Clean Waters

Healthy Habitats

Progress Report 2001

TORONTO & REGION
REMEDIAL ACTION PLAN

Toronto Economic Development Corporation

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Toronto and Region Remedial Action Plan

November 2001

Waterfront Regeneration Trust

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All images on this page: Rosemary G. Hasner, TRCA

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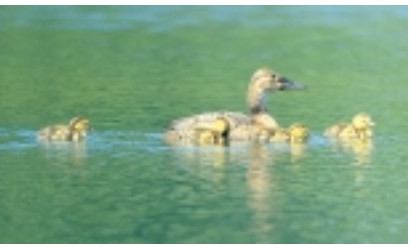

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Top and bottom image: Rosemary G. Hasner, TRCA
Middle image: Waterfront Regeneration Trust

Clean Waters, Healthy Habitats

Progress Report 2001

EXECUTIVE SUMMARY

Waterfront Regeneration Trust

Toronto's waterfront and watersheds have been on the "black list" of Areas of Concern around the Great Lakes since 1987. This document reports on the work that has been done since 1987 to restore water quality and healthy habitats. It provides an in-depth assessment of progress, outlines the activities that are underway towards remediation, and establishes clear priorities for removing Toronto from the list of Great Lakes Areas of Concern.

Toronto's waterfront and watersheds are still seriously degraded. Bacterial contamination frequently makes much of the waterfront, as well as the rivers and creeks, unfit for swimming and other water contact recreation. Harmful contaminants affect the health of fish and wildlife, and restrict human consumption of the fish. Habitats for fish and wildlife have been reduced to degraded fragments, both along the waterfront and in the related watersheds. Toxic sediments restrict the disposal of harbour dredgeates to confined disposal sites. Litter and rotting algae make the water's edge unpleasant in many locations.

The causes of these problems are complex. The Toronto waterfront is affected by lake-wide influences, being downstream of the other four Great Lakes and the Niagara River, with many sources of water-borne contaminants as well as deposition from air pollutants. Local sources include the drainage from six watersheds (from Etobicoke Creek in the west to the Rouge River in the east) with 210,000 hectares of agricultural and urban lands. The volumes and pollution loads of stormwater and melting snow from these watersheds create serious impacts in the rivers and streams as well as the waterfront itself.

Overflows of raw sewage mixed with stormwater following heavy rains are a serious problem in the lower portions of the Don and Humber Rivers and directly along the waterfront. Spills, road runoff, and chemical inputs to sewers from industries and homes all contribute to a polluted aquatic environment. Fish, wildlife and their habitats are affected by sediments and contaminants in the rivers and lake. In addition, in the course of several centuries of agriculture and urbanization, wetlands have been filled, forests and riparian vegetation removed, creeks buried or channelized, shorelines hardened, and dams and weirs built in the rivers, obstructing fish migration.

Rosemary G. Hasner, TRCA

Progress has been made since 1987. Toronto's Remedial Action Plan was published in 1994 and has provided guidance to a range of activities by watershed groups, municipalities, the conservation authority, provincial and federal agencies, and industries. Beach water quality has been significantly improved at the Eastern Beaches, and will be improved at the Western Beaches with the completion of a combined sewer/stormwater detention tunnel in 2002. Twenty hectares of new waterfront habitats have provided for increases in the variety and biomass of fish. New parks and trails provide pleasant greenspace, recreation and interpretive opportunities. Lake-wide pollutants such as DDT have decreased. And there are better controls on spills and industrial inputs to the sewers.

But overall, most of the causes of degradation are still in place and we still have a long way to go to achieve our vision of clean waters and healthy habitats in Toronto's watersheds and waterfront.

