning and informed decision-making. There are five features which are key to successful planning under the EA Act.⁽¹⁰⁾

These features are:

- consult with affected parties;
- consider reasonable alternatives;
- consider all aspects of the environment;
- systematically evaluate net environmental effects; and
- provide clear, complete documentation.

The Remedial Action Plan (RAP) is also about good planning. It too contains these same five key features, though not to the same level of detail. The remedial action plan and the environmental assessment process are complementary and hierarchical documents. The RAP functions as the 'master plan', they outline the components of a plan, that when fully implemented, will restore and protect water quality in the AOC. The environmental assessment picks up where the RAP leaves off, it addresses an individual component of the framework provided by the 'master' plan or RAP.

RAPs are developed through an extensive program of public consultation. The end product, is a consensus document, it has the support of all the participants. Typically, the participant list includes; but is not restricted to, federal, provincial, regional, local government officials, and an extensive cross section of the public.

It is suggested that the public consultation process the RAP goes through to develop its consensus based remedial action plan, should count as 'credit' towards some of the requirements of the environmental assessment process. The exact credit would be negotiated as part of the environmental assessment.

The purpose of this Recommendation is to secure recognition of the remedial action plan as having fulfilled some of the requirements of the environmental assessment process.

RECOMMENDATION #4

Secure recognition of the remedial action plan as having fulfilled some of the requirements of the environmental assessment process.

⁽¹⁰⁾ *Interim Guidelines On Environmental Assessment Planning and Approvals. Ontario Ministry of the Environment. July 1989.*

PROPOSED LEAD:

MOEE (EA Branch and Regional Offices) and EC (Great Lakes and Corporate Affairs Branch)

PROPOSED PARTNERS:

None

TIMING:

Immediately

COST:

Provincial and federal agency staff time.

STATUS:

The Environmental Assessment Branch (MOEE) is presently reviewing the question of RAPs status in the environmental assessment process.

EVALUATION

Having official status in the EA process would effectively integrate the RAP program and its Recommendations into official decision making (approval) processes. This could result in three consequences: the RAP would be seen by the public and government officials as being 'important'; two, the RAP program would be seen as an implementation oriented program, as opposed to its present image of a planning program; and three, participation in the RAP would be encouraged as the public would see a tangible 'reward' for participation in the program. These consequences would strengthen the RAP's ability to implement its Recommendations and thus achieve its goals.

Recommendation #4 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	All (Indirectly)	All (Indirectly)
Beneficial Use Impairments (Table 1)	All (Indirectly)	All (Indirectly)

RATIONALE

Remediating water quality in the AOC is a complicated process. It requires the creation of a process that can bring jurisdictions and resources together to develop and implement a remediation plan for a geographically defined length of river/ tributary. This is the purpose of community liaison committees.

Niagara River RAP participants can play an important role linking or networking with the different community liaison committees working on the rivers and tributaries.

RECOMMENDATION #5

The Niagara River RAP endorse and encourage the process of multisectoral liaison committees as the vehicle to facilitate the satisfactory remediation of water quality in the Niagara River AOC.

Community Liaison Committee Success Story

Four years and \$440,000 later, the Friends of the Creeks of Fort Erie are beginning to see some successes in Frenchman Creek. For example, in terms of fisheries, they have done a lot of in-stream work to remove debris dams, allowing the creek to flow more freely. It has succeeded to the point that successful spawning runs of white sucker and emerald shiners have been documented for the first time in recent history. Now anglers in the Niagara River concentrate on the creek's mouth where muskie come to feed on these young forage fish as they move out of the creek.

The RAP can be a conduit, for example, passing information on funding programs to the committees, keeping everyone informed of others' progress, and ensuring that all are working towards the same goals. To do this, it is recommended that the RAP, through the PAC seek 'involvement' in the different liaison committees. What form that involvement takes, is the responsibility and decision of the RAP participants at that time.

EVALUATION

There is a history of community liaison committees in the Niagara River AOC. They have worked well at identifying and utilizing resources available to them in the community and have the ability to involve the community. Typically the committees are partnerships of

government officials (federal, provincial, regional and municipal), non-government organizations and concerned citizens.

PROPOSED LEAD:

Niagara Partners In
CleanUp Committee

PROPOSED PARTNERS:

PAC

TIMING:

Ongoing

COST:

Statement of intent.

Recommendation #5 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	All (Indirectly)	All (Indirectly)
Beneficial Use Impairments (Table 1)	All (Indirectly)	All (Indirectly)

STATUS:

A Winter 1995 listing of Community Liaison Committees in the Niagara River AOC includes:

- Friends of Fort Erie's Creeks (Frenchman Creek and Black Creek);
- Welland River (Welland) Cleanup Committee;
- Friends of the Welland River;
- Lyon's Creek East; and
- Lyon's Creek Action Committee.

RATIONALE

Geographic Information System (G.I.S.) is a rapidly advancing computer based technology where information is organized, analyzed and presented on a map format with reference to location.

RECOMMENDATION #6

Establish a Geographic Information System repository for the Niagara River Area of Concern.

The existence of many data bases and host agencies (*refer to Table 3*), many of which are located outside the AOC, poses a number of problems when attempting to implement an ecosystem approach to remediation. Physically, information or even access to information, is not available to those who could use it (e.g., local liaison committees). A second problem exists. There is an absence of a standard base map scale. While recognizing that no one scale will support all needs, the variety of scales makes it difficult to compare information without the ability to re-scale information. A GIS repository could offer that service. As well, the hosting organization needs to be able to make a commitment of time, money and expertise if the wealth of information currently available is to remain accessible and current to the organizations and individuals in the community.

Ready access to information will be an aid to successful community led cleanup action. The current state of information is in many cases, beyond the retrieval and assessment capabilities of community individuals and organizations, making the information of little use to them in organizing cleanup plans.

This Recommendation calls for the establishment of a G.I.S. repository for the Niagara River AOC in partnership with other organizations. The repository would have two main functions: one, to maintain an up-to-date contact list of agencies with information on the Niagara River AOC in a G.I.S. format; and two, to have the capability of producing G.I.S. maps. The repository would operate on a storefront basis.

EVALUATION

A G.I.S. repository, located in the AOC, would provide local community groups and government officials access to information required to move cleanup forward and by doing so, will help to achieve the Niagara River RAP goals.

PROPOSED LEAD:

Brock University

PROPOSED PARTNERS:

EC, Health Canada,
MOEE, OMNR, NPCA,
OMAFRA,
Region of Niagara,
City of Niagara Falls

TIMING:

Immediate

COST:

Cost of staffing a G.I.S. repository at Brock University has not been estimated.

Recommendation #6 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (<i>Pg.18-19</i>)	All (Indirectly)	All (Indirectly)
Beneficial Use Impairments (<i>Table 1</i>)	All (Indirectly)	All (Indirectly)

STATUS:

Discussions with various government agencies⁽¹¹⁾ and other institutions are underway. The Hamilton Harbour RAP, which has a three year agreement with McMaster University to provide a Hamilton Harbour RAP G.I.S., is participating in these discussions.

⁽¹¹⁾ These agencies included: Environment Canada, Ontario Ministry of Environment and Energy, Ontario Ministry of Natural Resources, Niagara Peninsula Conservation Authority, Health Canada, Ontario Ministry of Agriculture, Food and Rural Affairs, Region of Niagara and City of Niagara Falls.

<p style="text-align: center;">Table 3</p> <p style="text-align: center;">Agencies with Niagara Peninsula Information on G.I.S.</p>			
Agency	G.I.S. System	Information	Contact
Environment Canada, Environmental Protection Branch	MapInfo	Shoreline habitats, biological resources, human use resources, special status areas	Sue Chen 416 973-7390
Environment Canada Environmental Services Branch	Spans GIS Spans MAP	MOEE Biomonitoring DOE Upstream/Downstream data, Niagara Region pollution plant influent and effluent data	Wendy Leger 905 336-4630
Health Canada	Spans GIS	Environmental parameters related to potential human exposure to contaminants	Sandra Owens 613 954-8490
Ontario Ministry of Agriculture, Food and Rural Affairs	PC Arc/Info	Soils, land use, physiography	Bob Vanden Broek 519 767-3572
Niagara Peninsula Conservation Authority	SPANS GIS	Water quality survey information (Welland River)	Chris Attema 905 227-1013
Region of Niagara	AutoCAD 12	Sanitary sewer information (including CSOs)	Ian Smith 905 685-1571
City of Niagara Falls	PC Arc/Info, ArcCad, ArcView	Potential pollution sources, Official Plan, Zoning, woodlots, wetlands, flood plains	Brenda Maggs 905 356-7521
Brock University	MapInfo	Ontario Base Mapping	Collen Beard 905 688-5550 Ext. 3468

RATIONALE

The purpose of this Recommendation is to make it easier for community individuals and government organizations to assess the value of their participation in a community liaison committee. Are the tasks and goals of the committee of interest to them?

Do they match the mandate of the agency or organization? Having some idea of the purpose of a committee and its tasks will help people assess their potential involvement and role in that committee. It will be easier for the RAP to organize community liaison committees if potential participants know what may be required of them.

The model terms of reference are by necessity generic, they contain items that address broad categories of actions or required reviews for example, determine if fluctuating water levels are a concern and if they are, work with the appropriate authorities (e.g., Ontario Hydro) to address those concerns; determine a preferred water budget for a subwatershed, etc. Given the history of community liaison committees in the Niagara River AOC, it is suggested that the model terms of reference be created from existing committee terms of reference.

RECOMMENDATION #7

Develop model 'terms of reference' for remediation projects by community liaison committees

EVALUATION

Niagara River RAP participants agreed that it would be easier to promote the establishment of community liaison committees if potential members understood the purpose and tasks of such organizations. The terms of reference was the vehicle for promoting that understanding.

Recommendation #7 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	All (Indirectly)	All (Indirectly)
Beneficial Use Impairments (Table 1)	All (Indirectly)	All (Indirectly)

PROPOSED LEAD:

Niagara Partners In Cleanup Committee

PROPOSED PARTNERS:

None

TIMING:

Immediate

COST:

Agency staff and volunteer time.

STATUS:

Many of the existing community liaison committees have terms of reference, which could be used to develop the generic terms of reference identified in Recommendation #7.

RATIONALE

The purpose of the Implementation Structure is to ensure the Recommendations are executed in a co-ordinated manner and that beneficial uses are achieved. The Implementation Structure recognizes the unique conditions of the Niagara River AOC.

The Implementation Structure has three main components:

- Niagara Partners in Cleanup Committee (NPICC);
- the Public Advisory Committee (PAC); and
- the Niagara Implementation Centre (NIC).

The Niagara River Partners in Cleanup Committee, composed of government agencies and the community provides resources that will be required to support community led cleanup action.

The PAC has adopted a 'watch dog' or implementation tracking role, and so will be able to provide the ongoing drive and followup necessary to keep the process going. The Canadian cleanup criteria can be used as the basis for assessing implementation progress.

The Niagara Implementation Centre's role is to coordinate and administer Niagara River RAP implementation projects and core aspects of continuing public involvement. It is also envisioned that the NIC will provide administrative support to the PAC.

Refer to page 108 for more information about the Niagara River RAP Implementation Structure.

RECOMMENDATION #8

Initiate the Niagara River RAP Implementation Structure.

EVALUATION

The Implementation Structure will re-orient the Niagara River RAP from a Stage 2 'development' focus to an 'implementation' focus and in doing so will help to ensure the Recommendations are executed in a co-ordinated manner and that beneficial uses are achieved.

PROPOSED LEAD:

EC/MOEE

PROPOSED PARTNERS:

Agencies with Implementation Responsibility

TIMING:

September 1995

COST:

Cost to operate the NPICC, PAC and NIC is estimated at \$60,000/year.

Recommendation #8 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	All (Indirectly)	All (Indirectly)
Beneficial Use Impairments (Table 1)	All (Indirectly)	All (Indirectly)

STATUS:

Discussions need to begin immediately with proposed participants concerning the initiation of the proposed Implementation Structure.

WATER QUALITY REMEDIAL RECOMMENDATIONS

WATER QUALITY RECOMMENDATIONS

Water quality Recommendations address concerns about environmental conditions directly impacting the chemical, physical and biological integrity of the water in the watershed (Canadian portion). This section is composed of municipal, industrial and rural non-point sources Recommendations. Landfill recommendations are addressed in the Surveillance and Monitoring Section. Sediments and the surrounding landscape (biota/habitat) can also have an impact on water quality but these issues have been addressed in separate sections.

There are no Recommendations concerning atmospheric deposition. (*Refer to the Stage One Update Report for information on atmospheric deposition.*)

Great Lakes Environmental Issue

Environment Canada's "Upstream/Downstream Niagara River Monitoring Program" indicates that there are sources of contaminants within the Niagara River Basin. Further assessment of both the sources of contaminants and their respective impact on the environment will be continued by governments.

However, irrespective of where these contaminants originate, as more is known about the contaminants found in the river, concern has been raised throughout the Great Lakes Basin about their human health and Great Lakes ecosystem impacts.

This concern was summarized by the IJC, its Seventh Biennial Report on Great Lakes Water Quality, 'Everything has changed, but for our way of thinking.' For more information, please contact the IJC.

Municipal

The Municipal Section refers to the urban sewage collection and treatment system. Municipal Recommendations address the environmental issues associated with the treatment and disposal of sewage collected through the municipal and regional 'pipes in the ground' systems.

There are no Recommendations addressing treatment of stormwater. Treating all stormwater is not endorsed by the Niagara River RAP. Rather, the need to treat stormwater should be assessed on an outlet or drainageshed basis. It is suggested that this assessment be undertaken as part of a watershed review of the receiving water body. (*See Niagara River RAP Stage One Update for more information.*)

RECOMMENDATION #9

**The Niagara River RAP become
involved in
Infrastructure Needs Studies (INS).**

RATIONALE

**The Ontario Ministry of
Environment and Energy,
the Region of Niagara and**

area municipality's policies are directed towards the goal of virtual elimination of untreated sewage discharges into the environment. Untreated sewage discharges are primarily the result of combined sewer overflows, bypasses at the pumping stations and mechanical failures in the system (e.g., cross connection of sanitary sewer to stormwater sewers).

Infrastructure Needs Studies (INS) take a comprehensive view of the sanitary sewer system. As part of their review, INS are used to identify system deficiencies that lead to untreated sewage discharges to the environment. INS make two types of recommendations - those that can be implemented as the study progresses (easily implementable) and those that, following council approval, are incorporated in the municipal capital works budget.

SWAMP (Sewage Waste Amendment Marsh Process)

The Friends of Fort George have been testing a 'newly designed' man-made wetland system since November 1991. The purpose of this project is to answer the question, 'Can a constructed wetland successfully polish waste water year round in a cold climate?'

In this test, water from the Niagara-on-the-Lake sewage lagoon is flooded onto experimental mini-marshes for a short period each day. The water then percolates down through the beds, drawing air down into the pores of the soil as they drain and empty.

Treated drain water coming out of the bottom of the beds is cleaned of undesirable organic matter, pathogens and excess mineral nutrients. Results show a marked reduction of organic matter, phosphorus and nitrogen.

Constructed wetlands not only clean up our dirty water, they have the added bonus of providing a wildlife sanctuary for ducks, geese and other birds and animals that live in wetlands.

For further information, please contact The Friends of Fort George, P.O. Box 1283, Niagara on the Lake, Ontario L0S 1J0.

The Niagara River RAP has identified INS as the major mechanism for controlling discharges of raw sewage to the environment. Given their critical importance to achieving the Niagara River RAP goals, it is important that the public, including the Niagara River RAP, involve themselves in these studies, wherever opportunities exist.

There are public consultation opportunities during an INS (e.g., open house to explain/consult on findings) as well as during the implementation of any proposed remedial works.

INS Status

INS for Niagara on the Lake has been completed and remedial actions have been implemented. INS for Fort Erie have been completed and remedial actions are in various stages of implementation. INS in Niagara Falls and Welland are presently ongoing.

EVALUATION

INS have successfully remediated combined sewer overflows in the communities of Fort Erie and Niagara-on-the-Lake. Given their track record and the fact that they are a well developed, ongoing process, Niagara River RAP participants support using the INS as a mechanism for achieving their goals relating to the municipal sewage system.

Recommendation #9 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	3, 4, 5, 6, 7, 8, 9	3, 4, 5, 6, 7, 8, 9
Beneficial Use Impairments (Table 1)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14

Master Servicing Strategy Studies

The Master Servicing Strategy Studies for the Region's water and wastewater systems are two key undertakings. These studies will provide for a current, prioritized program reflecting a 10 year Capital Program as well as a long term planning strategy covering a 50 year period.

For more information, contact the Niagara Public Works Department.

PROPOSED LEAD:

Niagara Partners in
Cleanup Committee

PROPOSED PARTNERS:

PAC
Non-Government Organizations
Region of Niagara Area
Municipalities

TIMING:

Immediately

COST:

Volunteer time.

STATUS:

The Niagara River RAP has the opportunity to participate in the public consultation programs associated with these studies, either the studies themselves or the projects proposed by the studies. The Region of Niagara (Public Works Department) representative on the PAC provides an avenue for RAP participation in the INS.

RATIONALE

The Region of Niagara passed its Sewer Use Bylaw in 1988. More recently, MOEE is developing a draft Sewer Use regulation in consultation with

stakeholders through a Joint Technical Committee. The regulation will require municipalities to ensure that industrial, institutional, commercial and residential sewer users control effluent quality for the protection of sewer and sewage treatment infrastructure, health and safety of workers, quality of sludge produced and receiving water bodies.

RECOMMENDATION #10

Enforce the Regional Sewer Use Bylaw (Bylaw #3308).

EVALUATION

Enforcing the Regional Sewer Use Bylaw will help to achieve the RAP goals by ensuring that industrial, institutional, commercial and residential sewer users control the quality of effluent being discharged into the municipal sewer system.

Recommendation #10 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	3, 4, 5, 6, 7, 8, 9	3, 4, 5, 6, 7, 8, 9
Beneficial Use Impairments (Table 1)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14

PROPOSED LEAD:

Region of Niagara

PROPOSED PARTNERS:

Area municipalities

TIMING:

Immediate

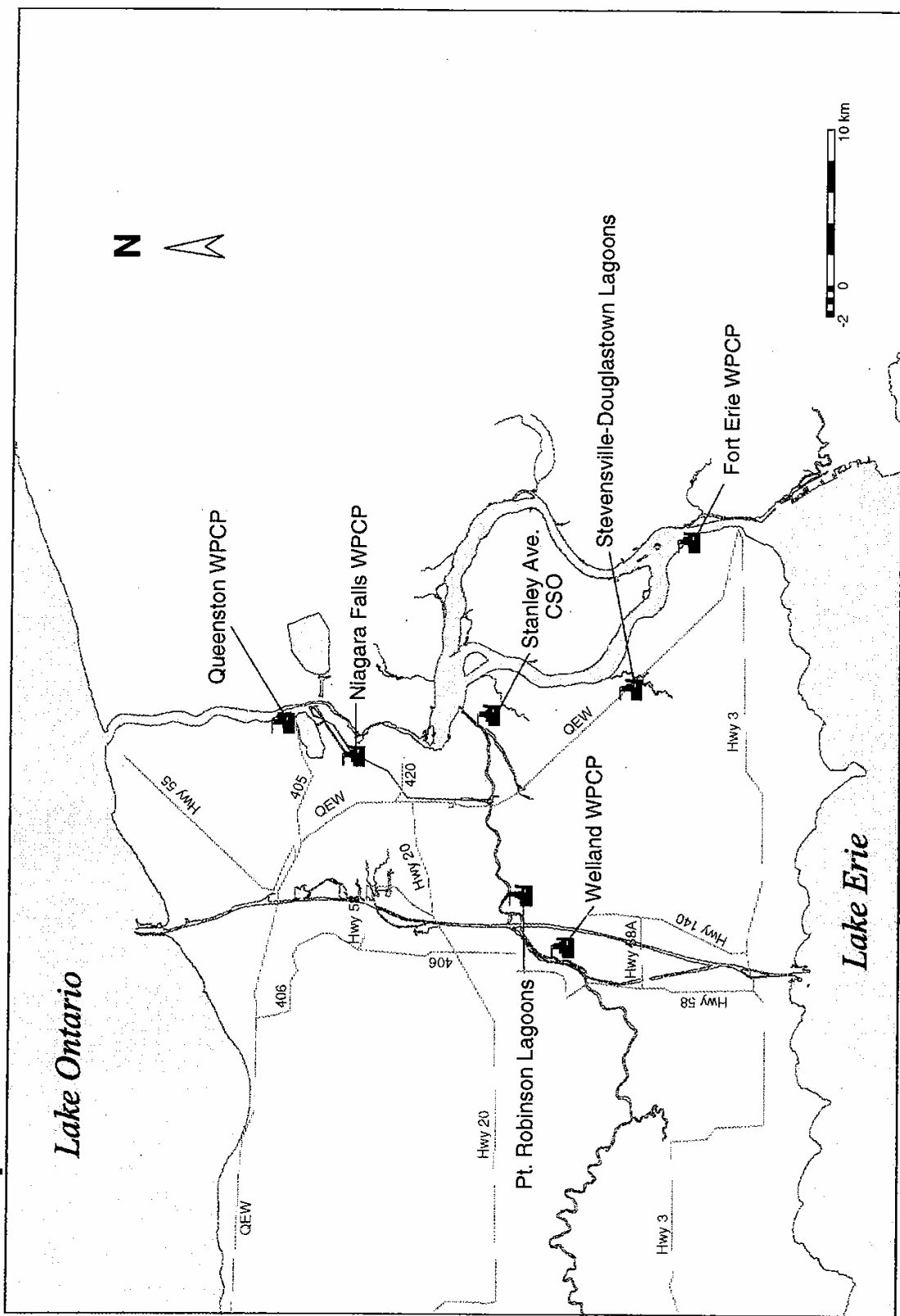
COST:

Minimal additional costs are anticipated.

STATUS:

The Region of Niagara in 1988 voluntarily implemented a Sewer Use Program under the Municipal Act through the enactment of a Sewer Use Bylaw. Upon promulgation of the MISA Sewer Use Regulation, the Region of Niagara will have to assess their compliance strategy to ensure the objectives of the regulation are met.

Municipal Point Sources



Data Source: Update Report Reduction of Toxic Chemicals from Ontario Point Sources Discharging to the Niagara River 1992. (MOEE, 1994)

Map 2

Map created by Water Issues Division
 Environment Canada
 Environment Canada

RATIONALE

Working with MOEE, the Region of Niagara completed the 'Water Pollution Control Plant Optimization Pilot Project' at the Grimsby WPCP in 1993. This program offered on-site operator training and assistance with the aim of optimizing the efficiency

of the WPCP. The program successfully increased the operating efficiency of the WPCP. Enhancing the performance at the WPCP may increase either: treatment capacity without physically increasing the size of the WPCP (allowing for the treatment of more combined sewer flow than would otherwise be possible); or increase the effluent quality (while treating the same amount of flow).

RECOMMENDATION #11

The Region of Niagara continue to work towards implementing a water pollution control plant optimization program for all its plants.

EVALUATION

WPCP optimization will help to achieve RAP goals by either treating more combined sewer flow or increasing the effluent quality of the existing flow.

Recommendation #11 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	3, 4, 5, 6, 7, 8, 9	3, 4, 5, 6, 7, 8, 9
Beneficial Use Impairments (Table 1)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14

PROPOSED LEAD:

Region of Niagara

PROPOSED PARTNERS:

MOEE

TIMING:

Immediately

COST:

The Region of Niagara has budgeted \$240,000 for the WPCP Optimization Program.

STATUS:

The Region is now (February 1995) in the process of implementing the program throughout the Region in all its WPCPs.

RATIONALE

MOEE is developing a draft Sewage Treatment Plant regulation in consultation with selected stakeholders through the Sewage Treatment Plant Joint Technical Committee.

It is anticipated that the MISA Municipal Regulation will impose strict monitoring protocols for treatment plants. The regulation will provide for the control of acute lethal toxicity, set sewage treatment plant effluent limits and reporting requirements and will require a minimum standard of secondary treatment.

RECOMMENDATION #12

Enforce the MISA Municipal Program For Municipal Sewage Treatment Plants upon the promulgation of the MISA Municipal Regulation.

EVALUATION

Enforcing the MISA Municipal Regulation will help to achieve the RAP goals by: providing for the control of acute lethal toxicity; setting sewage treatment plant effluent limits and reporting requirements; and requiring a minimum standard of secondary treatment.

Recommendation #12 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	1, 2, 3, 4, 5, 6, 7, 8, 9	1, 2, 3, 4, 5, 6, 7, 8, 9
Beneficial Use Impairments (Table 1)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14

PROPOSED LEAD:

Region of Niagara

PROPOSED PARTNERS:

MOEE, Area municipalities

TIMING:

After promulgation

COST:

The Region of Niagara has budgeted \$10M to implement MISA requirements at the Region's WPCPs (See Table 5).

STATUS:

A draft MISA Sewage Treatment Plant regulation is anticipated for public review by Fall 1995.

Table 4 Niagara Region Wastewater Projects - Completed Since 1990

Project Title/Location	Key Components	Completed	Cost \$ x 10(6)	Impact(s)
Anger Ave., WPCP Upgrading/Improvements Fort Erie	<ul style="list-style-type: none"> added secondary treatment for capacity of 24.5 ML/d. increased wet weather and peak flow capacity from 23.5 to 49 ML/d. peak flow treatment provides 49 ML/d secondary plus 49 ML/d primary. new outfall constructed. trunk sewer replacement on Niagara Parkway. raw sewage pumping capacity increased. SCADA system for automated control and analysis. 	1990	13.45	<ul style="list-style-type: none"> Improve treatment from primary to secondary. peak flow treatment capacity 4 times dry weather flow. reduce overflow to Niagara River. Improved outfall to Niagara River.
	<ul style="list-style-type: none"> Sludge Holding Facility. 	1994	2.9	<ul style="list-style-type: none"> Improve sludge management.
Welland WPCP Upgrading Welland	<ul style="list-style-type: none"> increase dry weather flow (DWF) capacity from 45.4 to 54.5 ML/d. peak flow treatment capability of 109 ML/d. tertiary treatment filters. SCADA system. 	1990	11.3	<ul style="list-style-type: none"> Improved effluent quality to Welland River. filtration to reduce nutrient load to river. improve water quality in Welland River.
Port Robinson Sewage Collection and Treatment Facility Thorold	<ul style="list-style-type: none"> new sanitary sewers. pumping stations & forcemain. lagoon treatment facility. 	1990	2.76	<ul style="list-style-type: none"> replaced malfunctioning septic system with sewers and treatment facility. improved effluent and quality to Welland River.
Queenston Sewage Collection & Treatment Facility Niagara-on-the-Lake	<ul style="list-style-type: none"> new sanitary sewers. 0.5 ML/d capacity (DWF). 1.7 ML/d peak flow capacity. new outfall pipe. 	1990	4.14	<ul style="list-style-type: none"> replaces malfunctioning septic system. eliminate raw sewage leaking to Niagara River. new outfall.
Chippawa Low Lift Sewage PS Improvements Niagara Falls	<ul style="list-style-type: none"> In-line storage on Stanley and Oldfield trunk sewers. upgrade pumping capacity with new pumps. 	1991	1.15	<ul style="list-style-type: none"> reduces basement flooding problems. reduces overflows to Power Canal (Niagara River).
Kalar Rd, Pumping Station Improvements Niagara Falls	<ul style="list-style-type: none"> add pump. upgrade control system. improves peak flow capacity from 182 L/S to 233 L/S. 	1993	0.25	<ul style="list-style-type: none"> reduces basement flooding risk. increases peak flow capacity.

Source: Region of Niagara/MOEE (Welland). July 1994.

Table 5 Niagara Region Water & Wastewater Projects In Progress or Future (10 Year Capital Program)

Project Title/Location	Key Components	Completion Date	Cost \$ x 10(6)	Impacts
Water Treatment Plant Backwash and Process Water Treatment Facilities NIAGARA REGION	<ul style="list-style-type: none"> equalization tanks at 7 plants. thickening facilities at 7 plants. centralized dewatering facility at DeCew Falls site. 	2000 2003 2003 +	11.7 10.9 5 to 27	<ul style="list-style-type: none"> phased for different plants and based on priority and financing available. timing dependent on funding availability. improvement to process waste management and resulting water quality in various receiving waters.
Modification to Disinfection Systems at Niagara's Water Treatment Plants NIAGARA REGION	<ul style="list-style-type: none"> improvement to existing disinfection process to provide for more safety. 	1996	0.4	<ul style="list-style-type: none"> improve safety and reduce risk of potential chlorine gas leaks, etc.
Welland Water Treatment Plant Improvements WELLAND	<ul style="list-style-type: none"> improve disinfection process. add treated water storage capacity. 	1995	2.0	<ul style="list-style-type: none"> will improve control of chlorine residual in distribution systems.
Water Master Servicing Strategy Study/Update NIAGARA REGION	<ul style="list-style-type: none"> assess entire Regional water supply and treatment systems. establish 10 year priorities. establish 50 years strategic plan. 	1995	0.20	<ul style="list-style-type: none"> will provide 10 year capital program for Regional water system. provide for efficiency and conservation measures. provide long-term servicing strategy.
Wastewater Master Servicing Strategy Study/Update NIAGARA REGION	<ul style="list-style-type: none"> assess Regional wastewater treatment & transport system. determine 10 year priorities. establish 50 year strategy plan. 	1995	0.20	<ul style="list-style-type: none"> will provide 10 year priority capital program for Regional system. provide plan for efficiency and conservation measures. provide long-term servicing strategy.
Parkway Sewage Pumping Station Capacity Improvements FORT ERIE	<ul style="list-style-type: none"> rebuild and relocate existing sewage pumping station (low lift). increase capacity to 98 ML/d from 40 ML/d. relocate to Anger Ave. WPCP location for better operation. standby power addition. SCADA Systems. 	1996	4.4	<ul style="list-style-type: none"> improve security with standby power. reduce overflows to Niagara River. improve efficiency of operation with new facility. improve relative risk with better emergency response capability results in more park area.
Lakeshore Rd. Sewage Pumping Station Improvements FORT ERIE	<ul style="list-style-type: none"> improvements to operation at pumping station. new forcemain. improved capacity in trunk sewage. 	1995	0.2	<ul style="list-style-type: none"> reduce overflows. improve efficiency. increased capacity to handle peak flows.
Dominion Rd. Sewage Pumping Station Improvements FORT ERIE	<ul style="list-style-type: none"> upgrade pumping capacity and operation. provide in-system storage. 	1996 2003	0.6 4.0	<ul style="list-style-type: none"> stage 1 works to reduce overflows and improve efficiency of system. stage 3 works to upgrade entire system and meet long-term needs.

Table 5 (Con't) Niagara Region Water & Wastewater Projects In Progress or Future (10 Year Capital Program)

Project Title/Location	Key Components	Completion Date	Cost \$ x 10(6)	Impacts
Ricardo/Melville/Front Pumping Station Improvements NIAGARA-ON-THE-LAKE	<ul style="list-style-type: none"> gravity system will eliminate one pumping station. improve capacity at Front St. P.S. improve capacity of Melville P.S. in-system storage. 	1996	0.5	<ul style="list-style-type: none"> eliminate overflows to Niagara River. improve efficiency through elimination of 1 pumping station. increased system capacity will treat more flow.
Upgrading Stanford WPCP NIAGARA FALLS	<ul style="list-style-type: none"> upgrade components to increase capacity from 68 ML/d to 80 ML/d (DWF) and peak capacity from 136 ML/d to 182 ML/d. 	1997	15	<ul style="list-style-type: none"> improved treatment to meet improved MOEE monitoring and sampling criteria. reduced overflows to Power Canal/Niagara River. improved water quality to Niagara River.
McLeod Rd. Sewage Pumping Station and Foremain Upgrade NIAGARA FALLS	<ul style="list-style-type: none"> upgrade pumping capacity at station. add new foremain. 	1997	4.0	<ul style="list-style-type: none"> reduce overflows to Power Canal/Niagara River. improve system capacity to capture more peak flow.
Welland WPCP Digester Improvements WELLAND	<ul style="list-style-type: none"> improve and upgrade sludge digestion capacity. 	1995	1.0	<ul style="list-style-type: none"> improved process operation and efficiency.
Kalar Rd., Pumping Station and Foremain Upgrade NIAGARA FALLS	<ul style="list-style-type: none"> increase pumping capacity at existing station. add new foremain. provide new discharge location for foremain. 	1996	2.0	<ul style="list-style-type: none"> reduces risk of basement flooding. reduces overflows to Power Canal/Niagara River. provides capacity for servicing service area.
Dorchester/Drummond Pumping Station Improvements NIAGARA FALLS	<ul style="list-style-type: none"> improvement to existing structure, controls mechanical, hydraulic and electrical systems. 	1996	1.0	<ul style="list-style-type: none"> improve efficiency of operation. reduce overflows.
Garner Rd., Sludge Holding Lagoon Upgrade NIAGARA FALLS	<ul style="list-style-type: none"> improvements to existing cells, site, etc. addition of cells for increased storage capacity to meet Region-wide needs. 	1997	3.0	<ul style="list-style-type: none"> improved efficiency and management of digested sludge operation.
Improvements to Sewage Pumping station along River Road NIAGARA FALLS	<ul style="list-style-type: none"> upgrade system operation of numerous, including improved capacity and replacement of pumping station(s) by gravity sewers. 	1998	5.0	<ul style="list-style-type: none"> improved efficiency. elimination of overflows. could impact Bender Hill, Seneca St., Central, Muddy Run pumping stations.
Standby Power Provision at WPCP and Pumping Stations NIAGARA REGION	<ul style="list-style-type: none"> provision of standby power at facilities phased in on priority basis. 	2001	10.0	<ul style="list-style-type: none"> improved risk management. eliminate or reduce potential for raw sewage release to environment.

Table 5 (Con't) Niagara Region Water & Wastewater Projects In Progress or Future (10 Year Capital Program)

Project Title/Location	Key Components	Completion Date	Cost \$ x 10(6)	Impacts
Implementation of MISA Requirements at Regional Plants NIAGARA REGION	· improvements/upgrades as required on priority basis.	2002	10.0	· to meet regulatory requirements.
CSO Control and Related Improvements NIAGARA REGION	· improvements as required and phased in on priority basis.	2003	11.0	· improvements to water quality in natural water bodies.
Welland WPCP Improvements WELLAND	· improvements and upgrade as required.	2003	16.0	· long term budget provision. · improved operation.
Queenston WPCP Improvements NIAGARA-ON-THE-LAKE	· improvements and upgrade as required.	2000	3.0	· long term budget provision. · improved operation.
Stevensonville/Douglstown Treatment Lagoon Upgrade FORT ERIE	· improvements and upgrade as required.	2000	0.20	· long term budget provision. · improved operation.
Improvements to Port Robinson Lagoon Facility THOROLD	· improvements to upgrade as required.	2000	0.20	· long term budget provision. · improved operation.

Source: Region of Niagara/MOEE (Welland). July 1994.

WATER QUALITY

Industrial

Included in this section are Recommendations for industries in the Niagara River AOC that discharge their effluent, via a conduit, directly into the environment, in this case, to a water body (river, tributary or connecting ditch). As noted in the Stage One Update, there are currently nine "direct dischargers" in the AOC. They are: Atlas Speciality Steels, Cytec Welland Plant, Geon Canada, Norton Advanced Ceramics of Canada Ltd., Washington Mills Ltd., Washington Mills Electro Minerals Corp., Fleet Industries, Gencorp Canada Inc., and StelPipe Welland.

Loadings calculations are influenced by...

- the frequency of monitoring;
- the accuracy of sample collection;
- the accuracy of sample preservation, transport and storage;
- the number of parameters analyzed;
- the accuracy of the analytical method;
- the analytical detectability of small amounts of contaminants; and
- the accuracy of the flow measurements.

(12) *Update Reports. Reduction of Toxic Chemicals From Ontario Point Sources Discharging To The Niagara River 1992 and 1993. Ministry of Environment and Energy. May 1994, 1995.*

(13) *The ten chemicals are:*

*Benz(a)anthracene;
Benzo(a)pyrene;
Benzo(b)fluoranthene;
Benzo(k)fluoranthene;
Dioxin(2,3,7,8-TCDD);
Hexachlorobenzene; Mercury;
Mirex/Photomirex; PCBs;
Tetrachloroethylene.*

Source: Niagara River Toxic Management Plan

these estimates are not statistically valid for demonstrating the 50% reduction in annual loads between 1986 and 1996. Some of the inherent difficulties are highlighted in the sidebar "Loadings calculations are influenced by...". These numbers might be better interpreted as differences between two sampling points in time rather than reductions in the annual loads between years.

Comprehensive effluent monitoring and limit setting 'Clean Water Regulations' have been promulgated for the Petroleum; Pulp and Paper; Metal Mining; Metal Casting; Industrial Minerals; Organic Chemical Manufacturing; and Inorganic Chemical Sectors. In December 1994, MOEE released draft 'Clean Water Regulations' for the Iron and Steel Manufacturing and the Electric Power Generating Sectors for public discussion. Promulgation for these sectors is anticipated in 1995.

The Clean Water regulations establish limits for pollutants discharged by manufacturing plants in these sectors. See Stage One Update for an overview of these draft regulations as they will affect industries in the Niagara River AOC.

All Ontario direct discharges are monitored by Ontario under the Niagara River Toxic Management Plan (NRTMP). These measurements of daily point source loadings have been made at various levels of intensity from once per year to once per month.

In a May 1994 Report⁽¹²⁾, MOEE reported a reduction of 62% in the daily loads of the 18 Chemicals of Concern between the measurements taken in 1986 and those taken in 1992. Industries reduced by 91% the measured daily loads of the 10 chemicals targeted for 50% reduction by 1996⁽¹³⁾ (Figure 2). Considerable uncertainty is introduced by the extrapolation from daily to annual loads. Although estimates have been made,

Pollution Prevention Pledge Program

The Pollution Prevention Pledge Program (or P⁴) invites facilities to develop pollution reduction goals which exceed existing provincial, municipal or federal regulatory requirements and to share them with MOEE. Program objectives include reducing releases of chemicals into the environment; lowering the use of toxic chemicals; and diminishing the generation or disposal of hazardous or liquid industrial wastes. The Ministry publicly recognizes commitments and achievements under this voluntary program.

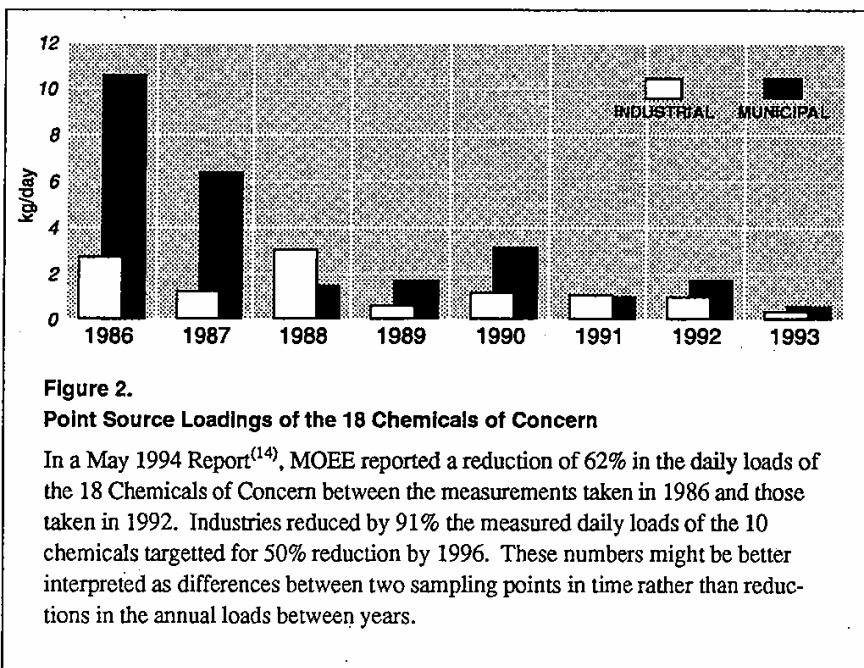
Presently, direct dischargers in the AOC are being contacted to inquire about their interest in participating in this program.

RECOMMENDATIONS

Please see Surveillance and Monitoring for Recommendation #27:

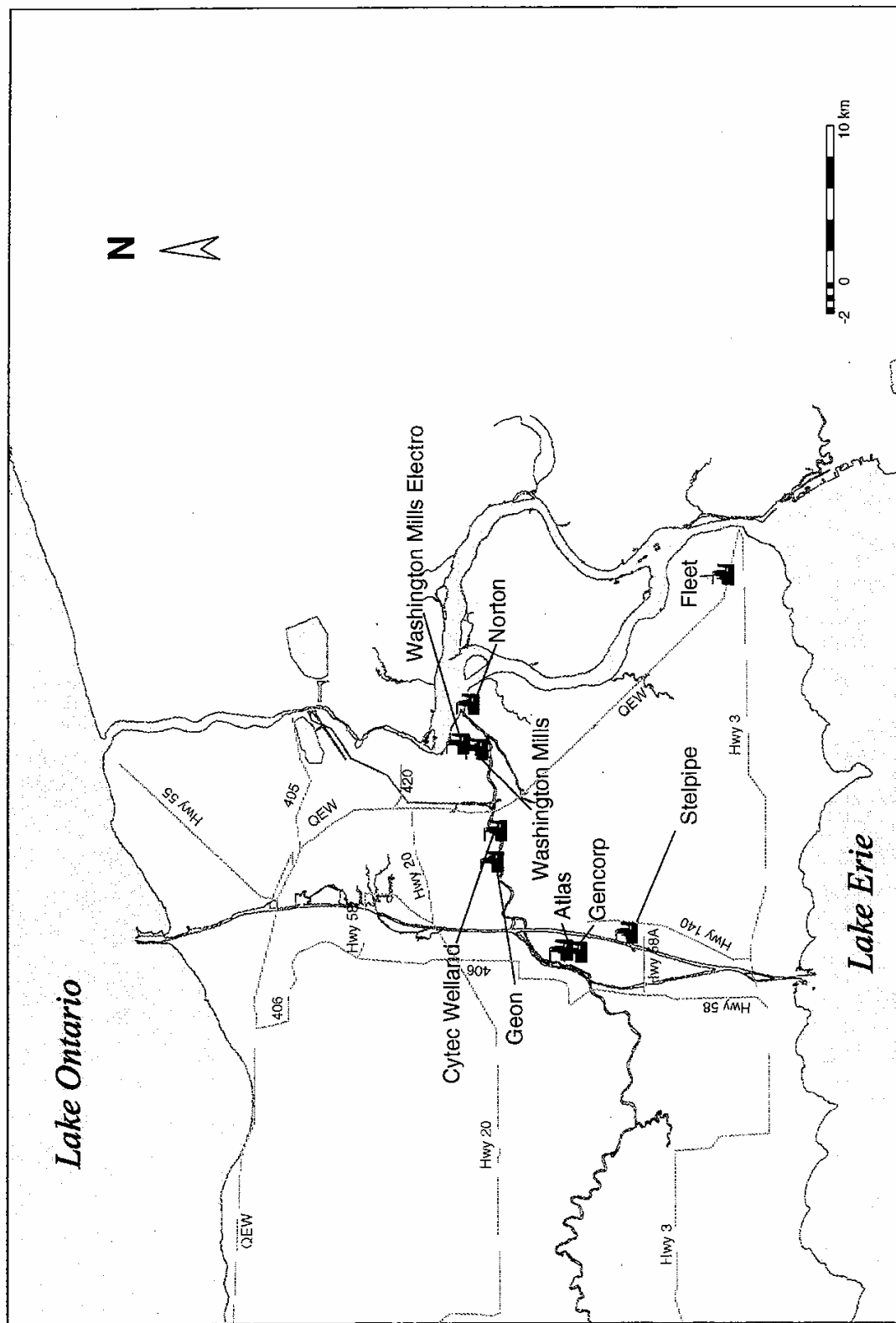
“Continue monitoring industrial point sources and publish results.”

The intent of this Recommendation is to ensure monitoring programs continue. Based on the downward trends demonstrated by the NRTMP Point Source Monitoring, no further action is suggested at this time.



(14) Update Reports. Reduction of Toxic Chemicals From Ontario Point Sources Discharging To The Niagara River 1992 and 1993. Ministry of Environment and Energy. May 1994, 1995.

Industrial Point Sources



Data Source: Update Report Reduction of Toxic Chemicals from Ontario Point Sources Discharging to the Niagara River 1992. (MOEE, 1994)

Map created by Water Issues Division
Environment Canada
Environnement Canada

WATER QUALITY

Rural Non-Point Sources

The Rural Non-Point Sources category refers to the environmental issues stemming from agriculture and other (e.g., construction practices, residential septic systems) practices in the rural areas of the Niagara River AOC.

RATIONALE

Many sources of pollution contribute to water quality problems in the rural area. Generally these fall within the classification of non-point sources - that is, the sources are diffused or

dispersed throughout the watershed. As identified in the Stage One Update Report, water quality problems include elevated levels of bacteria, phosphorus and nitrates.

This diffuse nature of the sources requires all rural land users to become involved in remedial action throughout the entire watershed if there is to be any successful remediation in the rural areas. In the rural area, there is no one pipe or source of pollution.

An existing program has successfully reduced pollution from non-point sources in a small geographic area of the AOC. The goal of the Clean Up Rural Beaches (CURB) program is to reduce or eliminate pollution at rural beaches. Through the program, rural landowners are eligible to receive financial and technical assistance to clean up potential sources of pollution on their property, principally bacteria loadings to the rivers.

RECOMMENDATION #13

Prepare and implement a rural non-point source pollution remediation strategy.

Marshes are Nature's Water Treatment Plants

Under the CURB program, the Upper Thames River Conservation Authority has built an artificial 0.3 hectare wetland area on a dairy farm to treat manure runoff. Preliminary results indicate that this system has reduced the levels of phosphorus, ammonia and faecal coliform bacteria by up to 95%.

The CURB program has been successful at cleaning up pollution sources that were impacting beaches. However, because it is a beach oriented program, less than 10% of the Niagara River AOC is covered by the program. Consequently, this program has been limited to only a few rural landowners, despite poor water quality throughout the Niagara River AOC.

Building on the experience of the CURB program, the proposed Rural Non-Point Source Remediation Strategy would restore and protect water quality in the rural areas of the watershed, by addressing individual

sources of pollution in a coordinated fashion.

A similar Recommendation has been developed in the Bay of Quinte RAP.⁽¹⁵⁾ That report describes in considerable detail the goals of the program, its critical elements, organization, workplan and schedule.

EVALUATION

CURB has been a very successful delivery vehicle for restoring water quality, notwithstanding its limited geographic area. Its success has been due to its ability to both encourage local landowners and governments to work together and to deal comprehensively with diffuse sources of pollution. The Niagara River RAP participants supported creating a Recommendation modelled on the CURB program.

⁽¹⁵⁾ *Agricultural NPS Remediation Strategies - Guidelines For Remedial Action Plans*. D.W. Draper and Associates Ltd. and HSP Inc. Environment Canada, Great Lakes Action Plan - Cleanup Fund. January 5, 1994.

Recommendation #13 is directly linked to Recommendations #14 (Environmental Farm Plan Program) and #29 (Welland River and Niagara River tributaries Monitoring Program).

Recommendation #13 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	1, 5, 6, 7, 8, 9, 10, 11, 15	1, 5, 6, 7, 8, 9, 10, 11, 15
Beneficial Use Impairments (Table 1)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 13, 14	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 13, 14

PROPOSED LEAD:

Niagara Peninsula Conservation Authority

PROPOSED PARTNERS:

EC (Great Lakes Cleanup Fund), MOEE, OMAFRA, Farmers.

TIMING:

Immediate

COST

Cost of remediation of all rural non-point sources of pollution is estimated at \$9.2M⁽¹⁶⁾

STATUS

The NPCA is presently implementing a rural non-point source remediation strategy for subwatersheds of the Welland River. The 'Agricultural Implementation Strategy and Remediation Program for the Welland River' consists of three parts: a water quality assessment and stream monitoring program; a landowner contact program; and development of remedial projects identified through the water quality monitoring and assessment. Water quality information and specific problem locations will be documented on GIS. This three year program runs until 1997 (dependent on securing funding). The water quality analysis and field observation portions of this program have been completed. Remedial actions will be initiated this year.

In addition NPCA is developing a ten year program to begin upon completion of the current three year Program. This proactive program, focusing on achieving specific goals for targeted subwatersheds, will be directed by a multi-agency steering committee. The key tasks of the program will include: i) information and extension activities, ii) cost sharing incentive programs, iii) technical assistance, iv) demonstration programs, v) program targeting initiatives, and vi) progress monitoring.

It should be noted that both these programs are consistent with the direction recently set by the NPCA through its "Rural Clean Water Program" (See Appendix F for program details).

⁽¹⁶⁾ This figure is based on the following information: \$3.2M for agricultural sources and \$6.0M for septic systems.
Source: NPCA.

The following four programs were identified as part of a rural pollution control/prevention strategy for the Niagara River Area of Concern. The Stage One Update Report contains water quality information for the Welland River and other Niagara River tributaries.

Rural Pollution Control / Prevention Strategy - Recommended Programs

Mandatory Septic System Re-Inspection

Ensure mandatory septic system inspection for all rural properties at least once every 15 years.

This program addresses the need to ensure septic systems, over time, are properly maintained. Septic systems are not designed to last forever. On average a septic system can be expected to function properly for 15 to 20 years.

Inspection as a condition of sale or every 15 years is the middle ground between mandatory checks every three years as suggested by the Commission on Planning and Development Reform in Ontario and the present situation of not requiring any inspections after installation.

There is precedent for required septic system inspection. Inspections by the Region of Niagara Health Department have been averaging about 600 per year⁽¹⁷⁾. Generally these inspections have been requested by banks or buyers acquiring first time mortgages or mortgage renewals.

A septic system reinspection program would ensure that septic systems in homes that did not change hands, were also operating properly.

Proposed Lead:

Region of Niagara Health Department

Proposed Partners:

MOEE, NPCA

Timing:

Immediately

Cost:

The cost of implementing this program of septic system reinspection has not been estimated.

Status

At the present time, the Municipality does not have the legal right to develop and implement a septic system reinspection program. However, an amendment to the Environmental Protection Act is currently before the Ontario Legislature. This enabling legislation would allow a municipality to institute a program of septic system reinspection. Supporting documentation notes that MOEE would be required to establish septic inspection training programs. The proposal is part of the planning reform initiative of the provincial government.

(17) Private Septic System Inspections By Year 1990 (616); 1991 (620); 1992 (695); 1993 (547).
Source: Region of Niagara Health Department

Care and Feeding of ... Your Septic System

This manual offers operating advice, details the maintenance requirements, and suggests options for septic systems in need of repairs. It is a practical guide to day-to-day "care and feeding" of your on-site treatment system.

Contact MOEE (the Public Information Office) for your copy.

Rural Pollution Control / Prevention Strategy - *Recommended Programs*

Research Residential Sewage Disposal Systems

**Research residential sewage disposal systems
to determine best system for use in the
Niagara River Area of Concern.**

There is a concern that the traditionally designed septic system may not be the most appropriate system given the predominately heavy clay soils found in the Niagara River AOC.

Rather than conducting research, the purpose of this program would be to find and utilize research that has been undertaken by other organizations and is applicable to the local soil conditions in the Niagara Peninsula.

Composting Toilets

Public Works Canada concluded in a report "Composting Toilets - A Report on their Use and Performance" (June 1994), that composting toilets are an effective means of handling toilet wastes and a viable alternative to the conventional methods. They have proven themselves to accomplish on-site waste management in a cost-saving, energy-saving, waterless, odourless and non-polluting manner, with safe useful end-products.

Proposed Lead:

Region of Niagara Health Department

Proposed Partners:

NPCA, MOEE (Municipal Approval Section), academic and research institutions

Timing:

Immediate

Cost:

Cost of implementing this program has not been estimated.

Status

At the present time, a number of institutions and organizations (e.g., University of Guelph, University of Waterloo, Sir Sandford Fleming College, Parks Canada and the U.S. EPA) are conducting research into sewage disposal system designs, including alternatives to septic systems, such as composting toilets. It is suggested that these organizations be contacted to see if any of the work to date is applicable to the soil conditions of the Niagara Peninsula.

Rural Pollution Control / Prevention Strategy - Recommended Programs

ClearingHouse For Funding Program

**Continue financial incentive programs by
existing agencies.**

By one count, there were over 17 government and 20 non-government funding programs potentially available for rural non-point source pollution control in the AOCs. (See pg 57, *Funding Programs: A Partial List*). Ideally, there would be one office offering 37 coordinated programs for cleaning up rural non-point sources of pollution.

It is important that these programs continue as they are a source of funds for remediating and protecting water quality. Recognizing that the programs will continue to be offered by different funding agencies, discussions need to be initiated immediately to determine a lead agency that will act as a clearinghouse for all these programs; that is, create a one window access to the programs for the rural community.

Proposed Lead:

To be determined

Proposed Partners:

Funders

Timing:

Immediate

Cost:

Agency staff time.

Status

At the present time, there is no central Clearing House or one window access to funding programs.

Rural Pollution Control / Prevention Strategy - Recommended Programs

Ringbill Gulls Water Quality Study

Research impact of Ringbill Gulls on water quality in the rural areas of the Area of Concern, to determine if it contributes to an impaired use.