This report identifies six key areas of priority action to remove Toronto from the list of Areas of Concern:

1. ***wet weather flow management***
2. ***pollution prevention***
3. ***habitat restoration***
4. ***smart growth***
5. ***education***
6. ***monitoring***

Rosemary G. Hasner, TRCA

1. **Wet Weather Flow Management.** Uncontrolled flows of polluted stormwater and combined sewer overflows are the most significant cause of degradation of Toronto's waterfront and watersheds. Implementation of the City of Toronto's emerging Wet Weather Flow Management Master Plan will be essential to restore clean waters in the Toronto Area of Concern. It will identify the most effective combinations of controls that can be applied at the source (e.g. on individual properties), during conveyance of water through the stormwater system, and before discharging into a watercourse or the lake (e.g. ponds, tanks and tunnels). In addition, complementary actions should be taken in the upstream municipalities, by continuing with programs to retrofit stormwater quantity control ponds to also control water quality. Consideration should be given to providing stormwater management for those urban areas, roads and highways that were developed before stormwater controls were mandatory. And vigilance is required to ensure that stormwater management in new developments and redevelopments throughout all the watersheds accomplishes the best results possible.

2. **Pollution Prevention.** Even in dry weather, pollution gets to rivers, creeks and the lake from a variety of sources. Key actions to address these sources include reducing the use of hazardous chemicals, eliminating cross connections between the sanitary and storm sewer systems, preventing spills, improving and enforcing sewer use by-laws and storm-water policies, and applying best management practices to municipal infrastructure, construction sites, industries and agriculture.

3. **Habitat Restoration.** Habitat improvements should continue along the waterfront and in the watersheds, with emphasis on rivermouth wetlands; areas where land use changes are occurring such as Port Union, the West Donlands and the Toronto Portlands; removal of barriers in the rivers and creeks; and restoration of shoreline/riparian cover. Protection of existing habitats is also essential, especially in areas of new development.

Waterfront Regeneration Trust

4. **Smart Growth.** Although the focus of the RAP is on remedial action to restore degraded environments, we recognize that ongoing population growth, and the new development to support it, could result in losing the gains made in restoration efforts. On the other hand, new development and redevelopment offer opportunities for proactive approaches to environmental protection and management, learning from the mistakes of past practices and applying the best practices available today.

5. **Education and Involvement.** Increased efforts are essential to educate residents, businesses and industries and encourage more sustainable practices, including better lot-level stormwater management, water conservation, reduction in use and proper disposal of chemicals, and habitat stewardship.

6. **Monitoring.** In order to delist Toronto and Region as an Area of Concern, we need to be able to clearly demonstrate that the beneficial uses specified in the Great Lakes Water Quality Agreement have been fully restored. This report identifies a focussed list of monitoring and research needs for the RAP, which should be addressed by all the agencies participating in the integrated monitoring program developed by the Toronto and Region Conservation Authority.

Removing Toronto from the list of Areas of Concern will not be quick nor easy. It took some two hundred years to degrade our waterfront and watersheds to today's conditions, and it will likely take decades to restore environmental health. However, progress to date is encouraging and demonstrates that much is possible.

The benefits of a clean, green, healthy environment are clear, and have been widely recognized in recent municipal plans, watershed strategies, and related initiatives such as the efforts to protect the Oak Ridges Moraine and revitalize Toronto's waterfront. A common thread that links all these initiatives together is the recognition that a healthy environment is essential for a strong economy and vibrant communities. The workplan outlined in this report to restore clean waters and healthy habitats represents a major contribution towards the high quality of life that will attract new business investments and meet the needs of residents and tourists alike.

1. Introduction

Rosemary G. Hasner, TRCA

In 1987, Canada, the United States and the International Joint Commission identified 42 areas of concern around the Great Lakes (Figure 1) where remedial action was required to restore environmental quality. Toronto and Region (Figure 2) was identified as one of these contaminated hot-spots. Fourteen years later, only one of these areas (Collingwood Harbour) has been removed from the "black list".

Key terms and acronyms are defined in a glossary on pages 47 - 48.