Under CURB, bacteria control measures have been implemented at the Binbrook Reservoir beach, part of the Niagara River AOC. Included in this comprehensive strategy were species and site specific control measures to address bacteria sources - gulls feeding and roosting on the beach area. These measures have been successful in controlling bacteria levels in the water, resulting from gull populations using the beach area.

The question has been raised, "If the gulls are a known contributor to water quality problems at rural beaches, and they are found in equally large numbers in farm fields, do they also contribute to water quality problems in agricultural areas?" This question needs to be answered before considering a Recommendation to control gulls in agricultural areas. As this is an issue that could have an impact on any AOC with an agricultural component, MOEE has been proposed as the 'lead' agency.

Proposed Lead:

Ministry of Environment and Energy

Proposed Partners:

NPCA, Environment Canada (CWS), AC, OMAFRA

Timing:

Immediate

Cost:

Cost of study has not been estimated.

Status

At the present time, it is not known if Ringbill Gulls are contributing to water quality problems in the rural areas of the Niagara River Area of Concern.

RATIONALE

The Environmental Farm Plan (EFP) program was developed in 1993 by the Ontario Farm Environmental Coalition (Ontario Federation of Agriculture, Christian Farmers Federation of Ontario, AGCare and the Ontario Farm Animal Council). By proceeding through a self directed workbook, the farmer develops an Action Plan for managing risks, including environmental risks. In doing so, the farmer can reduce the environmental impact of a farming operation. The Niagara River RAP supports this new initiative as a mechanism for addressing the agricultural component of rural non-point source pollution.

Water quality topics covered by the EFP review include: storage of petroleum,

pesticides and fertilizers; treatment of household waste water; storage of agricultural waste; livestock yards; milking centre washwater; water efficiency; soil management; nutrient management in growing crops; manure use and management; stream, ditch and floodplain management; wetlands and wildlife ponds; and woodlands and wildlife. (See Figure 3 for an example of the workbook).

The Ontario Farm Environmental Coalition's goal is to have in place an Action Plan for every farm in Ontario by the year 2000. Given the environmental component of the EFP, the Niagara River RAP encourages the farmers in the AOC to follow the practices outlined in the EFP. Voluntary participation by the farmers will contribute to protecting and improving water quality in the rural areas.

Within the EFP, there is an Incentive Program. The purpose of the Incentive Program is to encourage the farmer to commit his financial resources to implement environmental solutions identified in his Action Plan.

However, given the cost of remedial actions, the present grant of \$500 is not sufficient for this purpose. It was felt that an additional \$1000 (total incentive \$1500) would provide sufficient incentive to the farmer.

EVALUATION

Niagara River RAP participants saw the Environmental Farm Plans as a credible vehicle for remediating agricultural sources of pollution and so supported its inclusion as a Recommendation in the Niagara River RAP Stage 2 Report. Participants recognized

RECOMMENDATION #14

Farmers in the Niagara River AOC be encouraged to follow sound farming practices such as recommended in the Environmental Farm Plan program.

RECOMMENDATION #15

Additional funding per farm business be given to the Environmental Farm Plan Incentive Program operating in the Niagara River AOC.

Environmental Farm Plan - Environmental Practices

Promoting sound environmental practices are an integral part of the Environmental Farm Plan program. For example, the following practices are included under the "best" category:

- Forest is managed by a set plan for environmental and commercial benefits (woodlots);
- Forest operations cause no damage to soil and water quality (woodlots);
- No access to woodlot by livestock (woodlots);
- More than 10 feet of natural vegetation in the buffer strip (streams and ditches); and
- No bank damaged from entry of surface water (streams and ditches).

that the EFP program represents the 'carrot' approach to remediation and so is the preferred approach. The fact that the program is new and untested, is grounds for regularly reviewing its progress.

Recommendations #14 and #15 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	1, 5, 6, 7, 8, 9, 10, 11, 15	1, 5, 6, 7, 8, 9, 10, 11, 15
Beneficial Use Impairments (Table 1)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 13, 14	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 13, 14

PROPOSED LEAD:

Ontario Farm Environmental Coalition

PROPOSED PARTNERS:

Farmers, AC, OMAFRA

TIMING:

Immediate

COST

Additional costs to operate the Environmental Farm Plan (above what is already budgeted) are not anticipated.

Estimated cost of remediating all agricultural sources of pollution is \$3.2M (see Recommendation #17).

Cost of increasing the financial incentive has not been estimated as cost depends on how many farmers claim the incentive.

STATUS

Farmers in the Niagara River AOC are participating in the EFP.

Figure 3.

Environmental Farm Plan Worksheet (Courtesy of the Environmental Farm Plan Program)

Worksheet #23 Woodlands and Wildlife: How do you rate?

ONTARIO ENVIRONMENTAL FARM PLAN WORKBOOK

Rating	4 Best	3 Good	2 Fair	1 Poor	Sites	Your Rating	
WOODLOTS							
1 Management	Forest is managed by a set plan for environmental and commercial benefits. Dense undergrowth with a variety of tree and other woodland species. Forest operations cause no damage to soil and water quality.	Forest is managed by proper harvesting – no long term plan. Undergrowth is moderate – commercial species only. Forest operations cause minimal damage to soil and water quality.	Forest is neglected or too heavily cut OR all best trees have been harvested. Few young trees (saplings or seedlings). Some field weed species present. Forest operations cause significant damage to soil and water quality.	Forests have been recently removed or “clear-cut”. No young trees (saplings or seedlings). Field weed species only. Forest operations cause irreparable damage to soil and water quality.			
2 Livestock access	No access to woodlot by livestock.	Livestock restricted to less than 10% of woodlot OR access is for less than 10% of the year (6 weeks total).	Livestock have access to woodlot on a seasonal basis.	Livestock have free access to woodlot at all times of year.			

Bold italic type: These conditions violate provincial legislation.

Worksheet #23

FUNDING PROGRAMS: A PARTIAL LIST

(As of November 1993)⁽¹⁸⁾ ⁽¹⁹⁾

Government-sponsored programs include:

Canada Green Plan
Environmental Farm Planning
Environmental Farm Practices Incentive Program
Provincial Rural Beaches Program
Clean Up Rural Beaches Program
Conservation Land Tax Rebate Program
Private Landowners Assistance Program
Community Fisheries Involvement Program
Community Wildlife Involvement Program
Woodland Improvement Act Assistance / Agreement
Regional Establishment Program
Jobs Ontario Community Action
Environmental Youth Corps
Environmental Education and Awareness Program
Green Communities Initiative
Accelerated Depreciation Program for Environmental Purchases
Canada's Great Lakes Action Plan - Cleanup Fund

Private funds which may be applicable to RAP areas include:

Global Relief
Shell Environmental Fund
Trees Ontario
Allstate Foundation of Canada
Carthy Foundation
Chawkers Foundation
Friends of the Environment Foundation
George Cedric Metcalf Charitable Foundation
George Lunan Foundation
Great Lakes Conservation Program (Laidlaw Foundation)
J.P.Bickell Foundation
McLean Foundation
National Heritage Challenge Program (Ontario Heritage Foundation)
National Heritage Grant Program (Ontario Heritage Foundation)
Peacock Foundation
PEW Charitable Trusts
Rockerfeller Brothers Fund
The Samuel and Saidye Bronfman Family Foundation
Sir Joseph Flavelle Foundation

⁽¹⁸⁾ *Agricultural Non-Point Sources Remediation Strategies - Guidelines for Remedial Action Plans. For Environment Canada. January 1994.*

⁽¹⁹⁾ *An excellent inventory of all relevant programs may be found in "Inventory of Ontario Provincial Funding Programs Applicable to Remedial Action Plans", January 1991. MOEE.*

The Recommendations in this section address the environmental issues associated with contaminated sediment in the rivers and tributaries. Please refer to the 'Environmental Conditions and Problem Definition' and 'Stage One Update' reports for background material on contaminated sites.

SEDIMENT RECOMMENDATIONS

RATIONALE

The Niagara River RAP has identified the lower Welland River as the priority focus of sediment assessment work in the AOC.

Within a portion of the lower Welland River, the Welland River (Welland) Cleanup Committee has been established and is working with EC, MOEE, and Atlas Specialty Steels to facilitate sediment assessment and develop a detailed proposal for full scale cleanup in the summer of 1995.

RECOMMENDATION #16

The lower Welland River (downstream of the Welland airport) be the priority focus of any sediment assessment.

EVALUATION

Based on the success of a pilot project (Welland River Sediment Removal Demonstration) and subsequent studies, Niagara River RAP participants agreed that implementation of this Recommendation, by removing a source of contamination to the river, will help to achieve the Niagara River RAP goals for the Welland River and Niagara River tributaries.

Recommendation #16 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	Not applicable	16
Beneficial Use Impairments (Table 1)	Not applicable	6, 7

Additional Information

MOEE has issued a series of reports associated with its sediment management strategy. These include:

- Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario;
- Laboratory Sediment Biological Testing Protocol;
- Sediment Assessment: A Guide to Study Design, Sampling and Laboratory Analysis; and
- Guidelines for Evaluating Construction Activities Impacting on Water Resources.

In preparation at this time (February 1995) is the following document:

- An Integrated Approach to the Evaluation and Management of Contaminated Sediments (draft).

The first four reports are available through MOEE's Public Information Centre.

PROPOSED LEAD:

Welland River (Welland) Cleanup Committee

PROPOSED PARTNERS:

Members of the Welland River (Welland) Cleanup Committee

TIMING:

Summer 1995

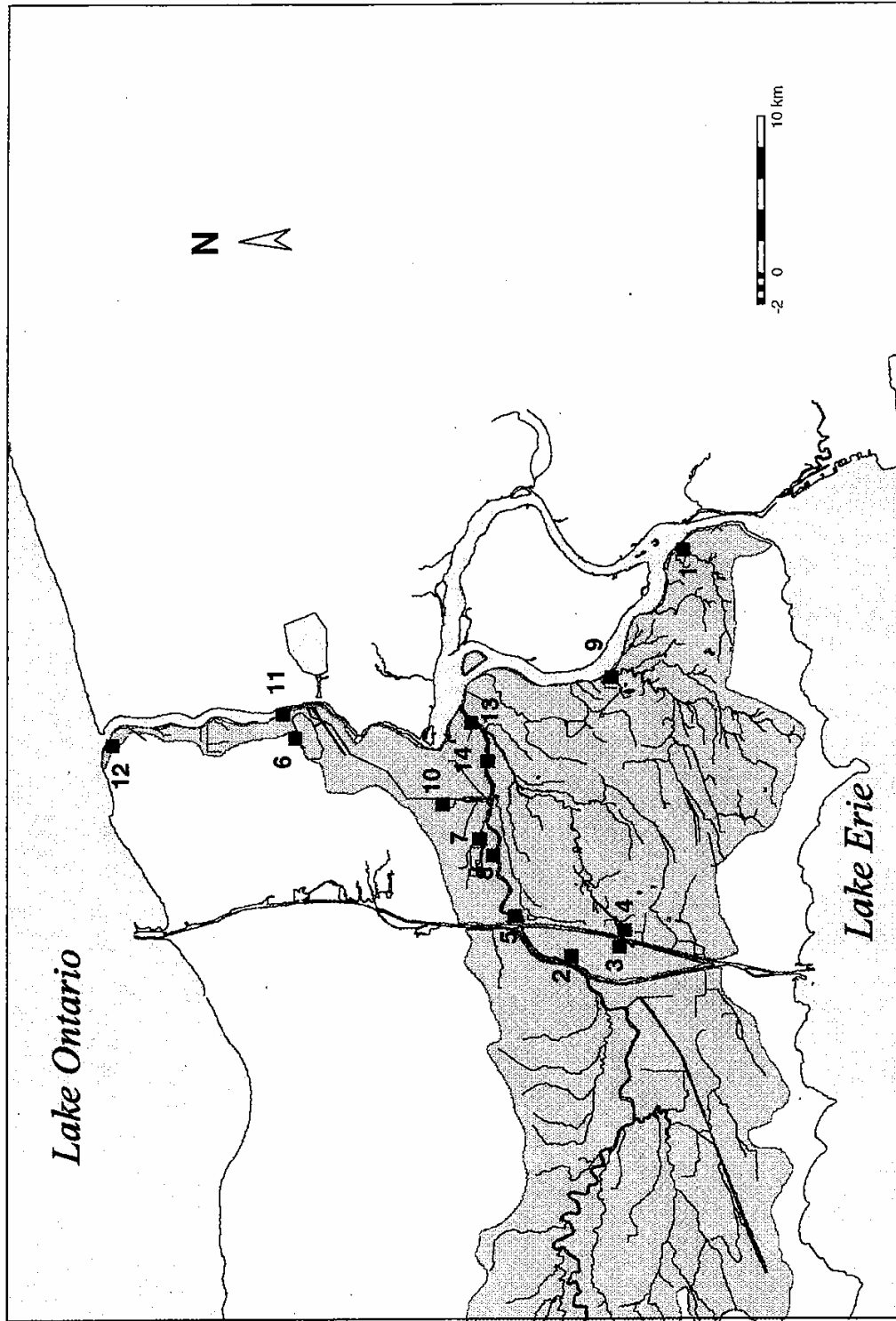
COST:

Estimated cost is \$4.0 M (with silt curtain) or \$3.5 M (without silt curtain).

STATUS:

A full scale cleanup of the Welland Reef site (approximately 6500 cu.m.) is planned for Summer 1995.

Contaminated Sediment Sites



Contaminated Sediment Sites

- | | | | |
|----------------------|----------------------------------|---|-------------------|
| 1 Frenchman Creek | 5 Welland River at Port Robinson | 9 Black Creek | 13 Pell Creek |
| 2 Welland River Reef | 6 Sir Adam Beck Reservoir | 10 Chippawa Power Canal | 14 Chippawa Creek |
| 3 Lyons Creek West | 7 Thompsons Creek at Cytec | 11 Niagara River at Queenston | |
| 4 Lyons Creek East | 8 Welland River at Geon | 12 Niagara River at Niagara-on-the-Lake | |

Data Source: Ministry of Environment and Energy, 1994

Map 4

Map created by Water Issues Division

Environment Canada
 Environment Canada

RATIONALE

The Niagara River RAP Sediment Working Committee met in the Summer and Fall of 1993 to review and assess all previously identified potentially contaminated locations. A

classification system was developed. It included three categories: Level 1 (detailed sediment assessment and/or remediation required/work underway); Level 2 (available information indicates the further (site specific) sampling is required, followed by a decision to move to Level 1 or 3); and Level 3 (Sites to be included in a long term monitoring program). See Stage One Update - Sediment Section for a short description and assessment of the sites in each category.

Level 1 sites are under active investigation at this time. Recommendation #17 identifies the need to resample Level 2 sites. Level 3 sites will need to be part of an ongoing Niagara River AOC sampling program.

EVALUATION

Identification of contaminated sites is the first step of a cleanup or remediation process. Identifying potentially contaminated sites therefore, is a prerequisite to removing a source of pollution and therefore a prerequisite to achieving the Niagara River RAP goals.

RECOMMENDATION #17

Potentially contaminated locations be prioritized for review, assessment and remediation.

Welland River Sediment Removal Demonstration

In fall 1991, a demonstration of contaminated sediment removal took place in the Welland River. A modified Mud Cat dredge was used to remove 230 cubic meters of industrial mill scale and clayey silt sediments. The sediment was transported in a flexible pipeline to a multi-stage sediment treatment plant.

Success of this project has led to discussion of a full scale clean-up of this area, *now planned for Summer 1995.*

Recommendation #17 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	6	16
Beneficial Use Impairments (Table 1)	6, 7	6, 7

PROPOSED LEAD:

Niagara River RAP (Sediment Working Group)

PROPOSED PARTNERS:

PAC

TIMING:

Review Completed (*Refer to the Stage One Update report*).

COST:

Agency staff and volunteer time.

STATUS:

The review of the identified sites has been completed. Further assessment of the Level 2 sites is ongoing, as noted in Recommendation #18.

RATIONALE

It was agreed by the Sediment Working Group that potentially contaminated sites identified by the Group (see Recommendation #17) be re-sampled in order to confirm either absence or presence of suspected contamination. Included are the following three sites: Sir Adam Beck Reservoir, Thompson Creek at Cytec and Frenchman Creek. This determination can not be made on presently available information. Any followup work will depend on sample results.

RECOMMENDATION #18

Test potentially contaminated sediment sites to confirm absence / presence of contamination.

EVALUATION

Determining if these sites contain contaminated sediment and remediating the sites if required will help to achieve the Niagara River RAP goals by removing a source of contamination to the rivers and tributaries.

Recommendation #18 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	6	16
Beneficial Use Impairments (Table 1)	6, 7	6, 7

PROPOSED LEAD:

Frenchman Creek — MOEE
Thompson Creek — Cytec
Sir Adam Beck Reservoir — MOEE

PROPOSED PARTNERS:

MOEE, EC

TIMING:

Immediately

COST:

Resampling can be conducted within existing industry and government agency program budgets. Remediation costs are dependent on study findings and so have not been estimated.

STATUS:

Thompson Creek site is currently being sampled by a consultant for Cytec. The Sir Adam Beck Reservoir and Frenchman Creek can be sampled through MOEE.

BIOTA / HABITAT RECOMMENDATIONS

'The Ecological Imperative'

The purpose of these papers (Appendix A) is to stimulate discussion of issues central to the Niagara River RAP's consideration and development of biota/habitat recommendations. These are not "scientific" papers, designed to present research findings.

The first of the three interconnected papers, "General Overview and Application of Ecological Relationships" discusses the need to establish an overall ecological context. "Towards Maintaining Niagara District's Sustainable Environment" is the application of this overview to the Niagara Area. Lastly, in the paper "An Application of Sustainable Environmental Management", the ecological overview is applied to a parcel of land.

Wildlife (biota) depends on areas of natural environment (habitat) for survival. Niagara River RAP participants adopted the view that restoring and protecting habitats should be the focus of Recommendations. For example, an aquatic insect community could not exist in a polluted stream, nor could a healthy human community survive in a polluted atmosphere. Only when the habitat is rehabilitated can plant and animal life repopulate a habitat.

The Niagara River RAP accepted the view that it is important to recognize that habitat restoration projects are also part of, and must fit into a regional framework.

RECOMMENDATION #19

**Prepare a natural heritage strategy
for the Niagara River AOC.**

RATIONALE

Landscapes in most of southern Ontario, including the Niagara River AOC, are a fragmented network of semi-natural areas. Many of these are small and isolated from other features, like a mosaic, and there is considerable scientific evidence that the species they contain are at risk because of this. In order to maintain an integrated ecosystem in the Niagara watershed, there is a clear need to first protect and conserve the existing natural features with their functions.

As well, core natural areas must be knit back together with natural corridors by restoring land where none exist, if necessary. This integrated network of lands and waters, define the natural landscape we wish to conserve: our natural heritage strategy.⁽²⁰⁾

Recognizing the fragmented nature of the existing data base and the need to provide a framework for remediating beneficial use impairments, 'Loss of fish and wildlife habitat' and 'Degraded fish and wildlife populations', the Niagara River RAP will prepare a natural heritage strategy.

The strategy involves assembling existing information on wetlands, Areas of Natural and Scientific Investigation (ANSI), valley lands, Environmentally Sensitive Areas (ESAs), woodlands, waterbodies, watercourses, artificial fish and wildlife habitat, corridors, species at risk, historical and other data.

This information is compiled on a G.I.S. where it is reviewed using a technique called 'gap analysis'. This analysis identifies what the historical landscape used to look like based on the present soils and geology and missing or under-represented vegetation. The purpose of this analysis is to identify the habitat potential for creation and rehabilitation. With this information, the natural heritage strategy can be developed.

With the recent passage of Ontario's new Planning Act, a number of key natural features such as woodlands, valley corridors, water systems, habitat areas, and wetlands, which contribute to overall ecosystem health, are to be protected (part of Goal A, "Natural Heritage, Environmental Protection and Hazard Policies").⁽²¹⁾ A natural heritage strategy is one way of implementing this section of the Planning Act.

⁽²⁰⁾ For more information, refer to, Riley, J.L. and P. Mohr. *The Natural Heritage of Southern Ontario's Settled Landscapes*. Ontario Ministry of Natural Resources. 1994.

⁽²¹⁾ Ontario's New Planning System. "Empowering Municipalities Protecting the Environment Streamlining the Planning Process." Ministry of Municipal Affairs. December 1994.

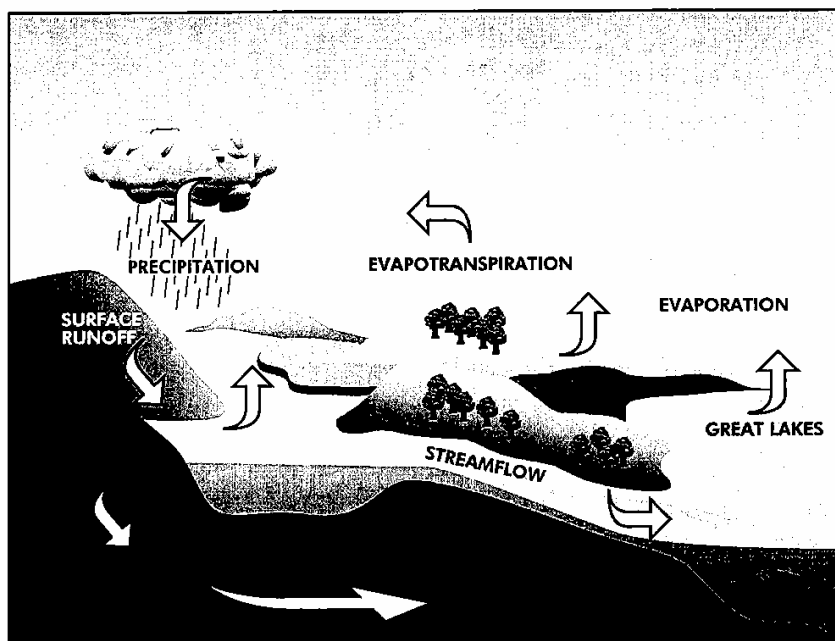


Figure 4. The Water Cycle

(Source: 'Clean Waters, Clear Choices'. Metro Toronto and Region RAP)

EVALUATION

The strategy will make recommendations on landscape retention, restoration and replacement targets leading to the restoration of biota/habitat beneficial use impairments of the Niagara River RAP.

PROPOSED LEAD:

Region of Niagara /
Environment Canada
(CWS)

PROPOSED PARTNERS:

NPC, NPCA, MOEE,
OMNR, Niagara Falls
Naturalists, Peninsula
Field Naturalists, Niagara
River RAP.

TIMING:

Immediately

COST:

Cost has not been deter-
mined.

Recommendation #19 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	11, 12, 13, 14	11, 12, 13, 14
Beneficial Use Impairments (Table 1)	1, 3, 4, 5, 6, 11, 13, 14	1, 3, 4, 5, 6, 11, 13, 14

STATUS:

A Niagara River RAP Ad Hoc committee composed of NPC, NPCA, OMNR, Niagara Falls Naturalists, citizens and co-chaired by the Region of Niagara and CWS is preparing a plan for developing a natural heritage strategy. It is anticipated that the development plan will be completed by Spring 1995, after which time work on the natural heritage strategy will commence.

RATIONALE

Governments are continually reviewing Acts, Regulations and Policies that have an impact on water quality in the Niagara River Area of Concern. These review processes generally include an extensive public consultation component. By participating in these review processes, Niagara River RAP participants can work to ensure these other policies etc., are consistent with the Niagara River RAP goals. Rather than waiting for other environmental initiatives to come to the Niagara River RAP, this Recommendation clearly suggests the Niagara River RAP has a responsibility to take its goals to other environmental processes that could affect water quality in the Niagara River AOC.

RECOMMENDATION #20

The PAC will critically evaluate government review processes to ensure that they embody the principles and objectives of the Niagara River RAP.

EVALUATION

PAC participation in the different government review process will help to ensure government policies and practices reflect the Niagara River RAP goals and objectives.

Recommendation #20 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	All (Indirectly)	All (Indirectly)
Beneficial Use Impairments (Table 1)	All (Indirectly)	All (Indirectly)

PROPOSED LEAD:

PAC

PROPOSED PARTNERS:

Various (dependent on the issue being reviewed)

COST:

Volunteer and agency staff time.

TIMING:

Ongoing

STATUS:

At any one time, there are a number of government review processes that could have an impact on water quality in the Niagara River AOC. As of February 1995, these included the following:

- Environmental Policy Review
(Region of Niagara)
- Watershed Strategy Initiative
(Niagara Peninsula Conservation Authority)
- Drainage Act Administrative Review
(Ontario Ministry of Agriculture, Food and Rural Affairs)

Government Review Processes

Environmental Policy Review (Region of Niagara)

Participate in Region of Niagara's review of its Environmental Policy.

The Region of Niagara, through its Ecological and Environmental Advisory Committee (EEAC), is currently reviewing its environmental policies, with an aim to developing an ecologically oriented municipal framework. Like the Ontario Planning Act, Regional planning policy has a major impact on the environment. There will be public consultation opportunities within this review process. The Niagara River RAP is on the Region's mailing list and will be notified of any opportunities for input.

Status:

The Niagara River RAP is on the Region's mailing list.

Contact:

Region of Niagara Planning Department.

Watershed Strategy Initiative (Niagara Peninsula Conservation Authority)

Participate in the Niagara Peninsula Conservation Authority's development of a Watershed Strategy Initiative.

In January of 1994, the Authority launched a new initiative, the Watershed Conservation Strategy. The Strategy is designed to develop activities to more effectively manage the natural resources in the Niagara Peninsula in consultation with its various partners in conservation - Provincial and Local government agencies, conservation clubs, special interest groups and interested private citizens.

The purposes of this project are to examine the NPCA's current programs, assess progress and prioritize the activities of the organization and programs for the future. The resulting report, the Watershed Conservation Strategy, will identify the resource management and environmental issues facing the watershed and, most importantly, will describe what actions the Authority will take to address these issues. The final Strategy will provide the framework for the future and will be used as a guide for accomplishing watershed objectives.

Goals and objectives of the project include eliminating/reducing duplication of effort between the NPCA and other government agencies with similar natural resource management programs, in order to streamline processes and to create more efficient systems for communities in the Niagara Peninsula. The Watershed Strategy Initiative will help to chart the Authority's strategic course into the future.

Status:

The Niagara River RAP is on NPCA's mailing list.

Contact:

Niagara Peninsula Conservation Authority

***Drainage Act Administrative Review
(Ontario Ministry of Agriculture, Food and Rural Affairs)***

RAP participate in Ontario Ministry of Agriculture, Food and Rural Affairs administrative review of the Drainage Act, to promote the application of ecosystem principles to drain design guidelines.

The design and maintenance of drains can have an impact on water quality in the rural areas of the Niagara River Area of Concern.

In September 1994, the Ontario Ministry of Agriculture, Food and Rural Affairs established a Stakeholder Committee to review, among other issues, design guidelines for drainage ditches. This review process provides an opportunity for the Niagara River RAP, through the involved organizations, to promote different drainage design concepts.

Status:

Stakeholder Committee being established.

Contact:

Ontario Ministry of Agriculture, Food and Rural Affairs
Mr. Sid Vander Veen (519) 767-3552

Spread of Exotic Species through Microscopic Organisms

In an effort to control the spread of exotic species, the Ministry of Natural Resources and the Ontario Federation of Anglers and Hunters have formed a partnership aimed at raising public awareness of how to slow down the spread of invading species. For example, exotic species, such as zebra mussels, can spread throughout the Great Lakes basin by people unknowingly transporting them in the microscopic organism stage of their lifecycle.

The partnership targets its free educational material to a wide cross section of society; including hunters, boaters, anglers and students. Their material addresses all aspects of the spread of exotic species, including how to prevent the spread of microscopic biota.

Contact:
The Invading Species Hotline 1 800 563-7741
(Ontario Federation of Anglers and Hunters)

RECOMMENDATION #21

A regulation requiring treatment or exchange (or some other technique) to ensure that ballast water cannot be a way for the introduction of exotic species into the Niagara River AOC be enacted.

RATIONALE

Ballast water is a common way for exotic aquatic species to enter the St. Lawrence River and Great Lakes. While the US government requires all foreign vessels entering American ports to perform a ballast water exchange at sea, the Canadian federal government does not require ships with a Canadian port destination to perform a seawater ballast exchange. Unlike the American program, the Canadian program is voluntary.

A regulation requiring ballast water exchange or some form of ballast water treatment to kill exotic species should be instituted in Canada to ensure that exotic freshwater species are no longer brought into any port of the St. Lawrence River, Great Lakes in ships' ballast water.

EVALUATION

Taking measures to ensure ballast water from ocean going ships is not an avenue for exotic species to enter the Niagara River AOC will help to meet the Niagara River RAP goals.

Recommendation #21	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	11	11
Beneficial Use Impairments (Table 1)	1, 3, 4, 5, 6,13	1, 3, 4, 5, 6,13

PROPOSED LEAD:

Department of Fisheries and Oceans / Transport Canada

PROPOSED PARTNERS:

OMNR

TIMING:

Immediate

COST:

Agency staff time.

STATUS:

At the present time, seawater ballast exchange is not required of ships with a Canadian port destination.

RATIONALE

Until recently, the four jurisdictions on the Niagara River (Canada, Ontario, U.S., New York State) did not have standard data collection and analysis methodologies. Consequently, much of the data was not comparable with other information collected from the same ecosystem, the Niagara River. In order to develop a comprehensive data base for the Niagara River, it was necessary to treat the river as one ecosystem. To do this the four jurisdictions agreed to collect data using standard methodologies and techniques and to share that information.

RECOMMENDATION #22

Continue to protect habitat on both sides of the Niagara River as one ecosystem.

EVALUATION

Implementing Recommendation #22 will allow the four jurisdictions that share the Niagara River to develop a comprehensive data base for the ecosystem. This common, comprehensive data base will allow the agencies to protect habitat in the Niagara River ecosystem. Such information is a necessary precondition for evaluating remediation efforts and delisting the Niagara River.

Recommendation #22 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	All (Indirectly)	Not applicable to Welland River
Beneficial Use Impairments (Table 1)	All (Indirectly)	Not applicable to Welland River

PROPOSED LEAD:

OMNR, NYSDEC

PROPOSED PARTNERS:

EC, USEPA, USFWS, CWS, DFO

TIMING:

Ongoing

COST:

No additional costs anticipated.

STATUS:

Agreement has been reached by the four parties to map the littoral zone habitat to a scale of 1:2000. Discussions continue on which physical parameters to measure (e.g., velocity, flow, substrate, aquatic plants and relative abundance).

RATIONALE

The focus of this Recommendation is to develop ecologically based planning documents (Official Plans, secondary plans, zoning by-laws) designed to ensure that development

does not have an adverse ecological impact on the watershed. The plans would provide policies respecting permitted uses, design criteria and questions to be addressed in reviewing specific development proposals. They would ensure that concerns with cumulative impacts - i.e., the impact of a number of unrelated proposals within the same watershed - were addressed while making the approval process for individual development projects more manageable.

Including watershed impacts as part of all plan reviews is consistent with recent land use planning reform legislation and guidance from the provincial government. Presently, many proposals are reviewed only for their impact on the immediate site or adjacent lands.

RECOMMENDATION #23

Municipal planning documents incorporate ecologically based policies and design criteria.

EVALUATION

Developing ecologically based planning documents would help ensure that development does not have an adverse ecological impact on the watershed and so will help to achieve the Niagara River RAP goals.

Recommendation #23 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	11	11
Beneficial Use Impairments (Table 1)	1, 3, 4, 5, 6, 13	1, 3, 4, 5, 6, 13

PROPOSED LEAD:

Region of Niagara

PROPOSED PARTNERS:

Area Municipalities, OMNR, NPCA, NPC, EC, MOEE

TIMING:

Ongoing

COST:

Agency staff time to review and revise planning documents.

STATUS:

Under current land use planning approval processes, not all land use proposals (e.g., site development) are subject to cumulative impact or watershed impact reviews.

Provincial Watershed Management Planning Initiative and the RAP

The Province in June 1993 released three interim watershed planning documents. (*Water Management on a Watershed Basis: Implementing an Ecosystem Approach; Subwatershed Planning; and Integrating Water Management Objectives into Municipal Planning Document*). These documents "describe a voluntary process for integrating provincial policies and programs related to water resource management and for reflecting the sustainability of water resources in the planning process."

The initiative identifies a five-part framework which defines, on an increasingly detailed and localized basis:

- broad water and related resource goals and objectives (watershed management plan);
- basic management strategies to meet the resource goals and objectives (watershed management plan);
- specific directions to guide land use planning decisions (subwatershed management plan);
- water resource requirements on individual land parcels that will meet the goals and objectives of stormwater plans; and
- site specific management techniques (site management plans).

The Remedial Action Plan process parallels the five-part framework as outlined above. The RAP has established community defined goals, objectives, and strategies. The RAP includes a process for developing and implementing 'shovel in the ground actions' - community liaison committees or mini-RAPs. Community liaison committees are expected to use appropriate management plans and techniques to develop site specific plans.

Warren Creek (Niagara Falls) and Frenchman Creek (Fort Erie) illustrate different approaches to watershed management planning. Warren Creek study is a 'planning/engineering' study initiated by the City of Niagara Falls, as part of the City's efforts to develop a business park. Frenchman Creek is a 'rehabilitation' project initiated and implemented by a community liaison committee concerned about the degradation of the stream and its watershed resources.

Whether it is for the purpose of accommodating new growth, restructuring existing development or remediating problems caused by existing development, it is important that the different approaches subscribe to the same set of goals and objectives, in this case, the RAP goals.

The RAP supports the use of 'watershed management planning' as a mechanism for implementing ecologically based municipal planning. (*See Recommendation #23*) Watershed management can take many forms. The RAP itself is a form of watershed planning. Community liaison committees will use some form of watershed planning to develop remediation plans. Subwatershed plans, a watershed management tool, have a role to play in planning urban development. While this RAP does not have a subwatershed planning Recommendation, it does support its discussion in the public forum provided by the Niagara Peninsula Conservation Authority's Watershed Strategy Initiative.

HUMAN HEALTH RECOMMENDATIONS

The Great Lakes Water Quality Agreement identifies human health as a component of a Remedial Action Plan. Health Canada suggests the RAPs use the World Health Organization's definition of health - "a state of complete physical, mental and social well-being and not just the absence of disease and disability."

Human Health Objectives

The waters, plants and animals of Lake Ontario shall be free from contaminants and organisms resulting from human activities at levels that affect human health or aesthetic factors such as tainting, odour and turbidity.

Human activities and decisions shall embrace environmental ethics and a commitment to responsible stewardship.

From: Great Lakes Water Quality Agreement

The *Environmental Conditions and Problem Definition* report describes the environmental problems in the AOC in terms of beneficial uses impaired, the degree of impairment and the geographic extent of such impairment.

The Niagara River RAP Stage Two Report moves the focus from identifying beneficial use impairments to identifying remedial actions or Recommendations. The Niagara River RAP human health Recommendations are designed to reduce human exposure to environmental contaminants.

(22) A 'pathway' includes all the elements that link the source of a contaminant to the exposure route by which the contaminant enters the body.

There are six main exposure 'pathways'⁽²²⁾ that contaminants in the environment can take to come in contact with humans. These are (not in order of importance):

- food (including fish, meat)
- water (drinking water, recreational use)
- air (indoor and outdoor)
- soil (dust, contaminated soil)
- sediments; and
- consumer products.

However, the greatest human exposure to Great Lakes persistent pollutants is through food: especially contaminated fish and wildlife. Only 10 to 15 percent of total exposure comes from air and water.⁽²³⁾ The Recommendations outlined in this section are designed to reduce an individual's exposure through the consumption of contaminated fish and wildlife.

(23) *The Great Lakes. Making Progress. The Government of Canada. 1993. Available from Environment Canada Inquiry Centre (Toronto, Ontario).*

Deposition of Air Pollutants to the Great Waters. First Report to Congress, U.S. EPA. May 1994

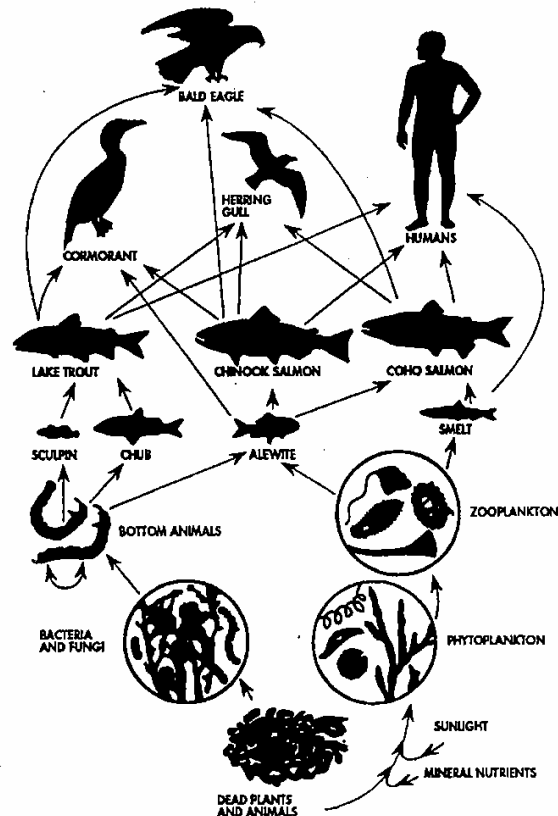


Figure 5. Typical Aquatic Food Web

(Source: Great Lakes, Great Legacy?, The Conservation Foundation)

RATIONALE

Because each of the jurisdictions sharing the Niagara River use its own testing protocol, sample sizes and acceptable contaminant levels, there can be contradictory advice on consumption of fish caught in the Niagara River and adjacent waters. It is suggested that the RAP produce a document, in an appropriate form that contains:

RECOMMENDATION #24

Develop a Niagara River Fish Consumption Advisory.

- the individual New York State and Ontario fish consumption advisories;
- a description of any differences in methodology currently used in the two jurisdictions and a discussion of the significance of differences; and
- consumption information about fish that are not currently in the province-wide Ontario Fish Consumption Guide (e.g., Upper Welland River).

Did You Know...?

An explanation of the "Guide To Eating Ontario Sport Fish" is available in English, French, Greek, Portuguese, Spanish, Italian and Chinese.

This advisory would not replace the state or province-wide documents currently published. Consideration would have to be given to the form(s) the consumption advisory information took. One report that covers all anglers may not be enough (e.g., posters, talks, etc.). While this would be an Ontario RAP lead study, it is suggested that New York State Department of Environmental Conservation should be a full participant in developing the Advisory.

EVALUATION

By distributing information about contaminants in fish, individuals will be able to reduce their exposure to contaminants and so reduce risks to their health.

PROPOSED LEAD:

MOEE (Environmental Monitoring and Reporting)

PROPOSED PARTNERS:

CIPHI (coordination), Region of Niagara Health Department, local angler organizations, cultural groups support organizations (local/provincial), OMNR, DFO, McMaster University (Great Lakes Fish and Wildlife Nutrition Project)⁽²⁴⁾, Health Canada (Great Lakes Health Effects Program), and NYSDEC

TIMING:

Immediate

Recommendation #24 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	Not applicable	Not applicable
Beneficial Use Impairments (Table 1)	Not applicable	Not applicable

Note: This Recommendation does not remediate a source of pollution and so is not applicable to the goals or beneficial use impairments.

COST:

Cost of the Recommendation has not been determined. However, the majority of the cost will be in agency staff and volunteer time.

STATUS:

Discussion should be initiated with proposed lead and partners.

⁽²⁴⁾ The McMaster University Environmental Health Program, with support from Health Canada's Great Lakes Health Effects Program, has initiated the "Great Lakes Fish and Wildlife Nutrition Project." The goal of the project is to develop public education/community action strategies to promote healthy consumption of Great Lakes sportfish and wildlife. There are many similarities between this project and Recommendations #24 and #25 and so it may be possible to share information and data.

RATIONALE

Water based wildlife is being consumed in the Area of Concern. Typically it includes waterfowl, bullfrogs, snapping turtles, and muskrat. Unlike fish, there is no wildlife consumption guide. The Niagara River RAP took the position that if game is being consumed, then ethically, research should be conducted to ensure that game is safe to consume.

The Lyon's Creek Action Committee has discussed conducting such a study of biota (turtles and frogs) in Lyons Creek.

This situation is not unique to the Niagara River AOC. There is not a wildlife consumption advisory for waterbased wildlife in Ontario. Rather than each AOC initiating its own study, it is suggested that a Great Lakes basin study be conducted.

RECOMMENDATION #25

Conduct research to determine if consumption of waterbased wildlife is harmful to human health.

EVALUATION

Distributing information about contaminants in waterbased wildlife enables individuals to take steps to reduce risks to their health.

Recommendation #25 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	Not applicable	Not applicable
Beneficial Use Impairments (Table 1)	Not applicable	Not applicable

Note: This Recommendation does not remediate a source of pollution and so is not applicable to the goals or beneficial use impairments.

PROPOSED LEAD:

Health Canada

PROPOSED PARTNERS:

CWS, OMNR

TIMING:

Immediate

COST:

Cost has not been estimated.

STATUS:

Discussion should be initiated with proposed lead and proposed partners.

SURVEILLANCE AND MONITORING RECOMMENDATIONS

Monitoring provides information that can be used to answer such questions as: Are standards being met? Are the Recommendations working? Have all sources of pollution been addressed? Given the importance of being able to show progress in the Niagara River RAP, monitoring will be required to answer these questions.

A surveillance program provides the framework for developing individual monitoring programs. Such a surveillance program is identified in Annex 2 of the GLWQA as a requirement for each RAP, "A description of surveillance and monitoring processes to track the effectiveness of remedial measures and the eventual confirmation of the restoration of uses."

While there has been no comprehensive surveillance program in the Niagara River AOC, there is an extensive history of monitoring in the AOC, including: monitoring for toxics under the Niagara River Toxics Management Plan (as well as tributary monitoring and shorewell monitoring); Environment Canada's Upstream/ Downstream Niagara River program, water quality monitoring on the Welland River and some of its tributaries and a number of ad hoc surveys as part of other studies in the Area of Concern (e.g., Ontario Waste Management Corporation survey of water quality in the area of its proposed site).

A recent trend in monitoring is to use biomonitoring techniques. Biomonitoring studies can indicate the presence of bioavailable contaminants at concentrations too low to be detected by direct chemical testing of the water.

Freshwater mussels (*Elliptio complanata*), filamentous algae (*Cladophora glomerata*) and young forage fish (*Notropis hudsonius*) have been routinely used as contaminant monitors on the Niagara River since 1980. The use of leeches (*Nephelopsis obscura*) as biomonitors for chlorinated phenols was initiated in the Niagara River in 1987 because of their ability to effectively accumulate these compounds. Sport fish are also routinely analyzed for contaminants to provide the public with consumption guidelines.

The biomonitoring studies using introduced mussels and leeches are designed to identify sources of contamination along the Niagara River and to compare the relative contribution of individual contaminants to the Niagara River from point and non-point sources. Biomonitoring studies will be particularly useful to determine if remediated waste sites or point sources are contributing contaminants to the river once cleanup efforts are complete.

Recent Biomonitoring Studies Include:

- Preliminary Technical Report of the Niagara River Mussel Biomonitoring Survey 1993. June 1994. MOEE.
- The Niagara River Mussel and Leech Biomonitoring Study. October 1992. MOEE.
- Spatial and temporal trends of organochlorine contaminants in spottail shiners from selected sites in the Great Lakes (1975-1990). Suns K.R., Hitchin G.G. and D. Toner. J. Great Lakes Res. 19(4):703-714
- Organochlorine contaminant trends in the Niagara River spottail shiners (trend update 1975-1993) Suns K. and G. Hitchin. April 1994. (MOE Report)

The proposed Niagara River RAP Surveillance Program was created by combining existing and proposed new monitoring programs. The Program consists of the following components:

- Upstream/Downstream Niagara River Monitoring Program;
- Point Source (municipal and industrial) Monitoring Programs;
- Urban Non-Point Source (landfills) Monitoring Program;
- Rural Non-Point Source Monitoring Program (new);
- Drinking Water Programs (including taste and odour programs);
- Resident Attitude Monitoring Program (new);
- Herring Gull Monitoring Program (new); and
- Community Based Wildlife Monitoring Program.

Note:

Recommendations #26 to #33 do not remediate sources of pollution and so are not applicable to the goals or beneficial use impairments.

It will be the responsibility of the Niagara Partners In Cleanup Committee to collect data from the monitoring programs and compile it into a comprehensive 'review' statement. This 'statement' could take the form of a 'State of the Environment' report, Technical Update Statements, etc.

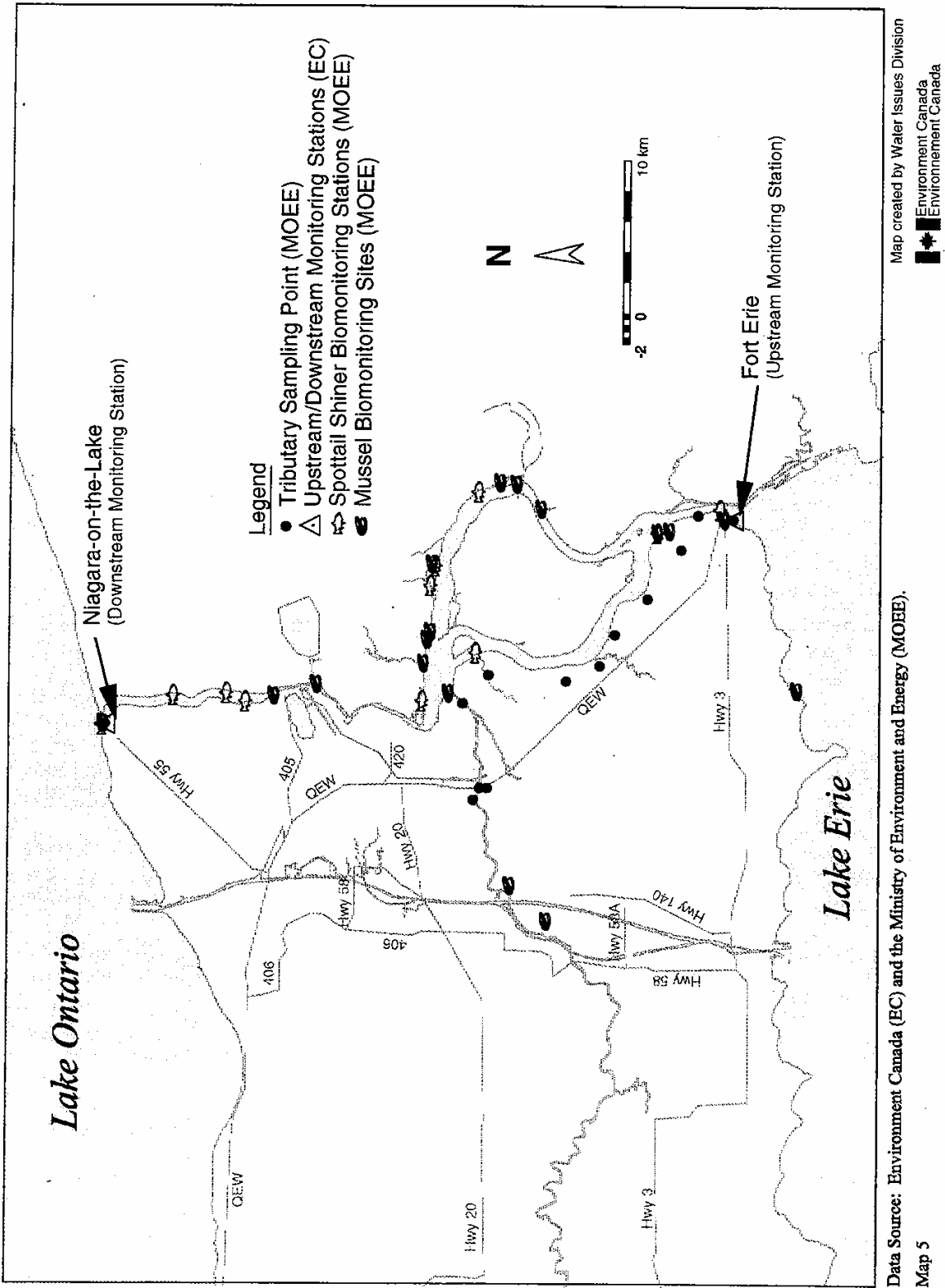
COMPONENTS OF THE NIAGARA RIVER RAP SURVEILLANCE PROGRAM

Upstream / Downstream Niagara River Monitoring Program

A water quality monitoring program involving the collection of ambient water and suspended solids samples at the head (Fort Erie) and mouth (Niagara-on-the-Lake) of the Niagara River has been established within NRTMP. The program, called Upstream/Downstream Niagara River Monitoring Program is operated by Environment Canada. Its purpose is to estimate input loadings of contaminants entering the Niagara River from Lake Erie at Fort Erie and output loadings leaving to Lake Ontario at Niagara on the Lake - the difference estimates the combined input of contaminants from point and non-point sources between these two points. (See Niagara River RAP Stage One Update for more information about the program and sampling data.)

At the 1993 Option Selection Workshop, participants suggested that the program results be monitored to determine the effectiveness of cleanup activities on the Canadian side. It was noted that because the program monitors inputs to the Niagara River from both Canada and the United States, the program results can not be used to monitor Ontario's cleanup efforts. However, the Upstream/Downstream Niagara River Monitoring Program will be one of the NRTMP programs to assess progress towards delisting in the Niagara River itself.

Monitoring Sites



Municipal and Industrial Point Sources Monitoring Programs

RATIONALE

As noted in the Introduction To Water Quality Monitoring Programs (see Appendix B), municipal point sources are currently monitored under the GLWQA, and NRTMP. Collectively, these programs monitor in excess of 256 parameters, including conventionals, nutrients, metals, and toxics.

The results of these monitoring programs show a reduction in the daily loads of the 18 Chemicals of Concern between the measurements taken in 1986 and those taken in 1992. These measurements might be better interpreted as differences between two sampling points in time than reductions in the annual loads between years. This downward trend is expected to continue as further remedial measures are implemented by the individual facilities.

The Municipal and Industrial Point Source Monitoring Program will continue.

RECOMMENDATION #26

Continue monitoring municipal point sources (e.g., sewage treatment plants) including but not restricted to NRTMP point source monitoring program parameters.

RECOMMENDATION #27

Continue monitoring industrial point sources and publish results.

EVALUATION

Monitoring municipal and industrial point sources will allow the Niagara River RAP to track the effectiveness of the Recommendations in meeting the goals and to propose revisions to the Recommendations if monitoring indicates the goals are not being met.

Recommendations #26 and #27 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	Not Applicable	Not Applicable
Beneficial Use Impairments (Table 1)	Not Applicable	Not Applicable

PROPOSED LEAD:

MOEE / NRTMP (MOEE, EC, EPA, NYSDEC)

PROPOSED PARTNERS:

None

TIMING:

Ongoing

COST:

Agency staff time.

STATUS:

Municipal and Industrial Point Source Monitoring program is one of the NRTMP programs. While NRTMP is currently examining its role post 1996, it is anticipated that these programs, in some form, will continue.

Municipal Non-Point Sources Monitoring Program

RATIONALE

In 1984 the Niagara River Toxics Committee (NRTC) identified five landfill sites as having a significant potential to introduce contaminants to the Niagara River. All five sites were assessed in 1991 using historical data with four of the five sites assessed again in 1993 using samples collected from the sites.

Certificates of Approval at two sites (Bridge Street and Browns Line portion of the Welland Cytec landfill) require Annual Reports of the monitoring data.

This Recommendation calls for annual reporting for all five sites unless monitoring results warrant less frequent reporting (e.g., trace amounts are consistently reported).

RECOMMENDATION #28

Landfills continue to be monitored regularly, as determined by monitoring results.

EVALUATION

Monitoring municipal non-point sources will allow the Niagara River RAP to: one, track the effectiveness of the Recommendations in meeting the goals and two; propose revisions to the Recommendations if monitoring indicates the goals are not being met.