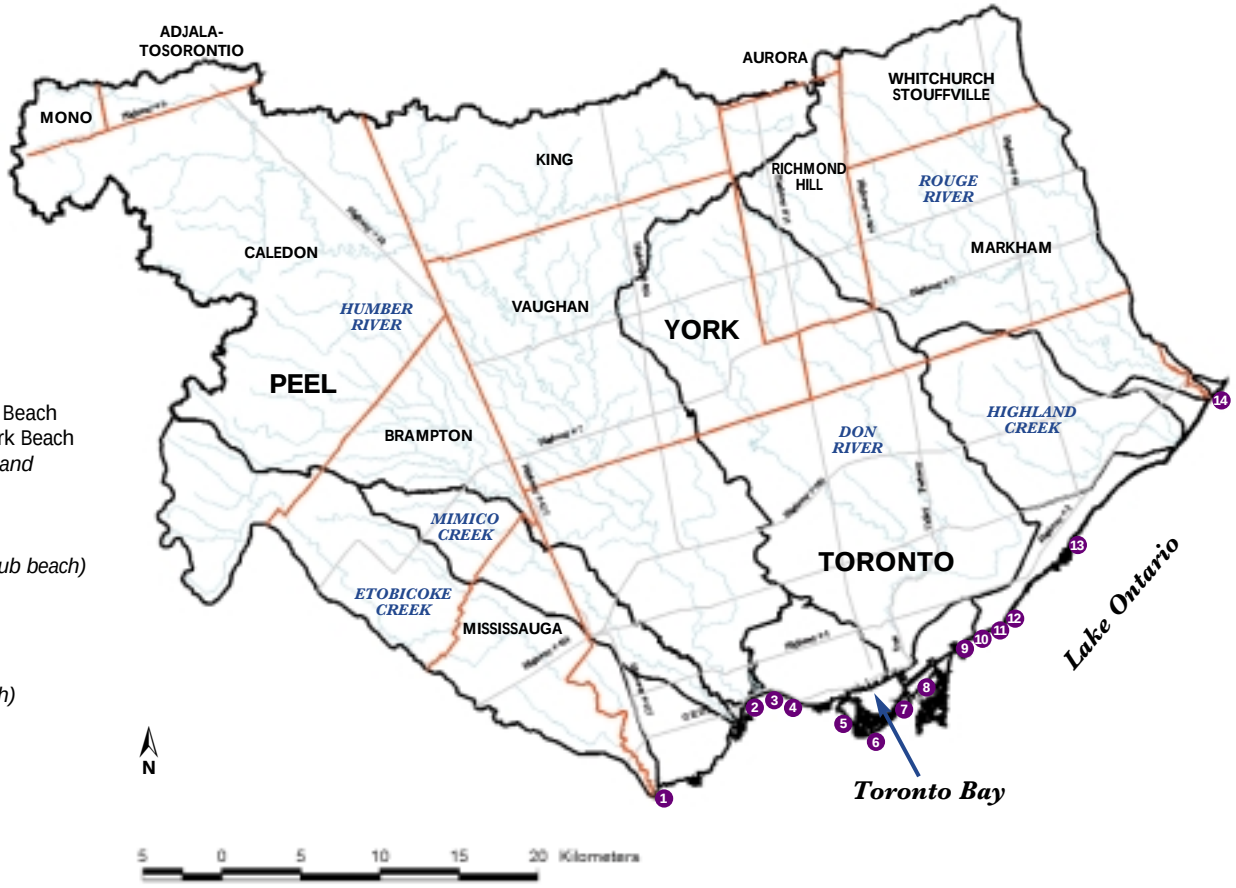
Figure 1.
The Great Lakes and Areas of Concern.

City of Toronto Archives

1.1 WHY IS TORONTO AN AREA OF CONCERN?

Like most urban areas around the Great Lakes, Toronto suffers from contaminated stormwater, loss of habitat, and degradation of natural landscapes. Figure 3 demonstrates the extent of urbanization in the Toronto region. Toronto's waterfront is also influenced by water from the Niagara River and the other Great Lakes. Toronto's large airshed contributes pollutants directly, through atmospheric deposition to the Lake and watercourses, and indirectly, through contamination of stormwater.

Figure 2.
Watersheds, municipal jurisdictions, and waterfront beaches in the Toronto and Region RAP area.