Recommendation #28 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	Not Applicable	Not Applicable
Beneficial Use Impairments (Table 1)	Not Applicable	Not Applicable

PROPOSED LEAD:

MOEE/EC (NRTMP)

PROPOSED PARTNERS:

Various

TIMING:

As required

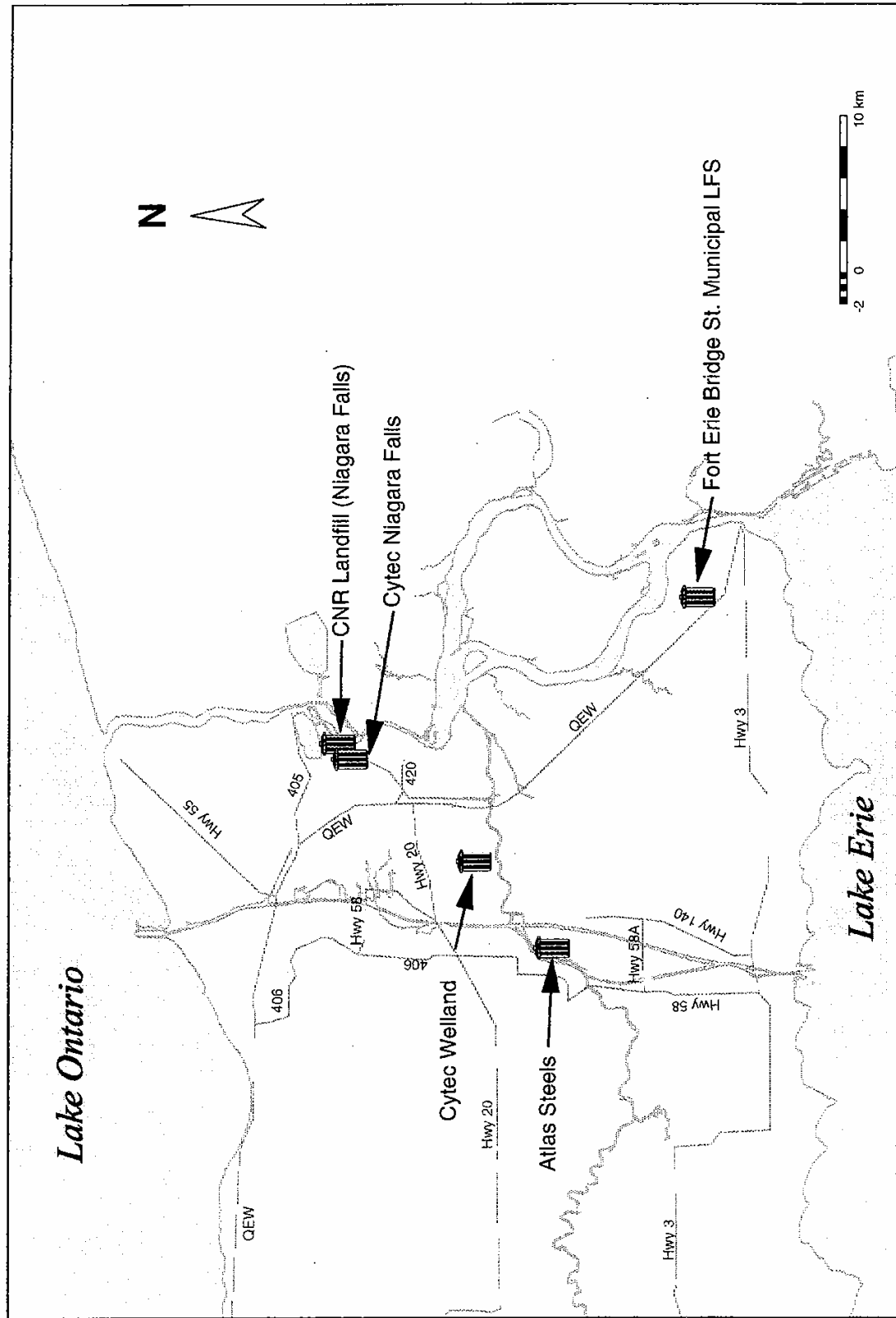
COST:

Based on past experience, cost of reviewing the five sites is estimated at \$25,000 per review.

STATUS:

Landfill sites (non-point sources) have been monitored under the NRTMP. While NRTMP is currently examining its role post 1996, it is anticipated that this program, in some form, will continue.

Canadian Landfill Sites



Data Source: Potential Contaminant Loadings to the Niagara River from Canadian Waste Disposal Sites (Moneco Consultants, Ltd., 1990).

Map created by Water Issues Division
 Environment Canada
 Environment Canada

Map 6

Rural Non-Point Source Monitoring Program

⁽²⁵⁾ *Chemicals of Concern in Niagara River Tributaries. Ontario Ministry of Environment and Energy. July 1993.*

RATIONALE

At the present time, there is not a program to regularly monitor water quality in the Welland River and (Niagara River) tributaries. However, in recent years water quality and biota/habitat studies have been conducted on the Welland River and the Niagara River tributaries.⁽²⁵⁾ Most recently (summer 1994) a water quality study was conducted on the Upper Welland River (see Recommendation #13).

Collectively, these studies indicate that phosphorous, BOD and turbidity need to be addressed. (See Stage One Update for a summary of findings from past studies). The purpose of a regular monitoring program would be to assess the effectiveness of cleanup activities and to plan future remediation activities.

RECOMMENDATION #29

Develop and implement a Welland River and (Niagara River) Tributaries Monitoring Program.

EVALUATION

A Welland River and (Niagara River) Tributaries Monitoring Program will enable the Niagara River RAP to track the effectiveness of the Recommendations addressing rural non-point sources of pollution and propose changes to those Recommendations if required.

Recommendation #29 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	Not Applicable	Not Applicable
Beneficial Use Impairments (Table 1)	Not Applicable	Not Applicable

PROPOSED LEAD:

MOEE (WCR)

PROPOSED PARTNERS:

NPCA

TIMING:

Initiated Summer 1994, afterwards, every three years.

COST:

Estimated cost of monitoring program is \$32,000.00.

STATUS:

The NPCA conducted the Welland River Monitoring Study in 1994. A report is being prepared by NPCA for distribution in 1995.

Drinking Water Programs

(26) For more information, refer to: "Report To The Chair and Members of Public Works and Utilities Committee. Subject: Taste and Odour Occurrences in Drinking Water and Their Control. DEP3693. January 25, 1995. Public Works Department, Region of Niagara.

RATIONALE

In response to the recent taste and odour problems⁽²⁶⁾ in the drinking water, the Region of Niagara has installed powdered activated carbon systems at the

City of Niagara Falls and City of Welland water treatment plants. Granular activated carbon systems will be installed in the City of Niagara Falls water treatment plant in 1995 and the City of Welland water treatment plant in 1996. At the Port Robinson treatment plant, the Region installed granular activated carbon systems.

RECOMMENDATION #30

Taste and odour program (results) be monitored (drinking water).

EVALUATION

Monitoring the taste and odour program results will allow the Region of Niagara to track the effectiveness of remedial measures taken to date and propose revisions if required.

Recommendation #30 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	Not Applicable	Not Applicable
Beneficial Use Impairments (Table 1)	Not Applicable	Not Applicable

PROPOSED LEAD:

Region of Niagara

PROPOSED PARTNERS:

None

TIMING:

Ongoing

COST:

It will cost \$150,000 to install a granular activated carbon system in the City of Niagara Falls water treatment plant and \$100,000 for the City of Welland water treatment plant.

STATUS:

The Region of Niagara is monitoring the effectiveness of its program to reduce taste and odour problems in the drinking water.

Drinking Water Programs

RATIONALE

Drinking water quality is currently evaluated at the various water treatment plants under Ontario's Drinking Water Surveillance Program. The results of this program are published by MOEE in a yearly report entitled 'Drinking Water Surveillance Program (specified year)'.

RECOMMENDATION #31

Continue all monitoring programs for drinking water.

EVALUATION

Monitoring drinking water will confirm that the Niagara River RAP goals concerning drinking water continue to be met.

Recommendation #31 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	Not Applicable	Not Applicable
Beneficial Use Impairments (Table 1)	Not Applicable	Not Applicable

PROPOSED LEAD:

MOEE

PROPOSED PARTNERS:

Region of Niagara

TIMING:

Ongoing

COST:

Agency staff time.

STATUS:

Ontario's Drinking Water Surveillance Program will continue. The 'Drinking Water Surveillance Program (May 1994)' report indicates that no known health related guidelines were exceeded at the Fort Erie, Niagara Falls, Welland and St. Catharines water treatment plants.

Other Programs

RATIONALE

Changing resident attitudes is a major focus of the Niagara River RAP. The purpose of the proposed monitoring program is to assess changing attitudes about the environment, specifically RAP issues. This information can also be used to develop more effective and targeted programs. It is suggested that a monitoring program survey residents once every three years.

'A Survey of Attitudes Toward Water Quality in Communities Along the Canadian Side of the Niagara River' was conducted in 1983 for Environment Canada. As well, the Region of Niagara, in 1994, completed a study of the Region residents' attitudes towards the environment, as part of their Environmental Policy Review process. The survey results are presently being tabulated by Region staff.

Consideration should be given to using information from the Niagara River RAP interactive software program as a component of the resident attitude monitoring program.

RECOMMENDATION #32

Implement a resident attitude monitoring program.

EVALUATION

Monitoring resident attitudes will provide information on whether residents are changing views and habits concerning the environment. Are they changing? How have they changed? Has that resulted in changed behaviour? The RAP must do more than remediate old problems, it must also work to ensure new problems are not created. Monitoring resident attitudes and actions will provide the information necessary to make that assessment. If attitudes are not changing, then the Niagara River RAP and other environmental projects should be revised.

Recommendation #32 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	Not applicable	Not applicable
Beneficial Use Impairments (Table 1)	Not applicable	Not applicable

PROPOSED LEAD:

Niagara Partners In Cleanup Committee

PROPOSED PARTNERS:

To be determined

TIMING:

Once every three years.

COST:

Cost has not been determined.

STATUS:

Discussions should be initiated with potential partners.

Other Programs

RATIONALE

The Canadian Wildlife Service and its partners have developed a number of community-based wildlife monitoring programs. These programs are designed to be implemented by volunteers observing and listening to wildlife in their own community.

These programs provide to the community volunteer an option to choose a survey that matches their interest level, available time, and level of expertise (i.e., the Backyard Amphibian survey can be carried out by beginners, while the Forest Bird Monitoring Program must be done by experienced birders, with knowledge of the songs of 70 different bird calls potentially present in Ontario's forest habitats).

RECOMMENDATION #33

Support and encourage participation in Canadian Wildlife Services' community based wildlife monitoring programs.

EVALUATION

These programs are an invaluable method of collecting important information on the conservation of these species, while at the same time raising local awareness of wildlife issues in the community.

PROPOSED LEAD:

Environment Canada
(CWS)

PROPOSED PARTNERS:

Niagara Partners in
CleanUp Committee

TIMING:

Ongoing

COSTS:

No additional costs anticipated.

Recommendation #33 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	Not applicable	Not applicable
Beneficial Use Impairments (Table 1)	Not applicable	Not applicable

STATUS:

As part of the Ontario Landbird Monitoring Strategy a number of programs are available to the volunteer: Project Feederwatch; Christmas Bird Counts; Breeding Bird Survey; Ontario Birds at Risk; Ontario Nest Records Scheme; the Forest Bird Monitoring Program, Amphibian Road Call Counts, Amphibian Backyard Survey and others. In cooperation with the Long Point Bird Observatory, a marsh wildlife monitoring program has been initiated to monitor amphibians and marsh birds in Great Lakes wetlands with a special focus on AOCs. The marsh program is designed to provide an inventory of species present and their relative abundance, and information on species use of different habitats in the marsh. Together with the Ontario Field Herpetologists, the CWS provides community volunteers with opportunities to conduct frog surveys through the Backyard Amphibian and Road Call Count surveys.

STEWARDSHIP AND EDUCATION RECOMMENDATIONS

The Niagara River RAP strongly endorses the need for, and the role of, an education component in the remedial action plan. It has demonstrated this belief throughout its history. In the context of the general public, education is used in this RAP to change perceptions, by raising awareness of environmental issues (specifically water quality issues in the Area of Concern).

Education also has a role to play in the implementation of the ecosystem approach in the Niagara River AOC. Proponents of remedial projects and government officials

responsible for project approval, need information on the ecosystem (what are they trying to preserve or maintain) and what are the best practices to achieve ecosystem goals (e.g., best management practices).

In either context, education Recommendations by themselves, would not resolve existing environmental degradation, and so other Recommendations are included in a remedial action plan. However, education does work to eliminate future problems by changing people's current customs, attitudes and habits by getting information into their hands.

The education Recommendations are based on the following premises:

- Some of the environmental problems in the AOC affect the rural area, some the urban area and some are common to both areas.
- Federally, provincially and locally, there is a significant amount of education material that promotes pollution prevention on a variety of topics and issues, including water quality issues.
- There are a number of formal education programs directed to the general public being implemented in the AOC.

'Cut the Crud' Campaign

Starring Emm Maculate and Storm Derrane

This media campaign is the latest in a series of information campaigns directed towards Austin (Texas) residents. Its focus is non-point-source pollution. Its purpose is to make citizens aware of their role in protecting water in an expanding urbanized area. It is a creative campaign that includes the circulation of a poster and a 15 minute video. The first phase is directed towards the general public, a later phase will target businesses.

U.S. Water News, June 1994. Vol.10, No.12.

A Sampling of Water Focused Education Programs in the Niagara River AOC

WATER WATCH

An initiative to reduce the volume of water going into the storm and combined sewer systems, by disconnecting household downspout connections.

YELLOW FISH ROAD PROGRAM

By painting fish symbols beside storm sewer drains, people are reminded that what goes into the sewer ends up in local rivers.

U.S./CANADA JOINT SCHOOL BOARD ACTIVITY

Schools on both sides of the border are encouraged to exchange information on shared environmental issues.

The purpose of these education focused Recommendations is to ensure the public and regulators continue to receive the information they need to restore and protect the Niagara River ecosystem.

RATIONALE

While there are many ways exotic species are introduced to the natural environment (intentional and otherwise), the focus of this Recommendation is to educate local residents about the potential harm they are doing when they release unwanted pets into the environment. In many cases the native species cannot compete against the intruders and so are displaced by non-native species.

The Ministry of Natural Resources operates three natural environment programs directed to educating teachers and youth leaders about environmental issues so they can teach their students. These programs are: *Project Wild*, *Fishways*, and *Focus on Forests*. This Recommendation directs MNR to produce a supplement for these programs about the introduction of exotic species into the environment. It will be distributed to area residents so it can be used in the local programs.

EVALUATION

The Ministry's natural environment programs are actively used by school aged children in the Niagara River AOC. They are an effective educational tool and so represent an opportunity to educate students and indirectly, the residents about their role in preventing the spread of exotic species in the Niagara River AOC.

Recommendation #34 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	11	11
Beneficial Use Impairments (Table 1)	1, 3, 4, 5, 6, 13	1, 3, 4, 5, 6, 13

PROPOSED LEAD:

OMNR

PROPOSED PARTNERS:

Various

TIMING:

Immediately

COST:

Cost of implementing Recommendation is estimated at a one time cost of \$20,000.00.

STATUS:

Discussions should be initiated with OMNR concerning the implementation of this Recommendation.

RECOMMENDATION #34

The Ontario Ministry of Natural Resources develop an 'Introduction of Exotics' supplement to the *Project Wild*, *Fishways* and *Focus On Forests* programs.

RATIONALE

Within the public education Recommendation, there are two focuses - rural and urban communities. While acknowledging that there are activities common to both communities,

there are significant differences between the pollution issues each has to deal with. For example, bacteria in the rivers is both an urban and rural issue, but the source of that bacteria is different. Combined sewer overflow events are an issue in the urban areas, while bacteria from a variety of sources is a major issue in rural areas. It is assumed that the two offices (urban and rural) will coordinate efforts wherever possible.

The job of the implementing agencies would be to: identify the areas where the public has an impact on water quality and quantity issues; identify activities the public could participate in; determine if appropriate material is available and identify how to distribute the material.

RECOMMENDATION #35

Public education programs continue and new ones be developed as required.

EVALUATION

Distributing information promotes the public's understanding of the environment and so enables the individual to take environmentally informed actions. These can be both micro (pumping a septic system once every three years) and macro (participate in an INS Open House) in scale. Environmentally informed action is required to meet the Niagara River RAP goals.

Recommendation #35 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	All (Indirectly)	All (Indirectly)
Beneficial Use Impairments (Table 1)	All (Indirectly)	All (Indirectly)

PROPOSED LEAD (urban):

Region of Niagara

PROPOSED LEAD (rural):

NPCA/OMAFRA

PROPOSED PARTNERS:

Various

TIMING:

Ongoing

COST:

Cost has not been estimated.

STATUS:

The Region of Niagara, the Niagara Peninsula Conservation Authority and Ontario Ministry of Agriculture, Food and Rural Affairs are actively distributing information brochures about a wide range of environmental issues concerning the Niagara Peninsula.

RATIONALE

The focus of Recommendation #36 is to ensure those designing and approving remediation projects, are aware of and understand the information necessary to ensure that

individual proposed works supported and are integrated into the ecosystem in the Niagara River AOC (e.g., maintain hydrological flows, etc.). There are two components to this professional education option: one, understanding the Niagara River ecosystem; and two, building awareness of the techniques available to achieve the desired ecosystem (e.g., best management practices) and ensuring they are applicable to the Niagara River AOC.

To fulfil the purpose of this Recommendation, it would be necessary to tailor these programs to the Niagara River AOC (e.g., to ensure applicability to the Niagara River AOC). Developing this Recommendation would require: one, identifying educational needs of designers and regulators in the Niagara River AOC; two, compiling a list of available courses; three, assessing the adequacy of available courses for application in the Niagara River AOC; and four, distributing the information (e.g., manuals, workshops, seminars, etc.)

RECOMMENDATION #36

Professional education programs continue and new ones be developed as required.

EVALUATION

Distributing information to project designers or plan reviewers promotes their understanding of the environment and so enables those individuals to ensure specific works or activities restore and protect a healthy environment. Environmentally-based proposals will ensure the Niagara River RAP goals will be met.

Recommendation #36 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (<i>Pg.18-19</i>)	All (Indirectly)	All (Indirectly)
Beneficial Use Impairments (<i>Table 1</i>)	All (Indirectly)	All (Indirectly)

PROPOSED LEAD:

MOEE

PROPOSED PARTNERS:

Region of Niagara, area municipalities, NPCA, Niagara Partners in Cleanup Committee, professional associations, OMNR.

TIMING:

Immediately

COST:

Cost has not been estimated.

STATUS:

Currently, government agencies and private sector organizations sponsor many professional development education programs.

RATIONALE

Retention of grey water or wash water from galley sinks and showers on board pleasure craft is not presently required. Studies of the quality of grey

water⁽²⁷⁾ measured phosphorus concentrations typical of raw sewage, elevated indicator bacteria and the presence of known pathogenic bacteria in on-board grey water. In a more recent study⁽²⁸⁾, an analysis of conventional pollutants (nutrients, solids and oxygen demanding substances) in grey water reveal high concentrations. However, because of relatively small volumes, the mass loadings of these substances were small.

There is no study of the impact of grey water on water quality in the Niagara River AOC. However, based on the above information and the Niagara River RAP's call for addressing grey water on land (e.g., dishwater, shower water), it was agreed that this principle should also include the release of grey water directly into the rivers by boaters. The focus of this Recommendation will be to educate boat owners to retain grey water and dispose of it at local marina facilities.

It is suggested that MOEE, in consultation with boating industry associations and marinas develop a long term 'grey water' public education and awareness program. MOEE and the marinas should work together to distribute the information to local boaters.

RECOMMENDATION #37

Boat owners retain and dispose of grey water at marinas.

⁽²⁷⁾ Beak Consultants Ltd. 1989. *A Study of Grey Water from Pleasure Boats. A Report for the Ontario Ministry of the Environment.*

⁽²⁸⁾ Beak Consultants Ltd. 1991. *Grey Water Disposal from Pleasure Boats. A Report for the Ontario Ministry of the Environment.*

EVALUATION

Disposal of grey water at marinas will eliminate a source of pollution to the AOC's rivers and so will help to meet the Niagara River RAP goals.

Recommendation #37 to Address	Niagara River	Welland River and (Niagara River) Tributaries
Goals (Pg.18-19)	7	7
Beneficial Use Impairments (Table 1)	2, 8, 9	2, 8, 9

PROPOSED LEAD:

MOEE

PROPOSED PARTNERS:

Ontario Marina Operators Association, local marinas and sports stores

TIMING:

Immediate

COST:

Cost has not been estimated.

STATUS:

MOEE has published two brochures: 'Guide To Better Boating. Grey Water Management and Environmental Practices For Boaters' and 'ENVIRO-Boater'. The Ontario Marina Operators Association has developed a 'Marina Environmental Code of Ethics'. The Code asks boaters to work with the Association to: Protect our Ontario waterways from harmful dumping; Use environmentally compatible materials; Maintain our clean water heritage; and, Respect operating regulations.

MOEE has proposed a grey water regulation that will prohibit certain types of boats from discharging grey water and will require certain marinas to provide pump-out facilities year round. The regulation is expected to be promulgated by 1996.

Table 6 Summary Table - Niagara River RAP Recommendations

Recommendations		Proposed Lead	Proposed Partners	Status
GENERAL	1 Establish an International RAP.	EC/MOEE	MOEE (WCR)	Two national Niagara River RAPs.
	2 Provincial and federal governments develop an integrated ecosystem approach to management for its agencies.	Management Board of Cabinet/Federal Cabinet	Government agencies	
	3 Provincial and federal governments establish specific government funding programs for RAP implementation.	Ontario/Canada	Government agencies	No separate funding programs.
	4 Secure recognition of the remedial action plan as having fulfilled some of the requirements of the environmental assessment process.	MOEE/EC		RAP has no official status in EA process.
	5 The Niagara River RAP endorse and encourage the process of multisectoral liaison committees as the vehicle to facilitate the satisfactory remediation of water quality in the Niagara River AOC.	Niagara P.I.C.C.	PAC	Committees in place and ongoing.
	6 Establish a Geographic Information System Repository for the Niagara River AOC.	Brock University	Under discussion	Many agencies have G.I.S.
	7 Develop model "terms of reference" for remediation projects by community liaison committees.	Niagara P.I.C.C.		Many models available.
	8 Implement the Niagara River RAP Stage 3 Structure.	EC/MOEE	Agencies with implementation responsibility	Initiate discussions immediately.
WATER QUALITY Municipal	9 The Niagara River RAP become involved in Infrastructure Needs Studies.	Niagara P.I.C.C.	PAC, Region of Niagara, Area Municipalities, Non-government organizations	Fort Erie, Niagara-on-the-Lake INS completed and actions being implemented. Welland and Niagara Falls phased INS underway.
	10 Enforce Regional Sewer Use Bylaw.	Region of Niagara	Area municipalities	1988 Region of Niagara Sewer Use Bylaw.

Table 6 (Con't) Summary Table - Niagara River RAP Recommendations

Recommendations		Proposed Lead	Proposed Partners	Status
Municipal	11 The Region of Niagara continue to work towards implementing a water pollution control plant optimization program for all its plants.	Region of Niagara	MOEE	Implementation underway.
	12 Enforce the MISA Municipal Program for Municipal Sewage Treatment Plants upon the promulgation of the MISA Municipal Regulation.	Region of Niagara	MOEE, Area municipalities	Regulation under development.
Industrial	See Monitoring Section (Recommendation #27)			
Rural Non-Point Sources (RNPS)	13 Prepare and implement a rural non-point source pollution remediation strategy.	NPCA	OMNR, MOEE OMAFRA	NPCA establishing Rural Clean Water Program.
	14 Farmers in the Niagara River AOC be encouraged to follow sound farming practices such as recommended in the Environmental Farm Plan program.	Ontario Farm Environmental Coalition	Farmers, AC, OMAFRA	EFP being implemented by farmers.
	15 Additional funding per farm business be given to the Environmental Farm Plan Incentive Program operating in the Niagara River AOC.	Ontario Farm Environmental Coalition	Farmers, AC, OMAFRA	Suggestion \$1500. Currently set at \$500.
SEDIMENT QUALITY	16 The lower Welland River (downstream of the Welland Airport) be the priority focus of any sediment assessment.	Welland River (Welland) Cleanup Committee	MOEE, EC, OMNR Atlas Specialty Steels NPCA	Full remediation planned for Summer 1995.
	17 Potentially contaminated locations be prioritized for review, assessment and remediation.	Niagara River RAP	PAC	Completed Spring 1994.
BIOTA/HABITAT QUALITY	18 Test potentially contaminated sediment sites to confirm absence/presence of contamination.	MOEE	Various	Sampling underway.
	19 Prepare a natural heritage strategy for the Niagara River AOC.	EC (CWS)/Region of Niagara	PAC, NPCA, MNR, NPC, MOEE, NGOs	Strategy under development.
	20 The PAC will critically evaluate government review processes to ensure that they embody the principles and objectives of the Niagara River RAP.	PAC	Various	Various reviews underway.

Summary Table - Niagara River RAP Recommendations

Table 6 (Con't)

Recommendations		Proposed Lead	Proposed Partners	Status
BIOTA/ HABITAT QUALITY	21 A regulation requiring treatment or exchange (or some other technique) to ensure that ballast water cannot be a way for the introduction of exotic species into the Niagara River AOC be enacted.	DFO Transport Canada	To be determined	Seawater ballast exchange not required at the present time.
	22 Continue to protect habitat on both sides of the Niagara River as one ecosystem.	OMNR, NYSDEC	EC, USEPA, USFWS, CWS, DFO	Habitat mapping underway.
	23 Municipal planning documents incorporate ecologically based policies and design criteria.	Region of Niagara	Area Municipalities, OMNR, NPCA, NPC, EC, MOEE	Consistent with new Ontario Planning Act.
HUMAN HEALTH	24 Develop a Niagara River Fish Consumption Advisory.	MOEE	Region of Niagara, CIPH, MNR, DFO, HC, NYSDEC	Presently separate Ontario and New York State fish consumption advisories.
	25 Conduct a study to determine if consumption of water based wildlife is harmful to human health.	Health Canada	Various	Information currently does not exist.
MONITORING	26 Continue monitoring municipal point sources (sewage treatment plants) including but not restricted to NRTMP point source monitoring program parameters.	MOEE (NRTMP)	None	Ongoing.
	27 Continue monitoring industrial point sources and publish results.	MOEE (NRTMP)	None	Ongoing.
	28 Landfills continue to be monitored regularly, as determined by monitoring results.	MOEE (NRTMP)/EC	None	Landfills were monitored in 1993.
	29 Develop and implement a Welland River and (Niagara River) tributaries monitoring program.	MOEE	NPCA	Welland River and tributaries have been monitored periodically.
	30 Taste and odour program (results) be monitored (drinking water).	Region of Niagara	None	Filters have been installed.
	31 Continue all monitoring programs for drinking water.	MOEE	Region of Niagara	Ongoing.
	32 Implement a resident attitude monitoring program.	Niagara P.I.C.C.	To be determined	Region of Niagara conducted survey of residents in 1993.

Table 6 (Con't) Summary Table - Niagara River RAP Recommendations

Recommendations		Proposed Lead	Proposed Partners	Status
MONITORING	33 Support and encourage participation in CWS community based wildlife monitoring programs.	CWS	Niagara P.I.C.C. PAC	Programs ongoing.
	34 The Ontario Ministry of Natural Resources develop an 'Introduction of Exotics' supplement to the <i>Project Wild, Fishways</i> and <i>Focus On Forests</i> programs.	OMNR	To be determined	Under discussion.
EDUCATION	35 Public education programs continue and new ones be developed as required.	Region of Niagara (urban) NPCA/OMAFRA (rural)	Various Various	Information available from a variety of sources.
	36 Professional education programs continue and new ones be developed as required	MOEE	Various	Information available from a variety of sources.
	37 Boat owners retain and dispose of grey water at marinas.	MOEE	Local marinas, Ontario Marina Owners Association, NGOs	Information available to boaters.

See Appendix D for a list of acronyms.

AN IMPLEMENTATION STRATEGY

The development of the Niagara River Implementation Strategy has been influenced by the premises that support the development of the Recommendations in this Stage 2 Report. In particular, the following three key premises are noted:

- **Community liaison committees, composed of government, non-government and public organizations and individuals are responsible for developing and implementing 'on the ground' cleanup plans.**
- **Delisting the Niagara River is a different process than remediating impaired uses under Canadian jurisdiction. While there is no overall timetable for 'delisting' the Niagara River, there is a firm commitment to clean up the Canadian impairments. Delisting the Niagara River is dependent on developing international delisting criteria for the Niagara River.**
- **... the Recommendations have not been ranked or judged in relation to each other. All sources of pollution need to be addressed and remediated. What gets done, when, and at what speed will depend on a number of factors, including: availability of funding, political priorities, availability of information, community commitment, etc.**

Collectively, these three premises have determined the Niagara River RAP Implementation Strategy. There are three components to the Implementation Strategy: one, cleaning Canadian sources of pollution will be the focus of attention, even though that will not result in 'delisting' the Niagara River; two, all Recommendations will have to be implemented; and three, it is the community, in partnership with governments that will implement the Recommendations. The timetable for cleanup will be created as

cleanup action proceeds. Given the premises on which this RAP is based, there is no 'master' timetable.

Consequently, the Niagara River RAP and its Implementation Strategy fulfils a coordination function, as opposed to a 'command and control' function based on enforcing a master timetable. Consistent with a coordination function, the Implementation Strategy contains a

number of tools to ensure implementation of the Recommendations proceeds.

For example, the Implementation Strategy contains delisting criteria or benchmarks that can be used to assess implementation progress. These benchmarks are referred to as Canadian Cleanup Criteria. There is also a suggested list of International RAP delisting criteria.

The Implementation Strategy section consists of a discussion of cost analysis and benefit assessment, delisting criteria and the Niagara River RAP Implementation Structure.

The Niagara River RAP and its Implementation Strategy fulfils a coordination function, as opposed to a 'command and control' function based on enforcing a master timetable.

DISCUSSION OF COST ANALYSIS AND BENEFIT ASSESSMENT

Rational for Benefit Assessment

The benefits generated by restored aquatic ecosystems are pervasive and widespread (See 'Potential Benefit Categories Derived from Restored Water Quality' pg 98, for a partial list). Restored or remediated aquatic ecosystems improve habitat that sustains wildlife and human communities, increases diversity and productivity of wildlife communities and improves the health of human communities. Humans can derive greater value from the various commercial and non-commercial uses of aquatic ecosystems.

The benefits of watershed restoration are often difficult to define or describe, due to current limits of knowledge of ecosystem function and response, and to different perceptions of the benefits of ecosystem restoration. As a result, many of the policies and programs directed at ecosystem restoration simply assume that perceived benefits are both obvious and sufficient to justify restoration.

In one study conducted for Environment Canada⁽²⁹⁾, five broad benefits categories of watershed restoration were developed. The main function of the study was to demonstrate the range of potential benefits of investing in the environment, and to move towards quantification of the opportunities. The five categories of benefits are: sustainability benefits; avoided costs; use benefits; direct economic development benefits; and indirect and induced economic development benefits. These benefit categories are based on a view that the restoration of a watershed is a major activity that results in major economic benefits. The first three categories encompass benefits in the usual economic sense of goods, services and amenities for which people would be willing to pay. The last two categories are measures of economic activity or transactions, usually called economic impacts.

(29) *Development Potential and Other Benefits from Restoration, Enhancement and Protection of Great Lakes Basin Watersheds. Final Report. Hickling Corporation. September 1993.*

Costs Analysis In The Niagara River RAP

Estimating the dollar cost of a remedial action plan is conditional on identifying in considerable detail, the components of that plan. Stage 2 of the Niagara River RAP identifies Recommendations and where possible, includes in the discussion planning level costs. However, for the most part, there is not sufficient detail to develop a cost analysis and benefit assessment.

The reasons for this absence of detailed cost information include:

- many Recommendations are considered part of normal government operations and so they involve minimal or no additional costs;
- many Recommendations are already being implemented or are part of committed future spending and thus involve no additional costs over current or planned expenditure levels (e.g., MOEE permit processes, WPCP optimization process); and
- many Recommendations can not be determined at this time. Instead the Recommendation outlines a process, that includes collecting information necessary to determine specific remedial activities and their associated costs. For example, in urban areas, the Infrastructure Needs Studies will determine required measures and their costs. The Welland River Water Quality Survey (summer 1994) may provide information so that rural non-point source cleanup costs can be determined.

Summary

The Remedial Action Plan program recognizes that sufficient resources, for all required environmental remediation and restoration, are not available at one time. Consequently, the community's efforts to reach the goal of environmental restoration needs to be measured to ensure that resources are allocated to result in maximum benefits.

Cost analysis and benefit assessment of a Recommendation, or group of Recommendations, is one such measurement aid or tool for making choices and decisions dictated by financial constraints. Other decision making aids include; meeting government objectives and guidelines, protecting human and aquatic health, and aesthetic reasons.

It is important to remember however, the purpose of these aids is to support community decision making; they are not substitutes for community decision making. Cleanup decisions should be made on the basis of local conditions and potential (including economic), relative to the vision of the community that is undertaking restoration. Whatever costs and benefits are known, this information should be included in the decision making process.

For the reasons outlined above, a cost analysis and benefit assessment of the Niagara River RAP has not been developed at this time. However, the assessment would be a useful tool to decision making and so if in the future, knowledge of costs allow it be developed, then it should be pursued. A possible opportunity may present itself at the conclusion of the Upper Welland River Water Study when more is known about the rural non-point source remediation costs.

Potential Benefit Categories Derived from Restored Water Quality

Human Health

Reduced incidence of gastrointestinal disorders and other bacteria-associated illness and disorders

Reduced risk of cancer

Reduced potential for impaired development, disease, and illness associated with toxic chemicals, metals and other pollution variables.

Ecosystem Health

Improved water quality

Normalized and improved hydrological cycle and instream water budgets

Normalized water table levels

Improved ground water recharge and discharge regimes

Improved sediment quality

Decreased incidence of tumours in wildlife

Decreased impaired reproduction in wildlife

Restored ecosystem services

Increased life support

Increased biodiversity

Recreation

Increased swimming opportunities

Increased fishing opportunities

Increased boarding and boating opportunities

Increased tourism

Commercial Fishing

Increased revenues

Cost Avoidance

Decreased water treatment costs

Decreased health care costs

DELISTING CRITERIA

Delisting criteria are an essential component of the RAP process. They have been defined as, "Specific measurable criteria ... to determine when use goals have been met and when the beneficial uses have been restored."⁽³⁰⁾

The COARAP Steering Committee suggested that the delisting criteria should be based on observable and measurable indicators. As well, they should be premised on four fundamental underlying elements:

- locally defined use goals and environmental objectives;
- applicable federal and provincial water quality objectives, guidelines, standards and policies;
- the Principles and Objectives embodied in the Great Lakes Water Quality Agreement; and
- incorporate the targets set out in the Canada-Ontario Agreement (1994).

The criteria are a combination of quantitative and qualitative measures. The World Resources Institute⁽³¹⁾ use the terms 'policy' and 'rhetorical' indicators respectively. While both 'measure' ecosystem health, they differ significantly in how and what they measure.

Quantitative or 'policy' indicators or criteria measure ecosystem health using jurisdictional standards, guidelines, objectives or targets (e.g., Provincial Sediment Quality Guidelines, Provincial Water Quality Guideline, GLWQA Objectives, Provincial Drinking Water Objectives, NRTMP reduction targets).

Qualitative or 'rhetorical or narrative' indicators or criteria measure ecosystem health using ecological considerations (e.g., demonstrated commitment by municipal and industrial plant owners to ensure continual improvements).

The World Resources Institute suggests that "Indicators must be more than just a description of conditions or trends (which is fine in itself), but they must help to express progress toward attainment of public policy."⁽³²⁾

⁽³⁰⁾ *Severn Sound RAP Stage 2 Report. A Strategy For Restoring The Severn Sound Ecosystem and Delisting Severn Sound As An Area of Concern. Severn Sound Remedial Action Plan. April 1993. Page 62.*

⁽³¹⁾ *Reported in "Indicators for Evaluation of Progress under the Great Lakes Water Quality Agreement" Workshop Agenda (October 5-6, 1994). Indicators For Evaluation Task Force, International Joint Commission.*

⁽³²⁾ *Reported in "Indicators for Evaluation of Progress under the Great Lakes Water Quality Agreement" Workshop Agenda (October 5-6, 1994). Indicators For Evaluation Task Force, International Joint Commission. Page 11.*

The Niagara River RAP Delisting Criteria

The Niagara River forms the international boundary between Canada and the United States. The environmental problems of the Niagara River are the result of activities on both sides - likewise its cleanup or 'delisting' will be the result of activities on both sides. Neither side will be able to unilaterally 'delist' the Niagara River.

The Niagara River ecosystem presents unique considerations when developing delisting criteria, because it is divided into two RAPs. To ensure cleanup of the Canadian side of the Niagara River ecosystem continues, two sets of delisting criteria were developed:

The Niagara River's cleanup will depend on both Canada and the United States addressing the source of impairments on their respective sides. Neither will be able to unilaterally "delist" the Niagara River.

- *Canadian Cleanup Criteria* to guide remediation activities in the Canadian RAP (Welland River and (Niagara River) tributaries); and
- *International Delisting Criteria* to fulfil the requirements of the GLWQA (Niagara River ecosystem - Canada and U.S.).

Table 7 'Achievability of Niagara River RAP Goals For The Niagara River' incorporates the proposed International Delisting Criteria. Table 8 'Achievability of Niagara River RAP Goals For The Welland River and (Niagara River) Tributaries' incorporates the Canadian Cleanup Criteria.

While the Spring 1993 Option Selection Workshop identified a Recommendation (Niagara River Monitoring Program) related to the International Delisting Criteria, at this time, the focus of RAP activities is to develop the Canadian Cleanup Criteria. It is recognized that remediation of impaired uses in the Canadian AOC will not result in the delisting of the Niagara River.

International Delisting Criteria will need to be developed at a later time by an International Niagara River RAP. RAP participants have included a set of International Delisting Criteria that could serve to start that process at some future time.

The Canadian Cleanup Criteria are criteria that specify a standard to be met (e.g., government guidelines) or actions to be done (e.g., create a specified amount of habitat). These criteria are based on meeting Niagara River RAP goals and objectives.

The Canadian Cleanup criteria help to determine if the Recommendations are moving cleanup forward. The focus is to move cleanup forward rather than establishing quantitative criteria for measuring cleanup. Making progress is the priority in the Niagara River RAP.

The Niagara River RAP goals, rather than the list of beneficial use impairments, were used to develop the Canadian Cleanup Criteria. The goals reflect an ecosystem approach - they identify 'desired ends' or uses of the water. The list of impairments, on the other hand, reflects a traditional approach of identifying isolated pollution sources and addressing them one by one. By using Niagara River RAP goals, all impairments are addressed. (See Table 2 'Niagara River Impaired Uses and Goals Matrix'.)

Table 7 Achievability of Niagara River RAP Goals For The Niagara River ³³

Goals	Recommendations Necessary To Achieve Goal	Proposed International Delisting Criteria	Proposed Monitoring Program	Goal Attainment For Niagara River
1 To preserve and restore a good quality sustainable habitat in the Niagara River through the virtual elimination of the discharge of pollutants, with the ultimate goal of zero discharge of persistent bio-accumulative toxics.	12, 13, 14, 15	Point source monitoring shows trace amounts or non-detectable levels of persistent bio-accumulative toxics. Non-point source monitoring shows trace amounts or non-detectable levels of persistent bio-accumulative toxics. ³⁴	NRTMP Monitoring Programs ³⁵ NRTMP Monitoring Programs	Recommendations will not achieve goal. U.S. remediation required.
2 Seek extensions to the NRTMP goal of a 50% reduction of 10 chemicals, for further reductions by the year 2000, with eventual complete elimination of toxic discharges.	12	Review and report Chemicals of Concern reductions by NRTMP.	NRTMP Monitoring Programs	Will require the continued participation of the U.S. in NRTMP.
3 Continually improve the quality of treated discharges of municipal and industrial sewage effluent, with no spills or discharges causing fish kills or other undesirable impacts. (Includes quantity considerations).	9, 10, 11, 12	Demonstrated commitment by municipal and industrial plant owners to ensure continual improvements (i.e., total quality management program in place).	NRTMP Monitoring Programs	Recommendations will not achieve goal. U.S. remediation required.
4 Reduction and virtual elimination of Combined Sewer Overflows (CSOs).	9, 10, 11, 12	90% of the wet weather (peak) flow and all dry weather flow in combined sewer system is treated to WPCP levels, on an annual basis.	To be determined.	Recommendations will not achieve goal. U.S. remediation required.
5 To improve environmental quality so that there are no adverse effects or risks to human, animal and plant life so that consumption guidelines are eliminated, and water can be used without restriction for all desired uses.	9, 10, 11, 12, 13, 14, 15	There be no restrictions on consumption of fish attributable to local sources. When the incidence rates of deformities or reproductive problems in sentinel fish and wildlife species do not exceed background levels in control populations. There be no exceedance of the most stringent water quality objectives of the jurisdictions involved.	Sport Fish Contaminant Monitoring (Ontario) NRTMP Monitoring Programs	Recommendations will not achieve goal. U.S. remediation required. As well, contamination may be the result of pollution originating outside the AOC, and high background levels of mercury.

³³ Only the recommendations that directly addressed the goals are included in this table; 9 - 23, 34, 37.

³⁴ "Trace" means "a low concentration which requires cautious interpretation. From: "Sampling/Analytical Protocol Data Recording. July 1994. MOEE (MISA).

³⁵ NRTMP monitoring programs include: Upstream/Downstream Monitoring Program; Point Source Monitoring Program; and Biomonitoring.

Table 7 (Con't) Achievability of Niagara River RAP Goals For The Niagara River

Goals	Recommendations Necessary To Achieve Goal	Proposed International Delisting Criteria	Proposed Monitoring Program	Goal Attainment For Niagara River
6 Remediate and restore the Niagara River ecosystem so that human health is protected from deterioration from persistent toxins and pathogens.	9, 10, 11, 12, 13, 14, 15	90% of the wet weather (peak) flow and all dry weather flow in cs system is treated to WFCP levels, on an annual basis. Point source monitoring shows trace amounts or non-detectable levels of persistent bio-accumulative toxics. Non-point source monitoring shows trace amounts or non-detectable levels of persistent bio-accumulative toxics. Suspended, transported and in-place sediments contain levels of contaminants at or below LEL. Where no LEL standard exists, use LC50.	To be determined. NRTMP Monitoring Programs NRTMP Monitoring Programs NRTMP Monitoring Programs	Recommendations will not achieve goal. U.S. remediation required.
7 Control nutrient loading levels to a point that excessive weed and algal growth do not occur.	Not applicable. No concern of excess weeds.	Not applicable.	Not applicable.	Not applicable.
8 Reduce and maintain bacterial, visibility, and toxic chemicals levels to permit safe swimming.	9, 10, 11, 12, 13, 14, 15	Use most stringent swimming water objectives for phosphorus, sediments, turbidity and drinking water objectives for toxic chemicals (as there are no recreational objectives for toxic chemicals) of the jurisdictions involved.	Beach Protocol (Region Niagara Health Service) To be determined (U.S.) NRTMP Monitoring Programs	Recommendations will not achieve goal. U.S. remediation required.
9 Ensure water quality is sufficiently free of contaminants to be suitable for potable water after treatment in a modern plant, for industrial uses with minimal treatment, and for agricultural use.	Not applicable. (Taste and odour problems result from Lake Erie sources).	Not applicable.	Not applicable.	Not applicable.
10 Identify and correct high erosion areas so that non-storm suspended solids are less than 80 mg/l, sedimentation is reduced on fish spawning beds, and all life levels of desirable fish species are unimpeded.	Not applicable. (Very little deposition of sediment).	Not applicable.	Not applicable.	Not applicable.
11 Maintain and improve fish and wildlife habitat to encourage populations at healthy, contaminant free, self-sustaining levels without fear of bio-accumulation. (Includes increased diversity and maintenance and protection of rare, endangered and threatened species and habitat).	13, 14, 15, 19, 21, 22, 23, 34	Monitoring program indicates healthy, contaminant free, self-sustaining populations.	Sport Fish Contaminant Monitoring CWS Monitoring Programs NRTMP Monitoring Programs	Recommendations will not achieve goal. U.S. remediation required.
12 To sustain and improve the compatible Niagara River recreational and scenic resources. (Includes the whole Niagara River AOC).	13, 15, 19	To be determined.	To be determined.	Recommendations will not achieve goal. U.S. remediation required.

Table 7 (Con't) Achievability of Niagara River RAP Goals For The Niagara River

Goals	Recommendations Necessary To Achieve Goal	Proposed International Delisting Criteria	Proposed Monitoring Program	Goal Attainment For Niagara River
13 Maintain and improve the recreational and scenic resources through enhancements to the existing paths along the Niagara River and its tributaries, controls on the placement of fill along the gorge face, reduction of debris and litter on shore and in the water, the encouragement of natural regrowth, and the restoration of avian and other habitat along watercourses.	13, 14, 15, 19	To be determined.	To be determined.	Recommendations will not achieve goal. U.S. remediation required.
14 Aesthetic impact issues to be clearly addressed in any development in the AOC.	13, 14, 15, 19	To be determined.	To be determined.	Recommendations will not achieve goal. U.S. remediation required.
15 To reduce non-point sources of pollutants, including sediments, and eventually eliminate discharges of persistent bio-accumulative toxics.	13, 14, 15	Use the most stringent guidelines for contaminant levels in suspended, transported and in-place sediments, of the jurisdictions involved.	NRTMP Monitoring Programs	Recommendations will not achieve goal. U.S. remediation required.
16 Identify and correct contaminated sediment sites so that benthic community structure and toxicity is similar to unimpacted sites.	16, 17, 18	Ensure adequate sampling has been undertaken to identify all sites. Use the most stringent guidelines for contaminant levels in suspended, transported and in-place sediments, of the jurisdictions involved.	NRTMP Monitoring Programs	Recommendations will not achieve goal. U.S. remediation required.

Table 8. Achievability of Niagara River RAP Goals For The Welland River and (Niagara River) Tributaries³⁶

Goals	Recommendations Necessary To Achieve Goal	Canadian Cleanup Criteria	Monitoring Program	Goal Attainment For Welland River and (Niagara River) Tributaries
1 To preserve and restore a good quality sustainable habitat in the Niagara River through the virtual elimination of the discharge of pollutants, with the ultimate goal of zero discharge of persistent bio-accumulative toxics.	12, 13, 14, 15	Point source monitoring shows trace amounts or non-detectable levels of persistent bio-accumulative toxics. Non-point source monitoring shows trace amounts or non-detectable levels of persistent bio-accumulative toxics.	NRTMP Point Source Monitoring (municipal and industrial) Landfill Monitoring Welland River and (Niagara River) Tributaries Monitoring	No additional remedial actions required.
2 Seek extensions to the NRTMP goal of a 50% reduction of 10 chemicals, for further reductions by the year 2000, with eventual complete elimination of toxic discharges.	12	Review and report Chemicals of Concern reductions by NRTMP.	NRTMP review and report on reductions of Chemicals of Concern.	No additional remedial actions required.
3 Continually improve the quality of treated discharges of municipal and industrial sewage effluent, with no spills or discharges causing fish kills or other undesirable impacts. (Includes quantity considerations).	9, 10, 11, 12	Demonstrated commitment by municipal and industrial plant owners to ensure continual improvements (i.e., total quality management program in place). (Includes collection system and associated infrastructure)	NRTMP Point Source Monitoring (municipal and industrial)	No additional remedial actions required.
4 Reduction and virtual elimination of Combined Sewer Overflows (CSOs).	9, 10, 11, 12	90% of the wet weather (peak) flow and all dry weather flow in combined sewer system is treated to WPCP levels, on an annual basis.	Followup Inspection on CSO Outfalls (Region of Niagara)	No additional remedial actions required.

³⁶ Only the recommendations that directly addressed the goals are included in this table. 9-23, 34, 37.

Table 8 (Con't) Achievability of Niagara River RAP Goals For The Welland River and (Niagara River) Tributaries

Goals	Recommendations Necessary To Achieve Goal	Canadian Cleanup Criteria	Monitoring Program	Goal Attainment For Welland River and (Niagara River) Tributaries
5	To improve environmental quality so that there are no adverse effects or risks to human, animal and plant life so that consumption guidelines are eliminated, and water can be used without restriction for all desired uses.	<p>9, 10, 11, 12, 13, 14, 15</p> <p>There be no restrictions on consumption of fish attributable to local sources in the Canadian AOC.</p> <p>There be no restrictions on consumption of fish attributable to local sources in the Canadian AOC.</p> <p>There be no exceedance of the Provincial Water Quality Objectives.</p>	<p>Sport Fish Contaminant Monitoring</p> <p>Implement Recommendation #25</p> <p>Welland River and (Niagara River) Tributaries Monitoring Program</p>	<p>For the lower Welland River and the (Niagara River) tributaries, recommendations will not achieve goal. Fish in these waters are exposed to Niagara River. Contamination may be the result of pollution originating outside the AOC (U.S. sources on Niagara River, Lake Erie and Lake Ontario) and background levels of mercury.³⁷</p> <p>Guide to Eating Ontario Sport Fish contains no information on fish in the upper Welland River.</p> <p>There is little information on contaminants in local wildlife.</p>
6	Remediate and restore the Niagara River ecosystem so that human health is protected from deterioration from persistent toxins and pathogens.	<p>9, 10, 11, 12, 13, 14, 15</p> <p>90% of the wet weather (peak) flow and all dry weather flow in combined sewer system is treated to WPCP levels, on an annual basis.</p> <p>Point source monitoring shows trace amounts or non-detectable levels of persistent bio-accumulative toxics.</p> <p>Non-point source monitoring shows trace amounts or non-detectable levels of persistent bio-accumulative toxics.</p> <p>Suspended, transported and in-place sediments contain levels of contaminants at or below LEL. Where no LEL standard exists, use LCS0.</p>	<p>Followup Inspection on CSO Outfalls</p> <p>NRTMP Point Source Monitoring (municipal and industrial)</p> <p>Landfill Monitoring Welland River and (Niagara River) Tributaries Monitoring</p> <p>Welland River and (Niagara River) Tributaries Monitoring</p>	<p>No additional remedial action required.</p>

³⁷ Mercury was detected at trace levels in 7 out of 64 samples (industrial point sources) and 3 out of 28 samples (municipal point sources). From: Update Report. Reduction of Toxic Chemicals From Ontario Point Sources Discharging To The Niagara River 1992. May 1994. MOEE.
Upstream/Downstream Niagara River monitoring data (NRTMP) shows mercury at a non-detect level at both Fort Erie and Niagara-on-the-Lake.
Mercury was detected in 182 of 284 water samples, generally at low concentrations. PWQOs were exceeded once at one location. Chemicals of Concern in Niagara River Tributaries. July 1993. MOEE.

Table 8 (Con't) Achievability of Niagara River RAP Goals For The Welland River and (Niagara River) Tributaries

Goals	Recommendations Necessary To Achieve Goal	Canadian Cleanup Criteria	Monitoring Program	Goal Attainment For Welland River and (Niagara River) Tributaries
7 Control nutrient loading levels to a point that excessive weed and algal growth do not occur.	9, 10, 11, 12, 13, 14, 15, 37	Goal of 30ug./l/ for phosphorus, by controlling sources of phosphorus and other nutrients (i.e., nitrate and ammonia).	Welland River and (Niagara River) Tributaries Monitoring Program.	No additional remedial action required.
8 Reduce and maintain bacterial, visibility, and toxic chemicals levels to permit safe swimming.	9, 10, 11, 12, 13, 14, 15	Ensure safe swimming: faecal coliforms less than 100counts/100mls; control sources of phosphorus with the goal of 30ug./l. in the Welland River and Niagara River tributaries; Secchi disk visibility greater than 1.2 m; water quality meets drinking water objectives for toxic chemicals	Welland River and (Niagara River) Tributaries Monitoring Program. Beach Protocol (Region Niagara Health Services)	No additional remedial action required.
9 Ensure water quality is sufficiently free of contaminants to be suitable for potable water after treatment in a modern plant, for industrial uses with minimal treatment, and for agricultural use.	Not applicable	Not applicable. Not an impaired beneficial use.	Not applicable.	Not applicable.
10 Identify and correct high erosion areas so that non-storm suspended solids are less than 80 mg/l, sedimentation is reduced on fish spawning beds, and all life levels of desirable fish species are unimpeded.	13, 14, 15	When high erosion sites have been identified and remediated, so that non-storm suspended solids are less than 80mg./l.	Welland River and (Niagara River) Tributaries Monitoring Program.	No additional remedial action required.
11 Maintain and improve fish and wildlife habitat to encourage populations at healthy, contaminant free, self-sustaining levels without fear of bio-accumulation. (Includes increased diversity and maintenance and protection of rare, endangered and threatened species and habitat).	13, 14, 15, 19, 21, 23, 34	Monitoring program indicates healthy, contaminant free, self-sustaining populations.	Sport Fish Contaminant Monitoring CWS Volunteer Monitoring Programs	No additional remedial actions required.
12 To sustain and improve the compatible Niagara River recreational and scenic resources. (Includes the whole Niagara River AOC).	14, 15, 19	The Niagara River RAP goals are reflected in all agencies in the AOC whose mandate involves them with Niagara River RAP issues.	Appropriate agencies endorse RAP goals (e.g., NPCA, NPC, Region of Niagara, area municipalities)	No additional remedial actions required.

Table 8 (Con't) Achievability of Niagara River RAP Goals For The Welland River and (Niagara River) Tributaries

Goals	Recommendations Necessary To Achieve Goal	Canadian Cleanup Criteria	Monitoring Program	Goal Attainment For Welland River and (Niagara River) Tributaries
13 Maintain and improve the recreational and scenic resources through enhancements to the existing paths along the Niagara River and its tributaries, controls on the placement of fill along the gorge face, reduction of debris and litter on shore and in the water, the encouragement of natural regrowth, and the restoration of avian and other habitat along watercourses.	14, 15, 19	The Niagara River RAP goals are reflected in all agencies in the AOC whose mandate involves them with Niagara River RAP issues.	Appropriate agencies endorse RAP goals (e.g., NPCA, NPC, Region of Niagara, area municipalities)	No additional remedial actions required.
14 Aesthetic impact issues to be clearly addressed in any development in the AOC.	14, 15, 19	The Niagara River RAP goals are reflected in all agencies in the AOC whose mandate involves them with Niagara River RAP issues.	Appropriate agencies endorse RAP goals (e.g., NPCA, NPC, Region of Niagara, area municipalities)	No additional remedial actions required.
15 To reduce non-point sources of pollutants, including sediments, and eventually eliminate discharges of persistent bio-accumulative toxics.	14, 15	Suspended, transported and in-place sediments contain levels of contaminants at or below LEL.	Welland River and (Niagara River) Tributaries Monitoring NRTMP Monitoring Programs	No additional remedial actions required.
16 Identify and correct contaminated sediment sites so that benthic community structure and toxicity is similar to unimpacted sites.	16, 17, 18	Ensure adequate sampling has been undertaken to identify all sites. Suspended, transported and in-place sediments contain levels of contaminants at or below LEL.	Welland River and (Niagara River) Tributaries Monitoring NRTMP Monitoring Programs	No additional remedial actions required.