List of Beaches:

1. Marie Curtis Park East Beach
2. Sir Casimir Gzowski Park Beach *(formerly Windemere and Ellis Ave. beaches)*
3. Sunnyside Beach
4. Budapest Park Beach *(formerly Boulevard Club beach)*
5. Hanlan's Point Beach
6. Centre Island Beach
7. Ward's Island Beach
8. Clarke Beach Park *(formerly Cherry Beach)*
9. Woodbine Ashbridges Bay Beach
10. Beaches Park
11. Kew Beach
12. Balmy Beach Park
13. Bluffer's Park Beach
14. Rouge Beach

Waterfront Regeneration Trust

The degradation of Toronto's waterfront reflects the impacts of over 200 years of agriculture, industry and urbanization, involving:

- physical restructuring through burial and piping of streams, channelization of rivers, lakefilling, dock walls, dams and weirs, and increases in impervious paved surfaces;
- loss and degradation of natural habitats through deforestation, agriculture, urbanization, drainage and filling of wetlands, stripping of vegetation along river and stream banks; and
- inputs of nutrients, bacteria and toxic contaminants from stormwater drainage, agriculture, industries, sewage treatment, combined sewer overflows, atmospheric deposition, and upstream sources in the Great Lakes.

Figure 3.
Satellite image of the Toronto and Region RAP area showing extent of urbanization.

The International Joint Commission (IJC) developed fourteen criteria to define environmental degradation in Areas of Concern around the Great Lakes. They are expressed as impairment of beneficial uses, and Toronto's waterfront exceeds eight of them, with another three suspected of being impaired but requiring further assessment (Table 1). The beneficial uses are being restored through the implementation of a Remedial Action Plan (RAP). When this process is complete, Toronto and Region can be removed from the "black list" of Great Lakes Areas of Concern.

Table 1.
Impaired Uses in the Toronto and Region Area of Concern.

IMPAIRED USE	STATUS
Restriction on fish and wildlife consumption	Impaired
Degradation of benthos	Impaired
Restriction on dredging activities	Impaired
Eutrophication with undesirable algae	Impaired
Beach closures	Impaired
Degradation of aesthetics	Impaired
Degradation of fish and wildlife populations	Impaired
Loss of fish and wildlife habitat	Impaired
Wildlife deformities and reproductive problems	Requires Further Assessment
Fish tumours or other deformities	Requires Further Assessment
Degradation of phytoplankton and zooplankton communities	Requires Further Assessment
Tainting of fish and wildlife flavour	Not Impaired
Restriction on drinking water; taste and odour problems	Not Impaired
Added costs to agriculture and industry	Not Impaired

City of Toronto

The City of Toronto has a water quality assurance program that regularly confirms the good quality of our treated water supplies.

1.2 THE VISION: CLEAN WATERS, HEALTHY HABITATS

Rosemary G. Hasner, TRCA

The many dedicated individuals involved in the Toronto RAP – representing the public, scientists, government agencies and numerous stakeholder groups – are passionate about the kind of future they would like to experience. It can be summed up as follows: "the watersheds and waterfront should provide citizens with fishable, swimmable, drinkable and aesthetically pleasing water and aquatic habitats (*Clean Waters, Clear Choices*, 1994).

The Toronto Remedial Action Plan takes an ecosystem approach to achieve this vision. This approach provides a comprehensive consideration of the interactions among air, land, water and living organisms, including humans. It recognizes that although the original designation of the Toronto Area of Concern focussed on the waterfront, the health of the waterfront is closely tied to that of the watersheds. Therefore, RAP activities focus on the entire system.

OUR VISION FOR THE TORONTO AND REGION WATERFRONT AND WATERSHEDS

- *Any fish species indigenous to the Toronto waterfront and its watersheds should be able to return to the region, to live and naturally reproduce here.*
- *Opportunities to sustain and create fish and wildlife habitat throughout the Toronto and Region watersheds should be pursued in parallel with water quality initiatives.*
- *Within the waterfront, watershed and headwaters protection of the remaining wetlands should be a primary concern.*
- *People should be able to consume fish from the Toronto waterfront and its watersheds, without any restrictions resulting from contaminants of human origin.*
- *People should be able to swim at beaches and engage in water sports in Lake Ontario and Toronto and region's watersheds without risk of disease or illness.*
- *Levels of potentially toxic chemicals in Toronto and Region's drinking water should not exceed acceptable standards.*
- *The aesthetic quality of the waterfront, river valleys, ravines, wetlands and water bodies in the watersheds should be of sufficient quality to enhance passive and active recreational uses for all people.*
- *Opportunities should be provided for residents and visitors to study or observe a functioning, healthy ecosystem.*
- *People should be able to swim and engage in water sports in Lake Ontario and Toronto and Region's watersheds without encountering dangerous or hazardous materials.*