The proposed implementation framework was developed from a series of meetings by the RAP Team and PAC. The following sections describe the role and membership of the components of the implementation structure.

NIAGARA RIVER RAP IMPLEMENTATION STRUCTURE

The components of the Implementation Structure and their relationships are illustrated in Figure 6. There are three tiers of components:

- The 'Canada/Ontario RAP process' components include: Niagara Partners in Cleanup Committee (NPICC), the Public Advisory Committee (as a subcommittee of NPICC) and the Niagara Implementation Centre (NIC).
- Community cleanup organizations form the 'local or community' tier.
- The 'international linkage' components include: the International Advisory Committee (IAC) and the Niagara River Toxic Management Plan (NRTMP).

Each is discussed below.

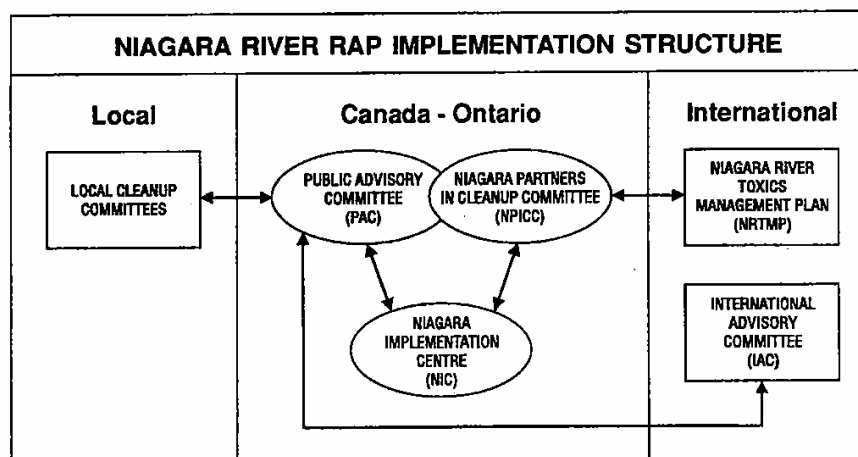


Figure 6.

NIAGARA PARTNERS IN CLEANUP COMMITTEE

The Niagara Partners in Cleanup Committee (NPICC) is the central component of the Niagara River RAP Implementation phase. NPICC will represent the agencies and municipalities with direct responsibility to implement the Recommendations and will:

- Coordinate programs to implement Recommendations;
- Facilitate implementation agreements and funding for remedial actions;
- Report on progress of work groups, including annual reporting on:
 - implementation of remedial actions
 - restoration of beneficial uses
 - environmental conditions of the Niagara River; and
- Conduct regular formal, Head-of-Council meetings to inform all the municipalities on RAP progress and provide a forum for discussion of implementation issues affecting their municipalities.

Agencies/organizations represented on NPICC will include:

- MOEE
- DOE
- DFO
- OMNR
- OMAFRA
- OMMA
- NPCA
- NPC
- PAC
- Region of Niagara
- Area municipalities

The NPICC will be Co-Chaired by the PAC Chair, representing the public and Regional Director (MOEE-West Central Region), representing government agencies.

The Public Advisory Committee (PAC) will be a subcommittee of the NPICC. The PAC's primary function in implementation of the RAP will be as a 'public watchdog'.

Its roles will include:

- Progress Evaluation
- Advisory
- Education/Community Outreach
- Lobbying

The roles are briefly discussed below.

1. Progress Evaluation

This would be the major role of the PAC. Depending on the RAP implementation status, information made available to the public could either be of a progress evaluation or an education/community outreach nature.

2. Advisory Role

The PAC would advise the public, NPICC and community cleanup organizations on the implementation of the RAP Recommendations.

3. Education/Community Outreach

The PAC would continue to plan and participate in educational and community outreach events. Information would be distributed to schools on a regular basis.

4. Lobbying

The PAC would develop and maintain contact with elected officials through various means, such as:

- regular presentations to MPPs and MPs in the AOC;
- scheduling regular appointments;
- hand delivering information;
- presenting RAP progress information and funding requirements to Regional Council and city councils.

The PAC would seek regular contact with the press and provide updates to reporters.

NIAGARA IMPLEMENTATION CENTRE

It is proposed that government agencies provide resources to support the Niagara Implementation Centre (NIC) in its role of coordinating and administering Niagara River RAP implementation projects and core aspects of continuing public involvement. It is also envisioned that the NIC will provide administrative support to the PAC.

COMMUNITY CLEANUP ORGANIZATIONS

Community cleanup organizations are actively working to cleanup the AOC's streams and rivers. While they are a vital part of the organized cleanup of the local streams, they are their own independent organizations. They are not part of the formal RAP structure. However, because they all share the RAPs goals, it is important that they be 'linked' into the RAP process.

INTERNATIONAL ADVISORY COMMITTEE

The International Action Committee (IAC) is a forum for the liaison of citizens of the two Niagara River RAPs. On the Ontario side it is called the Niagara River Public Advisory Committee and on the New York side it is called the New York Remedial Action Committee. During Stage One of the RAP process, both committees liaised through IAC to exchange information, to discuss common concerns and to plan joint activities.

The Mission Statement

The mission of the Niagara River International Advisory Committee is to reestablish a chemical, physical, and biological balance in the Niagra River ecosystem so that diverse plant and animal communities and human health and welfare can be improved and sustained for present and future generations. We will accomplish this in a way that reflects the international communities integrated concern for remediation and preservation of the River and in accordance with the Great Lakes Water Quality Agreement.

The International Advisory Committee (IAC), composed of public and government agency representatives, provides an important communication link between the two Niagara River RAPs. In the implementation structure IAC has a reporting link to NPICC and an information link to PAC.

NIAGARA RIVER TOXIC MANAGEMENT PLAN

The NRTMP⁽³⁸⁾ established a common goal of reducing the loadings of toxic chemicals to the Niagara River through appropriate cooperative and independent agency activities. The Niagara River RAP has utilized point source loading information from NRTMP in determining its Recommendations.

While there is no formal reporting link between the NRTMP and RAP, the programs share both agency staff and information to fulfil their mandates.

⁽³⁸⁾ The four Parties are Environment Canada, U.S. Environmental Protection Agency, Ontario Ministry of Environment and Energy, and NYS Department of Environmental Conservation. See Appendix E for more information.

APPENDIX A

THE ECOLOGICAL IMPERATIVE

GENERAL OVERVIEW AND APPLICATION OF ECOLOGICAL RELATIONSHIPS⁽¹⁾

(1) References:

Project Wild Activity Guide.
CWF. 1990.

Manual of Implementation Guidelines for the Wetlands Policy Statement. November 1992. Ministry of Natural Resources/Ministry of Municipal Affairs.

Stage One Report. Niagara River RAP. 1992.

Looking Ahead: A Wild Life Strategy For Ontario. Ministry of Natural Resources. May 1992.

Robert Lewies and Doris Krahn. Towards Maintaining Niagara District's Sustainable Environment. February 1991.

In a natural ecosystem, if one component is changed in any way, then other components usually respond in some manner, although these responses may not even be observable or measurable over a short period of time. Many factors influencing our environment are subtle - responses manifest themselves following continuous exposure and/or escalation, often after the actual causes have been obscured, confused or augmented by other influences.

Through our actions we have influenced our environment and still do. For some, the solution to the environmental problems we have caused is relatively simple - remove chemical contaminants from the soil, water and air and all will be well.

For others who prescribe to the ecological approach, an approach that acknowledges the inter-relationship and interdependence of all things, it is not that simple. In addition to littering our landscape with our waste materials and chemical contaminants, *we have altered our physical environment on a grand scale.*

Carolinian hardwood forest, which dominated the landscape of this area, has been largely removed. Over 80% of the natural wetlands of the area have been lost. How the forests and wetlands were removed, the amount that was removed, and how the land was treated after their removal, all have an impact on surface water quality and quantity. It is for this reason that the Niagara River RAP addresses a geographic area larger than the river itself.

How has changing the natural landscape on this massive scale affected surface water quality and quantity? Some of the considerations include:

- Natural flora affects base flows in surface waters. Water percolates into the soil at various rates, (depending on the permeability of the soil), to form ground water. A healthy ground water flow is essential to maintaining base flow in surface waters. Sandy soils allow relatively rapid passage of surface water to ground water. Clay soils, on the other hand, are highly impermeable and water percolation is slow. Deep-rooted vegetative cover aids percolation through impermeable soils by fracturing the soil mass. Loss of that vegetative cover means there is less percolation through the impermeable soils to the ground water.
- If the rate that water is applied to the surface exceeds the rate it can percolate into the soil, it builds up on the surface and will move across the land surface. As the volume and velocity of the water increases, its ability to erode and carry soil particles also increases. Flexible, well-rooted vegetative cover tends to impede flow and thus modify its ability to cause erosion. Loss of vegetative cover means an increase in the ability of water to cause erosion and sculpturing of the landscape, which in turn will cause a decline in surface water quality (e.g., increase in suspended solids and absorbed chemicals).
- Water moves upward through the soil by capillary action. The zone of soil saturated with water by capillary action is known as the water table. At the interface of uplands with streams and rivers, water exchange occurs between surface and subsurface waters. If the water table is at a higher elevation than the surface water, flow occurs from the

"Future management of rivers and fish habitat must focus on the entire watershed as a unit in order to ensure the sustainability of our use of healthy river ecosystems and the human environment. Restoration or rehabilitation of rivers and habitat for fish will entail an interdisciplinary approach, and require the cooperation of government agencies, professionals and the public."

From:
Urbanization and Stream Habitats for Fish. A Synoptic Review and Perspective. (Draft submitted to Theme Chairman: 1st World Fisheries Congress, Athens. 1992.)

J.G. Imhof, H.A. Regier, R.J. Planck, A.Schrimpf.

water table to the surface water. This helps to maintain the base flow in the surface water. If, on the other hand, the water table is at a lower elevation than the surface waters, the water table can not help to maintain the base flow in the surface water. The rate of exchange is dependent on the permeability of the soil, which in turn is affected by vegetative cover.

- Extraction of quarry stone, sand, gravel and soil, as well as extractions associated with housing, roads, canal and drain construction can alter ground water storage and flow and may also influence recharge of surface waters through springs and seeps, thus changing flow volumes to wetlands and streams. Any topographical changes associated with extraction processes and construction

further influence surface water flows and drainage patterns. These induced environmental changes alter ecological relationships.

- The natural flora provided habitat for a great many animal species and for some its loss was below some critical level required for their existence in any significant numbers (e.g., redshouldered hawk, osprey, and southern flying squirrel). A side benefit of good water management then, is the possibility of re-establishing sufficient natural cover so that these populations can be rebuilt into healthy natural communities.

Lewies and Krahn (1991) suggested that, in order to create a healthy ecosystem, approximately 20% of the Niagara Peninsula should be maintained under natural cover, taken as deciduous forest of the Carolinian Growth Zone. (See "Towards Maintaining Niagara District's Sustainable Environment" for discussion). It is interesting to note that the British Columbia government has recently dedicated 13% of the total land area of Vancouver Island as natural areas for this same purpose (i.e., establishing/ maintaining a healthy ecosystem.

SUMMARY

Vegetative cover, through a number of mechanisms, is essential to the overall health of the area's rivers and streams, affecting both water quality and quantity. Simply removing sources of pollutants will not complete the task of restoring and protecting the ecosystem in the Area of Concern. Nor will it allow attainment of all the RAP goals in the Area of Concern.

Table 1 Sustainable Environment Matrix		
	Conservation Component	Renewable Resource Use Component
Over Mature	3%	1 – 2%
Mature	3%	1 – 2%
Pole Stage	3%	1 – 2%
Seedling/Plantation	3%	1 – 2%
Shrub border	3%	1 – 2%
Meadow	3%	1 – 2%

Towards Maintaining Niagara District's Sustainable Environment

(Robert Lewies M.Sc. and Doris Krahn R.P.F. February 1991.)

Lewies and Krahn prepared a planning level rationale for estimating the land base necessary to sustain the natural environment in the Ministry of Natural Resources' Niagara District. Starting with the Brundtland Report, the points of development include:

- 24.3% of the land base as natural cover (the Report notes that, while in North America approximately 8.1% of available ecosystems are protected by reserve status, at least three times the total reserve area should be protected; hence the 24.3% figure);
- Lewies and Krahn define the natural environment as: forest cover (which is subdivided into 1) over-mature, 2) mature, 3) pole stage and 4) seedling/plantation); woody shrub cover; and, herbaceous plant cover or meadow. The components were assumed to be equal to each other. Each of the forest cover subcomponents were assigned a value of 3%. Each of the other components, woody shrub cover and herbaceous plant cover were assigned a value of 3%. In total, this gave an absolute minimum of 18% of natural cover for conservation purposes.
- A renewable resource use component was added to the over-mature and mature forest cover classes, a value of 1-2%. To maintain a balance, this value was added to the other natural environment components.
- The overall natural cover reserves amounts to 24-30% of the total land area within the Niagara District (See Table 1.)
- It is recommended that the natural cover distribution be shared equally among area municipalities. Municipalities lacking a base of sufficient open space for the establishment of natural cover, should incorporate the development of such areas into their redevelopment plans, rather than relying on neighbouring municipalities to supply their land base.
- The Niagara District contains a total land area of 242,000 hectares. Within this sustainable environmental scenario, it is recommended that at least 58,000 hectares, preferably 72,600 hectares of this land be reserved.

An Application of Sustainable Environmental Management

Robert W. Lewies (January 1993)

The site is a 57 ha. property in the Regional Municipality of Niagara. It is operated for religious, recreational, educational, and natural environmental maintenance purposes.

The property includes:

Forest cover — 12 ha (21%)

Pasture — 13 ha (24%)

Farmyard/meadow/fallow — 31 ha (55%)

and a cold water stream with a natural Brook Trout population.

The property is presently supplied with adequate forest/meadow cover with good distribution for conservation purposes, although some redistribution may be desirable/allowable for the owners development plans. To meet personal and public requirements, natural cover could/should be increased to about 18 ha (approx. 30%). This natural cover can be described as Conservation Forest, Production Forest, shrub border/meadow with a suggested ration of:

Conservation Forest — 7 ha

Production Forest — 5 ha

Meadow/Shrub Boarder — 6 ha

Total — 18 ha

Recommended distribution of the natural cover by type is with conservation forest to the back of the property for minimum disturbance, fronted by production forest which is in turn fronted by shrub boarder and meadow.

Modifications to this distribution should be made for 1), a vegetative buffer along the creek (with no more than 10% of the creek bank length open for use as road, lane or trail crossings and access points for fishing) 2) steep slopes subject to erosion, 3) wetlands and 4) connective corridors to join natural areas on the property or on neighbouring properties. Isolation of natural areas should be avoided if possible.

Conservation forest areas should be managed for the length of time necessary to obtain a variety or diversification of species, sizes, and distribution. Production forest should be managed according to a prescription developed by a competent forest technician for the desired forest products. For safety reasons edges along roads, lanes and trails should be tended for potential hazards back to a distance equivalent to maximum tree height. These tended areas should be included in the production forest classification.

Along creek banks cleared areas should be limited to no more than 10% of the total length contained on the property. With the exception of cattle crossing and bridges these areas should be maintained in grass cover on non-hardened surfaces and back for a distance of at least 30 metres from the top of each creek bank. The remaining creek banks, if not already vegetated, should be revegetated as soon as possible if in erosion prone areas, otherwise left to revegetate naturally to shrubs, trees or whatever if not erosion prone. Again the minimum distance of 30 metres back from the top of bank applies to these areas. Natural selection will eventually fill these areas with the appropriate species. Manage forest edge along the creek as for walking trails.

Natural vegetative buffers should also be maintained around wetlands as for creek banks. Access to wetlands, if desired, would be kept to minimum an utilized board walks and boat ramps (if applicable). Cleared areas should be maintained in the same way as those along creeks and should not exceed 10% of the perimeter. The buffer should be measured as commencing at the upland edge of the wetland (or where wetland plant species give way to upland species). Again the 30 meter buffer strip width applies. As with the other cover types, buffers are included as part of the lands dedicated to natural cover, and conservation of a healthy environment.

Fire and natural diseases have not been addressed in this presentation. Neither should be allowed to constitute a threat to either life or property. Proper site planning should reduce the threat of fire to life and property. Fire lanes can be designed into the forest areas and they may be the same as those created for the recreational/educational trails. Disease control should perhaps be limited to the production forest unless that in the conservation forest would virtually eliminate the total forest.

All the remaining areas of the property are suitable for development which may be agricultural, residential or industrial. Care must be taken to ensure that development does not impact in a negative way. Drainage must be maintained at pre-development levels both in terms of space and time. The natural areas must be protected. Flood plains cannot be encroached upon by structures which would alter their fluvial characteristics.

APPENDIX B

AN INTRODUCTION TO WATER QUALITY MONITORING PROGRAMS (Point Sources)

Point source discharges to surface waters in the Niagara River AOC have been regularly monitored since 1979. A number of programs serve as a method of evaluating effluent impacts and abatement requirements of discharges to surface water.

Great Lakes Water Quality Agreement (GLWQA)

Early monitoring programs were developed in order to meet the requirements of the 1978 GLWQA between Canada and the United States. Article VI 1 (c) of this agreement requires that an annual report of pollution abatement requirements for both municipal and industrial facilities be prepared. The MOEE encourages dischargers to self monitor their effluent quality and report the results.

The results of this monitoring are published annually in the Report on the Industrial Direct Discharges in Ontario and the Report on the Discharges from Municipal Sewage Treatment Plants in Ontario. In 1992 these were changed to Non-Compliance Reports. This revised format lists only those facilities that were in exceedance of their Certificates of Approval (see below) limits or MOEE/Federal Guidelines. These annual reports focus on conventional pollutants such as phosphorus, suspended solids, and BOD and present results as yearly or monthly average loadings.

Certificate of Approval (C of A)

The monitoring program based on the GLWQA has evolved over time to incorporate the monitoring requirements of a facility's Certificate of Approval (a legal document that outlines a facility's conditions of operation).

Many older, existing certificates authorized the installation of effluent treatment systems, but did not set effluent limits nor monitoring or reporting requirements. In these instances, effluent quality is judged by comparing reported effluent values against numerical limits as established by guidelines or objectives. New or revised C of A's use Section 7 of The Environmental Protection Act and Section 91 of The Ontario Water Resources Act to set legally binding, site-specific effluent quality, quantity and reporting requirements.

Current C of A's consider the impact of the effluent on the receiving body of water as well as the assimilative (self purification) capacity of the receiving water to establish the effluent limits. The water's ability to assimilate non persistent toxic contaminants takes precedence over degradable effluent discharges, even though discharged loadings may be within the limits set by federal/provincial guidelines or regulations. In these cases, more stringent requirements based on the receiving body's limited assimilative capacity are used to set effluent loading limits.

Municipal-Industrial Strategy for Abatement (MISA)

In order to provide a more comprehensive and consistent approach to effluent evaluation and abatement requirements, point source dischargers became subject to the Municipal-Industrial Strategy for Abatement (MISA) program.

MISA was designed to implement a legislated, uniform approach to the reduction and virtual elimination of persistent toxics in Ontario. The first phase of this program

was an effluent monitoring program of over 300 point source dischargers in 9 industrial sectors. This portion of the program was phased in from 1988 to 1990. MISA expanded upon the conventional and site-specific monitoring of IMIS and C of A's, and added persistent toxics to the monitoring obligations of direct dischargers.

Eight industrial facilities in the Area of Concern were involved in the first phase of the MISA program. These were: Atlas Specialty Steels in the Iron and Steel Sector; CanadianOxy Chemicals and Geon Canada in the Organic Chemical Sector; Cytec Niagara and Welland, Norton Advanced Ceramics, Washington Mills Ltd. and Washington Mills Electro Minerals in the Inorganic Chemical Sector.

The MISA Program has entered its second phase. The data collected during the initial monitoring phase is being reviewed for each facility on a sector-specific basis. Effluent limits regulations for the sectors represented in the Niagara River AOC are expected in 1994.

Effluent discharge limits will be set for problematic parameters at an industry-specific level. All sectors will be required to have effluents which are not acutely lethal to the water flea (*Daphnia magna*) or rainbow trout (*Oncorhynchus mykiss*). Compliance with these limits is to be achieved through the Best Available Technology Economically Achievable (BATEA). Each facility will be required to undertake a storm water control study.

Niagara River Toxics Management Plan (NRTMP)

Publication of the GLWQA monitoring data resulted in a concern for the water quality of the Niagara River by both Canada and the United States. As a result, the Niagara River Toxics Committee (NRTC) was formed. Today, this committee consists of senior representatives from Environment Canada, the Ontario Ministry of Environment and Energy, the United States Environmental Protection Agency (USEPA) and the New York State Department of Environmental Conservation (NYSDEC). The goal of the NRTC was to determine what toxic chemicals were in the Niagara River, identify their sources, recommend activities to control pollution and to establish procedures to monitor the effectiveness of these activities.

In February 1987, a Declaration of Intent was signed by representatives of the four environmental agencies having jurisdiction along the Niagara River. The goal was a 50% reduction in the loadings of 10 persistent toxic chemicals into the river by 1996. The Declaration of Intent, with its detailed workplan, forms The Niagara River Toxics Management Plan (NRTMP).

Participation by industry and the municipalities in NRTMP is voluntary. It utilizes the legislated abatement programs of the USEPA, Ontario Water Resources Act (OWRA) and MISA to work towards the achievement of its toxics reduction goals.

This program is subject to period revisions. Point sources have been added and others removed, as discharges are created or eliminated. As well, the list of Chemicals of Concern has been modified to reflect variations in environmental significance. The Niagara River Coordination Committee meets and reports regularly on progress towards 50% reduction.

As part of the NRTMP, MOEE produces an annual report which identifies point source discharges. This report has evolved with the program. Today it summarizes progress in reducing the point source loadings of a range of toxics monitored in municipal and industrial treatment plant effluents. This report: identifies point source discharges; provides schedules on a facility-specific basis for achieving the targeted reduction; and identifies the technical, legal and regulatory impediments, if any, that may interfere with achieving the targeted reduction.⁽¹⁾

Since much of the Niagara River Toxics Management Plan is directly related to the MISA monitoring program, there is an exchange of information between the two programs.

⁽¹⁾ Update Report. Reduction of Toxic Chemicals From Ontario Point Sources Discharging To The Niagara River 1992. Ministry of Environment and Energy. May 1994.

<p>Table 1</p> <p>Water Quality Monitoring Programs</p> <p>Background Information</p>	
Pollutant Category	Monitoring Program
Conventionals — Nutrients — Metals	IMIS MISA NRTMP
Volatile Organics — Chlorinated Hydrocarbons — (Solvents)	MISA NRTMP
Base/Neutrals Extractables — PAH's and Organics	MISA NRTMP
Acid Extractables — Phenolics	MISA NRTMP
Dioxins and Furans	MISA
Pesticides	NRTMP MISA (limited)
<p>Acronyms</p> <p>IMIS - Industrial Monitoring Information System</p> <p>UMIS - Utilities Monitoring Information System</p> <p>MISA - Municipal-Industrial Strategy for Abatement</p> <p>NRTMP - Niagara River Toxics Management Plan</p> <p>C of A - Certificate of Approval</p>	

APPENDIX C

PUBLIC ADVISORY COMMITTEE

ACTIVITIES SINCE STAGE ONE

REPORT

PUBLIC ADVISORY COMMITTEE (PAC)

The Niagara River Public Advisory Committee (PAC) was established in January, 1989, with the mandate to advise and assist the Remedial Action Plan (RAP) Team to develop a RAP for the Niagara River. As one of its first tasks, the PAC prepared the following statement:-

The mission of the Niagara River RAP is to re-establish, protect and maintain the integrity of the ecosystem for the Niagara River.

PAC meetings are held on the second Tuesday of the month in the Niagara Falls City Hall. The meetings are open to the public and are advertised in the local media and on Cable TV. In addition, agendas of upcoming meetings are mailed to interested citizens, politicians, media, government and non-government organizations, both in Ontario and New York. The mailing list is maintained at the PAC office, and additions to the list are made from requests received at the PAC office and during various public outreach activities.

The PAC meetings provide a forum for examining issues in the development of the RAP and for receiving presentations on ongoing or proposed projects in the AOC. The PAC is periodically consulted to support in principle various proposals. PAC decisions are documented in the meeting minutes.

The PAC operates under a Terms of Reference, which is described in the Niagara River RAP Stage 1 report: Environmental Conditions and Problem Definition; and summarized in a Factsheet. During the RAP process, the PAC strikes sub-committees as required - see PAC Structure section.

PAC Membership:

The PAC is comprised of representatives from various sectors of the community. Membership of the PAC has included representation from the following areas:

- Academia
- Agriculture
- Community Groups
- Conservation Authority
- Environmental Groups
- Fishing
- Health
- Industry
- Interested Citizens
- Municipal Governments
- Regional Government
- Niagara Parks Commission
- Power Generation
- Tourism & Recreation

For a list of members, see Acknowledgements.

The PAC Structure:

The role, structure, activities and initiatives of the PAC during Stage 1 of the RAP (1989-1991) are documented in the report, Stage 1: Environmental Conditions and Problem Definition. Also, the unique structure of the International Advisory Committee (IAC) is outlined in the Stage 1 report.

In 1992, an Executive Committee was established to take charge of such issues as nominations for the new Chair, restructuring of the PAC as required throughout the RAP process and PAC membership and representation on the various subcommittees.

The PAC continued to operate with the Technical and Communications & Editorial sub-committees throughout 1992 until mid-1993. During this time the PAC goals were articulated and the issue of selection of remedial options was being examined.

In 1993, after a series of workshops on the selection of remedial options, the PAC restructured by establishing working groups to more effectively address the issues of water quality, sediment quality, and aquatic biota and habitat quality during Stage 2.