Source: *Clean Waters, Clear Choices* 1994

A positive trend is that the strong vision and ecosystem approach used for the RAP are consistent with many other recent initiatives in the Greater Toronto Area. A few examples include the City of Toronto's Environmental Plan, Central Waterfront Part II Plan and Wet Weather Flow Plan; the Greening of York Region Initiative; the Toronto Community Foundation's Vital Signs project; initiatives to protect the Oak Ridges Moraine; the Toronto and Region Conservation Authority's Living City Campaign; the Rouge Park plans; and strategies to improve health in the Etobicoke, Mimico, Humber and Don Watersheds. A common thread that links all these initiatives together is the recognition that a strong economy and vibrant communities are dependent on a healthy environment. That means tackling the problems of past activities through remedial action as well as a preventative approach in all new activities.

Excerpt from Making Waves – City of Toronto Central Waterfront Part II Plan, October 2001

Several of the policies in the Part II Plan will contribute directly to meeting RAP objectives, for example, in order to promote a clean and green environment:

- development will contribute to the improvement of water quality in Toronto's rivers and streams, as well as in Toronto Bay, the Outer Harbour and Lake Ontario;
- combined sewer outfalls that discharge into Lake Ontario, the harbour, rivers and streams will be eliminated; and
- the health and biodiversity of the Central Waterfront will be enhanced and restored by protecting existing wetlands, fish and wildlife habitats, rare plant and animal species, shorelines, beach areas, woodlots and lands designated "Natural Areas" and "Environmentally Significant Areas".

1.3 ABOUT THIS REPORT

Dave O'Hara, City of Toronto

The International Joint Commission established a three-stage process for the restoration of Areas of Concern through the preparation and implementation of remedial action plans (RAPs). Table 2 highlights the key documents that mark the progress of the Toronto RAP process.

Table 2.
Milestones in the Toronto and Region Remedial Action Plan.

Stage 1: Problem Definition	1989: *Environmental Conditions and Problem Definition*
Stage 2: Strategy Development	1993: *Strategies for Restoring Our Waters* 1994: *Clean Waters, Clear Choices: Recommendations for Action*
Stage 3: Implementation	1996: *A Path to Clean Waters...Actions for Ecosystem Protection and Restoration 3rd report* 1999: *Clean Waters, Clear Choices: 1998 Progress Report* 2000: *Clean Waters, Clear Choices: 1999 Progress Report* 2001: *Clean Waters, Healthy Habitats: 2001 Progress Report*

Note: The 1993 and 1996 reports are no longer available, although library copies may be perused at the Waterfront Regeneration Trust. Copies of the other reports can be obtained from the Waterfront Regeneration Trust, including a technical version of this 2001 Progress Report that provides additional background information.

The Waterfront Regeneration Trust prepared this 2001 document to report on over a decade of studies, planning and action by researchers, government agencies, citizens, businesses, industries and community groups. It provides an in-depth assessment of progress towards restoring beneficial uses, outlines the activities that are underway towards remediation, and establishes clear priorities for removing Toronto's waterfront from the list of Great Lakes Areas of Concern.

Waterfront Regeneration Trust

2. Dirty Waters

Rosemary G. Hasner, TRCA

Stormwater carries dust, litter, oil and grease from roads into local rivers.

Rosemary G. Hasner, TRCA

Common household chemical products find their way to our rivers and lake through combined sewers, storm sewers, or in sewage treatment effluent.

Rosemary G. Hasner, TRCA

Stormwater is a significant non-point source of contaminants. Toronto alone has 2,600 sewer outlets.