The International Advisory Committee (IAC):

The IAC was established in March, 1990, and met on a monthly basis, alternating venues between Ontario and New York. The last meeting of IAC was held in June, 1993, at which time the U.S. Niagara River Action Committee (NRAC) was officially disbanded. The structure, role and joint activities of IAC are documented in chapter 1 of the Niagara River RAP Stage 1 report.

Shortly after its establishment, IAC developed the following mission statement:

The Mission of the Niagara River Remedial Action Committees is to re-establish a chemical, physical, and biological balance in the Niagara River ecosystem, so that diverse plant and animal communities and human health and welfare can be improved and sustained for present and future generations. We will accomplish this in a way that reflects the international community's integrated concern for remediation and preservation of the River, and in accordance with the Great Lakes Water Quality Agreement.

IAC provided an avenue for networking, cooperation and exchange of information between the two Niagara River RAPs. For example, it was through IAC that the PAC requested a presentation on the status of the U.S. RAP. Subsequently, a presentation on the U.S. RAP was made, with assistance of staff from the New York State Dept. of Environmental Conservation (NYSDEC).

Through IAC, the PAC was invited to attend the NRAC Public Workshops on the U.S. RAP Stage 1 report, which were held in May/93. In June/93, the PAC consolidated its comments in a response letter to NRAC.

IAC provided an opportunity for the PAC and NRAC to share resources, such as slides, photos, etc., during the development of their respective communications products. It also facilitated exchange of information on educational initiatives of School Boards in Ontario and New York with their local environmental groups - see section on Liaison Committees.

In addition, IAC meetings provided a forum for regular updates on the status of the Niagara River Toxics Management Plan (NRTMP) and the activities of the Coordination Committee. IAC has met with the NRTMP Secretariat to discuss issues pertaining to cleanup activities of the river.

The PAC now operates through a U.S. Issues sub-committee (established fall/93) on international issues. In Spring 1994, a letter expressing concern at the loss of citizen liaison between the two RAPs was forwarded to the Acting Commissioner, NYSDEC. A

formal response was received in July 1994. New York State has expressed continued support and cooperation in this shared Great Lakes resource.

The PAC Office:

In February, 1992, a publicly accessible PAC office was established in Niagara Falls. The office is managed by the Community Liaison Coordinator (CLC) and is the focal point of all PAC business. The office houses a collection of materials relating to the Great Lakes and Niagara River environmental issues from various sources both in Canada and the United States. Concise records of all PAC, NRAC, IAC, sub-committee meetings, and information from various sources are filed in the office.

The office is also the venue for sub-committee meetings, including past IAC meetings.

The PAC office provides a drop-in resource centre for interested citizens and students from both Ontario and New York. Periodically during the RAP process, students have volunteered to work at the PAC office on various projects.

PAC's Liaison with other Environmental Committees in the AOC:

One of the premises of Stage 2 of the RAP is to encourage and support community liaison cleanup activities.

Since 1989, extensive networking has taken place between the PAC and local environmental groups within the AOC. These groups include:

- Canadians for a Clean Environment
- Friends of Fort Erie's Creeks
- Friends of Fort George/Friends of the Buffalo River
- Friends of the Welland River
- Lyons Creek Action Committee
- Niagara Ecosystems Task Force
- Niagara Falls Environmental Planning and Greening Committee
- Niagara Interfaith Network on the Environment
- Niagara Greenways Initiative
- Niagara North Board of Waste Management
- Regional Niagara's Ecological and Environmental Advisory Committee
- Welland River (Welland) Cleanup Committee

In addition the PAC has supported in principle proposed cleanup activities by various outside committees. Examples of this include PAC endorsement of Great Lakes Cleanup Fund, Welland River demonstration dredging project and recently, the Lyons Creek East and Lyons Creek West Committees for their proposed remedial actions.

Workshops during Stage 2:

- June 13, 1992. Ecosystem Approach to Pollution Control Planning Studies. Brock University.
- April-June, 1993. A series of seven workshops were held to determine the selection of remedial options for the Niagara River RAP Stage 2 Report. Information from these workshops is available at the PAC office.
- August 1994. Draft Stage 2 Report review and development of implementation structure.
- January 1995. Review of revised Draft Stage 2 Report.

Communications products developed since 1989:

Factsheets, revised 1990, 1992:

- The Niagara River Area of Concern
- Areas of Concern and Remedial Action Plans
- Water Quality Initiatives and Programs
- Wildlife in the Niagara River
- The Niagara River Fisheries
- Public Advisory Committee (PAC) "Becoming Involved" (revised 1993)
- Public Involvement Program (revised 1993)
- Niagara River. Great Lakes Remedial Action Plan Status - Highlights.

Newsletters:

- CURRENT. Autumn 1991. Volume 1, Number 1.
- AU COURANT. Automne 1991. Volume 1, Numero 1.
- CURRENT. Spring 1993. Volume 2, Number 1.
- AU COURANT. Printemps 1993. Volume 2, Numero 1.
- CURRENT. Winter 1995. Volume 2, Number 2.

Summary Reports:

- The Niagara River - How did we get to this Stage?
- La riviere Niagara - Comment en est-on arrive la?

Slide-show: 1990 - 1993.

- The 12 minute slide-show was presented at various public outreach activities and speaking engagements. The Communications Sub-Committee has prepared a new slide-show, which includes information on proposed and ongoing remediation activities in the AOC.

Video Tapes:

- Cable 10 TV Interview of Ian Brindle (PAC Chair) and Paul Odom (RAP Coordinator). December 6, 1991.
- PAC meeting. September 8, 1992. Certificate presented to Ian Brindle/ Election of new Chair.
- Ontario Public Advisory Committee Council Conference. October 23-25, 1992. Sheraton Fallsview Hotel. (4 video tapes)

Audio Tapes:

- CJRN Niagara Falls. November 7, 1991. Bill Auchterlonie Talkshow featuring Ian Brindle (PAC Chair) and Phil Weller (Co-Chair of NRAC).
- Ontario Public Advisory Committee Council Conference. October 23-25, 1992. Sheraton Fallsview Hotel. (3 audio tapes).

The PAC Display System & Information Boards:

The PAC display is exhibited.

Information on various aspects of the RAP is presented on the PAC Display System at various events throughout the AOC, to raise public awareness of the RAP program.

The Niagara River Repository:

Established at the Niagara Falls Public Library in 1991, the repository contains a variety of documents on pollution in the Niagara River and is available to the public as reference material.

The repository has been advertised in the Librarian's column in the local media and acquisition of documents is ongoing. The repository bibliography is housed at both the library and PAC office.

Documents to which the PAC contributed articles:

- The Planet Today. Niagara edition. Fall 1991.
- Recreation Review. The Niagara Falls Department of Parks & Recreation. December 1991.
- Niagara Interfaith Network on Ecology Newsletter. October 6, 1993. Vol.#1, No.1.
- Stay Safe Magazine for Kids. Fall, 1993.
- Niagara Peninsula Conservation Authority. Focus on Conservation. Winter/Spring 1994.

Communications Products:

- HOMES FOR FISH is a colouring book which has been prepared for the PAC in partnership with the Dept. of Fisheries and Oceans.
- *Interactive Software*
The PAC, through the Communications sub-committee, in partnership with DFO and MOEE, has developed a user-friendly computer system that takes you on a journey along the Niagara River which tests your knowledge of its environmental issues and the Remedial Action Plan. These questions address issues in the categories of water quality, sediments, fish & wildlife, river facts and health, to develop the product. The system is scheduled at various libraries and venues throughout the AOC. A polling aspect of the software will provide information which will assist the PAC to identify and target community sectors for future public outreach activities, etc.
- *The Niagara River RAP Education Outreach*
The Niagara River PAC, along with DFO, CWS, MOEE, Philip Environmental and Canadians For a Clean Environment, presented an educational show at the Niagara Regional Science Fair (April 1994).

Other promotional items:

Sweatshirts, mugs, fridge and calendar magnets, visors. These items feature the Niagara River RAP Logo.

PUBLIC CONSULTATION ACTIVITIES - 1992.

Details of the events are available at the PAC office.

February

Tour of CanOxy on Frenchman Creek with students. The tour included a presentation on the company's environmental initiatives.

April

A Children's Festival. Skylon Tower, Niagara Falls. PAC display was exhibited and handout material was available to parents and children during the 3-day event.

April

American Waterworks Association Conference. Sheraton Fallsview Hotel, Niagara Falls, Ontario. Theme: Our Water - What's Changing. PAC participated in poster session, provided handout material and networked with other participating organizations.

April

Stamford Imperial Order of the Daughters of the Empire (I.O.D.E.). Presented slide-show, provided information and handout material.

April

Niagara Parks Commission Table Rock Complex. The PAC display was exhibited for 10 days. On Earth Day Canada Post unveiled the Niagara River stamp at Table Rock.

June

Environment Day. City of Niagara Falls - Orthodox Pavilion, Montrose Road. Canadians for a Clean Environment invited the PAC to display information and liaise with the public.

July

Canada Day. Optimist Hall, Niagara Falls. The City of Niagara Falls invited the PAC to exhibit the display, provide information and liaise with the public during the celebrations. Several citizens requested to be added to the mailing list.

October

Welland East District Women's Institute, Stamford Branch. A slide-show presentation was made and handout material provided to the members.

October

Conference was hosted by the PAC at the Sheraton Fallsview Hotel, Niagara Falls, Ontario. During the event, a bus tour was conducted along the Ontario and New York sides of the Niagara River.

December

The Fishing Corner, Niagara Falls, Ontario. Arrangements were made via a student of A.N.Myer High School to exhibit a PAC display and provide factsheets, etc. for the customers for one month.

PUBLIC CONSULTATION ACTIVITIES - 1993

January

Stamford Collegiate, Niagara Falls. Slide-show presentation and handout material for grade 12 students.

February

Canadians and Americans for the Protection of the Environment (C.A.P.E.) meeting at Niagara Falls City Hall (Ontario). A presentation on the status of the Niagara River RAP was made to Councillors and Aldermen of the cities of Niagara Falls.

April

Niagara Interfaith Network on Ecology (N.I.N.E.) invited the PAC to participate with its display in an Earth Day exhibition session. Jim Bradley, M.P. (St. Catharines-Brock) was the guest speaker at the event.

June

Environment Day. City of Niagara Falls. The PAC participated in a display session at the Niagara Square Shopping Mall.

June

St. Catharines Chamber of Commerce Environmental Seminar at Whiteoaks Tennis and Racquet Club, Niagara-on-the-Lake. PAC display and handout materials were available.

July

Canada Day celebrations at Optimist Hall, Niagara Falls. The PAC participated with the display and provided handout material and information to the public.

July

Teachers' Environmental Science Course (Brock Univ.) at St. John's Outdoor Centre, Fonthill. The slide-show was presented along with handout material for the teachers.

July

Pelham Public Library. The Chief Librarian requested to exhibit the PAC display at the Library for one week.

July

NRTMP Coordination Committee Meeting. Sheraton Fallsview Hotel. The PAC display was exhibited and handout material provided to interested attenders.

September

Niagara-on-the-Lake Library exhibited the PAC display for two weeks.

September

Niagara College Environmental Studies Program. St. Catharines Campus. Slide-show and information provided to the teacher and students. Two of the students are now PAC members.

October

IJC Biennial Meeting at Windsor. The PAC display was exhibited at the RAP Forum.

November

Canada Trust's Friends of the Environment Foundation exhibited the PAC display for the customers.

Nov./Dec.

A survey on public awareness of the Niagara River RAP in the AOC was conducted.

December

Hay Day '93. Wellandport Community Centre. Sponsored by Ontario Ministry of Agriculture & Food and local Agricultural Businesses. The PAC was invited to exhibit the display and network with representatives of the agricultural sector.

December

IJC Niagara River RAP Stage 1 Review Meeting. Niagara Falls Public Library.

PUBLIC CONSULTATION ACTIVITIES - 1994

January

Niagara Parks Commission School of Horticulture. Project Treecycle with the City of Niagara Falls. The PAC participated in a display session for the public and provided information and handout material.

January

Meeting with Gary Pillitteri, M.P. Niagara Falls to provide him with a status report on the Niagara River RAP.

February

Stamford Kiwanis, Niagara Falls, invited the PAC to show the slide-show and provide information for the members.

March

Canada Trust, Niagara Falls - Stamford Branch, exhibited the PAC display for one week.

Mar./Apr.

The Centennial Library, St. Catharines, exhibited the PAC display for two weeks.

April

Niagara Regional Science and Engineering Fair at Brock University. Presentations were made to about 300 students by DFO, CWS, MOEE, CCE, and Philip Environmental.

April

Presentation on the Niagara River RAP to students and professors from State University of Buffalo at Brockport.

April

St. Catharines Kiwanis invited the PAC to present the slide-show and provide handout material to the members.

April

The City of Niagara Falls First Annual Home Show. Memorial Arena, Niagara Falls. The PAC was invited by the Dept. of Parks & Recreation to display information and provide handout materials.

May

The Fort Erie Public Library, Gilmore Road Branch exhibited the PAC display for one month.

June

St. Catharines Chamber of Commerce Environmental Seminar. Parkway Complex, St. Catharines. The PAC displayed information at the event.

June

Niagara South Board of Education. PAC presentation to students at local school.

June

The Niagara Falls Public Library. The PAC display was exhibited at the library for two weeks.

June

Niagara River Toxics Management Plan Coordination Committee meeting. Holiday Inn, Grand Island, N.Y. The PAC provided a table-top display for the event.

June

Open House on the Stage 2 remedial options. Niagara Falls Public Library.

July

Canada Day. Optimist Hall, Niagara Falls. The PAC display will be exhibited.

July

Pelham Public Library, Fonthill, exhibited the display for two weeks.

August

The Interactive Computer System was introduced to the community at the Niagara Falls Public Library. Guests included Margaret Harrington, MPP Niagara Falls.

September

Interactive Computer System was hosted by Brock University Library.

September

RAP representative attended Great Lakes Leadership Network (Lake Geneva, Wisconsin).

September

OPAC/SPAC'94 Conference, Sarnia/Port Huron. The theme was 'Opportunities for Local Action'. PAC representative attended.

September

Taping of Margaret Harrington's (MPP Niagara Falls) Cable TV Show "Queen's Park Report", Niagara Falls. Topic: News on the Niagara River.

October

Niagara Environmental Technology Expo. The PAC displayed information and provided handout materials during the two-day event.

November

Canada Trust's "Friends of the Environment Foundation" hosted the Interactive Computer System at the Lundy's Lane/Dorchester Road Branch, Niagara Falls.

December

An Open House was held at the PAC Office. Invitations were sent to schools in the Niagara River AOC, including: Niagara College, Brock University and NPC's School of Horticulture.

December

PAC members attended NRTMP Public Consultation Workshop.

* Handout material includes Factsheets, Newsletters and Reports.

PUBLIC CONSULTATION ACTIVITIES - 1995

January

Project Treecycle at the Niagara Parks Commission's School of Horticulture. The PAC presented the Interactive Computer System, displayed information and provided handout material.

January/February

The Interactive Computer System was hosted by the Pelham Library.

APPENDIX D

ACRONYMS

Remedial Action Plan

AOC	Area of Concern
COA	Canada Ontario Agreement respecting water quality in the Great Lakes
IAC	International Advisory Committee
NPICC	Niagara Partners In Cleanup Committee
PAC	Public Advisory Committee
NIC	Niagara Implementation Centre
RAP	Remedial Action Plan

Welland River (Welland) Cleanup Committee Water Quality Issues

CofA	Certificate of Approval
COC	Chemicals of Concern (part of NRTMP)
CSO	Combined Sewer Overflow
GIS	Geographic Information Service
GLWQA	Great Lakes Water Quality Agreement (signed 1972 revised 1978 and 1987)
IMIS	Industrial Monitoring Information System
INS	Infrastructure Needs Studies
MISA	Municipal Industrial Strategy for Abatement
NRTMP	Niagara River Toxic Management Plan
SCADA	Supervisory Control and Data Acquisition (related to sewage treatment plants)
UMIS	Utilities Monitoring Information System
WPCP	Water Pollution Control Plant

Agencies and Organization

AC	Agriculture Canada
CIPHI	Canadian Institute of Public Health Inspectors
CWS	Canadian Wildlife Service (Environment Canada)
DFO	Department of Fisheries and Oceans
EC	Environment Canada
IJC	International Joint Commission
MOEE	Ministry of Environment and Energy
MOEE-WCR	Ministry of Environment and Energy - West Central Region
NGO	Non-Government Organization
NYSDEC	New York State Department of Environmental Conservation
NPC	Niagara Parks Commission
NPCA	Niagara Peninsula Conservation Authority
OH	Ontario Hydro
OMAFRA	Ontario Ministry of Agriculture, Food and Rural Affairs
OMNR	Ontario Ministry of Natural Resources
OWMC	Ontario Waste Management Corporation
PIC	Public Information Centre (MOEE)
USFWS	Fish and Wildlife Service

APPENDIX E

NIAGARA RIVER TOXICS MANAGEMENT PLAN

⁽¹⁾ The four Parties are: Environment Canada; United States Environmental Protection Agency; Ontario Ministry of the Environment and Energy; and New York State Department of Environmental Conservation.

⁽²⁾ These groups have been reformed to the Technical Advisory Work Group.

The Four Party ⁽¹⁾ "Report of the Niagara River Secretariat Relative To The Status of Commitments Under The Niagara River Declaration of Intent" (June 1994) made the following recommendations:

1. The Niagara River Secretariat (NRS) should review all relevant reports on quantifying loads to the Niagara River and make appropriate recommendations to improve loading estimates to the Niagara River.
2. The NRS recommends that the River Monitoring Committee's proposed workplan and budget for the review and analysis of the ambient data base be approved by the NRCC.
3. The NRS recommends that the Non-Point and Point Source Committees⁽²⁾ be reconstituted as work groups in order to review the potential solutions to measuring/communicating progress. A report is to be tabled with the NRCC recommending activities that can be carried out. It is anticipated that this report will outline what can be done in the context of:
 - resource implications;
 - policy implications;
 - target setting;
 - how proposed work will be used to reflect progress; and
 - timeframe.

The NRS will develop specific terms of reference along with proposed memberships.

4. The NRS will develop a Report (including public consultation) by March 1, 1995, that will:
 - i - provide a status report on the existing Declaration of Intent, by reporting against the commitments of the U.S. and Canadian point and non-point plans;
 - ii - identify unfulfilled commitments to be included in an amended Declaration of Intent;
 - iii - recommend new commitments and objectives to be included in an amended Declaration of Intent;
 - iv - recommend improvements to point and non-point source monitoring;
 - v - recommend a process and structure for implementing a strategy beyond 1996, including the scope of a public involvement process;
 - vi - recommend a Four Party approach to communicating information to measure progress, both for 1996 and beyond.
5. The NRS should sponsor technology transfer workshops to demonstrate new and emerging technologies applicable to hazardous waste landfill site remediation. These would result in the publication of a summary report if appropriate.
6. The NRS should regularly submit all NRTMP updates and progress reports to the IJC Regional Office in Windsor, Ontario.

APPENDIX F

NPCA RURAL CLEAN WATERPROGRAM

DATE: September 15, 1994

TO: The Chairman and Members of the Authority

RE: RURAL CLEAN WATER PROGRAM - REPORT NO. 316-94

As members are aware, the Authority has been involved in water quality improvement efforts in the Binbrook Reservoir watershed through the "Clean Up Rural Beaches Program" (CURB) since 1988. Over this period, the sources of water quality impairment were determined with an extensive monitoring and subsequent remediation program. The CURB program has proven to be very successful with cost-effective solutions for landowners addressing many of the problem areas. Water quality in the Binbrook Reservoir has improved and for the third consecutive season, there was no beach closure.

With the positive results from the Binbrook CURB initiative, and with the majority of sources addressed, staff are recommending that the Authority initiate a Rural Clean Water program. The Rural Clean Water program would be similar in design to the Binbrook CURB, but would focus on other sub-watersheds of the Authority area of jurisdiction. The benefits of the proposed Rural Clean Water program include improved water quality, fish habitat, and ecological health within our watershed.

By almost any standard measurement, there is poor water quality in most creeks and streams in the Niagara Peninsula watershed. Turbidity, suspended sediment and phosphorus levels consistently exceed the Provincial Water Quality Guidelines. Stagnant flow during mid-summer, combined with rotting algae, results in low dissolved oxygen levels in many streams. Low oxygen levels stress the aquatic ecosystem, particularly desirable fish species. Very high bacteria levels found at other stream locations create an unacceptable public health risk. The Conservation Authority, with its watershed basis, is ideally suited for developing and delivering targeted, efficient and effective water quality improvement programs.

The need for soil conservation and water quality improvement programs has also been recognized by respondents to the NPCA Watershed Conservation Strategy. In the *Summary of Questionnaire Results*, it is reported that "many respondents indicated that rural water quality programs, from improved farm management practices to septic system monitoring and maintenance, should be implemented in the NPCA watershed". The Stage (II) *Niagara River Remedial Action Plan* also recommends that the Authority assume a leadership role in developing a rural non-point source pollution strategy for the Niagara River area of concern.

The Authority has received support for rural water quality initiatives in 1994. Environment Canada, through the Great Lakes Cleanup Fund, has provided funding to the Authority to support the development of a rural non-point source monitoring and remediation program for the Niagara River RAP area of concern. The Ministry of Environment and Energy (MOEE) has provided a water analysis lab allocation and co-op student staff.

The proposed "Rural Clean Water Program" will assist landowners to recognize and solve problems contributing to poor rural water quality. The program approach will be modelled after the CURB program. The goal of the "Rural Clean Water Program" will be to improve stream water quality in Niagara by changing landowner attitudes and behaviour through extension, education and cost-sharing programs.

"Targeted effort" will be the key principle guiding the program. The following program will be established on selected sub-watersheds through the following phases.

- Phase 1 - Establish water quality monitoring stations.
- Phase 2 - Initiate landowner contact program to identify problem locations and understand landowner concerns.
- Phase 3 - Establish "Tributary Cleanup Associations" with Authority/Authority member leadership.
- Phase 4 - The "Tributary Cleanup Association" and the Authority pursue funding from sponsoring agencies, such as the MOEE, Environment Canada, and Ontario Ministry of Agriculture and Food and Rural Affairs for remediation and cost-sharing programs.

It is very important that specific watersheds be targeted for rehabilitation. Measurable environmental improvement can be achieved if considerable effort is focused on achieving specific water quality objectives for targeted sub-watersheds. If resources are spread too thinly, it may not be possible to demonstrate environmental improvement within a reasonable time-frame. The targeted sub-watershed, in order of priority are...

- 1) Watershed upstream of Chippewa CA (Oswego Creek/Upper Welland River).
- 2) Watershed upstream of Welland Airport (Beaver/Forks Creek).
- 3) All other streams draining into the Niagara River "Remedial Action Plan" area of concern and watercourses draining into Lake Erie.
- 4) Twenty Mile Creek.
- 5) All other streams draining into Lake Ontario.

"Targeted effort" will also form the basis for remediation programs. The guiding principle will be to solve the most cost-effective problems first. The following chart (Table 1) is a general ranking of problem types from the "most cost-effective" to "least cost-effective".

Table 1	
Most Cost Effective to Least Cost Effective Rating	
PHOSPHORUS	BACTERIA
1. Topsoil erosion	1. Domestic septic systems
2. Milkhouse washwater	2. Direct livestock access to stream
	3. Milkhouse washwater
	4. Manure application
	5. Manure storage

The proposed Rural Clean Water Program budget (Table 2) will replace the existing CURB program. As mentioned, the intent is to replace the CURB program and focus on an expanded area of the watershed without an increase in staff or administration budgets. The program staff component of the CURB was based on a cost-sharing formula of 50% MOEE and 50% NPCA. A similar cost-sharing arrangement is proposed for the "Rural Clean Water Program". Potential partners include Environment Canada, through the Great Lakes Cleanup Fund, and the MOEE.

Table 2		
Proposed Rural Clean Water Program Budget		
	EXISTING CURB PROGRAM	PROPOSED RURAL CLEAN WATER PROGRAM
Salaries and Benefits	\$47,700	\$47,700
Transportation	\$5,500	\$5,000
Expenses & Miscellaneous	\$2,000	\$2,000
Field Equipment, Educational Material & Transportation	\$4,000	\$4,000
TOTAL	\$58,500	\$58,500

In addition to the base budget, funding is required for cost-sharing projects with private landowners and water sample analysis laboratory fees (Table 3). With the CURB Program private landowner cost-sharing programs and laboratory analysis fees were provided by the MOEE. A similar funding level of 100% for these components is proposed for the "Rural Clean Water Program". Potential funding agencies include Environment Canada, through the Great Lakes Cleanup Fund, and the MOEE.

Table 3		
Proposed Landowner Cost-Share & Water Analysis Budget		
	EXISTING CURB PROGRAM	PROPOSED RURAL CLEAN WATER PROGRAM
Landowner Cost-Sharing Program	\$80,000	\$80,000
Laboratory Analysis	\$25,000	\$40,000

It is recommended that staff be authorized to submit "Rural Clean Water Program" proposals to both Environment Canada and the MOEE for 1995.

APPENDIX G THE A B C'S OF STARTING A COMMUNITY LIAISON COMMITTEE

(a view from the trenches - Candice Paris, Lyon's Creek Action Committee)

It is not easy. When a matter of public interest or public risk becomes public there seems to be an initial surge of activity. The rumour mill works overtime and many people profess to want to be kept in the know and involved. And then... the media become occupied with other news and public interest wanes.

1. Be persistent! If the issue is important, someone has to assume a leadership role to get interested parties together.
2. Personally call all who are interested. If they identify a neighbour who has also expressed interest, get their name and phone number and call them too.
3. Set up an exploratory meeting in your home. If for no other reason people will come to see the inside of your home and see if you make good banana bread.
4. At first meeting establish level of interest and begin to draft terms of reference. Determine how frequently people are willing to meet, and what time and location is convenient for the majority. Record notes of the meeting. Establish tasks to be completed at the next meeting (eg. selection of Chair or Co-Chairs) and set a meeting date/time/location.
5. Two weeks prior to next meeting, hand deliver an agenda to each member.
6. 3-4 days prior to meeting, personally call each member to remind them of meeting and to seek a commitment they will attend (or send an alternate to the meeting).

Basically this is the approach we have used throughout: i.e.,

- Agendas
 - Reminders
 - More reminders
 - Minutes
 - Action plan determined by consensus
 - Keeping members informed and involved.
7. **Never forget that leisure time is highly valued. Make sure you make the most of each member's time. Start and finish meetings on time.** Involve members in meaningful work between meetings and put their item and name on the agenda for the next meeting so that they can give a progress report.
 8. Expect to spend a wee bit of money on paper, and misc. supplies. Also be prepared to deliver agendas, and pre-meeting telephone reminders. This personal contact allows ongoing discussion of what to expect in the next meeting.
 9. Keep meetings interesting and focused on the terms of reference of the committee, and stick to the action plan.