Three types of water pollution affect health and activities in the Toronto waterfront and watersheds:

- **Bacterial** pollution discharged directly to the waterfront by combined sewer overflows and storm sewers, and to the tributaries by contaminated runoff from rural and urban areas. Bacteria pose a threat to the health of people swimming, windsurfing or boating in polluted waters.

- **Contaminants** such as trace metals and organic chemicals from combined sewer overflows and storm sewers discharging to the waterfront as well as from the rivers and creeks draining urban and industrial areas. These contaminants may be taken up by aquatic life and impair their health, or the health of animals that feed on them. Once waterborne contaminants enter the system they will react with sediment particles in the water and settle to the bottom, resulting in areas of contaminated sediments. These sediments impair the quality of the benthic community and provide an entry point for contaminants to the food chain.

- **Nutrient** enrichment from treated sewage effluent, combined sewer overflows and storm sewers to the waterfront, as well as from the flows of the Don, Humber and Rouge Rivers and Etobicoke, Mimico and Highland Creeks. Excesses of nutrients, in particular phosphorus, stimulate nuisance growths of algae which reduce water clarity, form objectionable deposits, alter the natural algae community and reduce the oxygen content of water.

These pollutants come from four main sources:

- Local point sources, such as combined sewer overflows and water pollution control plant outfalls, which discharge directly to the waterfront and in some cases the lower tributaries. They are the most direct targets for remediation.

- Watershed non-point sources, which deliver pollution to the rivers, creeks and waterfront from the rural and urban areas in the watersheds. They represent a diffuse and less easily-managed problem.

- Lake-wide sources, such industries upstream in the Niagara River and the other Great Lakes, which result in contaminants such as Mirex, in the Toronto area. They cannot be managed by remedial action in Toronto.

- Historic sources, such as sediments and soils that were contaminated by activities which have since ceased.

The local point and watershed non-point sources contribute the most serious pollution to the Toronto waterfront and watersheds, and are the target of the Toronto Remedial Action Plan. Table 3 uses examples of four key measures of pollution to demonstrate the importance of remediating these sources, focussing on storm water, combined sewer overflows (CSOs) and treatment plant bypasses. Chemical makeup of wet weather flows is highly variable and often peaks in the first flush, as rain washes the accumulated contaminants from roads, parking lots and rooftops. A National Water Research Institute study of stormwater and CSO in Toronto and Hamilton found that the greatest toxicity was in stormwater associated with winter highway maintenance and sites having high traffic densities. This toxicity was mainly from oils, metals, and road salt. Stormwater was found to be more toxic than CSO, and the highest toxic responses were from first flush samples (Rochfort, NWRI 2000).

Table 3.
Provincial Water Quality Objectives and average event mean concentrations of pollutants from different sources in the Toronto Area of Concern.

		STORM SEWER			UNTREATED SANITARY SEWAGE		
	PWQO	Dry Flow	Wet – Residential	Wet – Other Areas	Raw Sewage	Plant Bypass	CSO
Total Suspended Solids (mg/L)	–	16	91 - 237	25 - 331	226	476	193
Total Phosphorus (mg/L)	0.03	0.12	0.36 - 0.82	0.12 - 0.70	6.1	14.8	3.2
Copper (mg/l)	0.005	0.019	0.025	0.016 - 1.180	0.25	0.59	0.51
E. coli (#/100 ml)	100.00	15,300	25,000 - 430,000	1,000 - 10,000	50,000,000	4,080,000	6,300,000

Source: calculated for modeling purposes from various studies for the City of Toronto Wet Weather Flow Master Plan, 2001

Figure 4.
Toronto Bay Sewershed

City Works, 1997

Dry weather flows contain high concentrations of some pollutants, primarily from illegal sanitary cross connections and spills. However they do not contribute such high total loadings as wet weather flows, since volumes are considerably lower. Ashbridge's Bay Sewage Treatment Plant bypasses during periods of very heavy rainfall contain high concentrations of pollutants. Bypasses occurred 19 times in 1997, discharging an estimated total of 3,216 million litres (Waterfront Regeneration Trust, 1999). Volumes will decline as the plant is expanded and wet weather flow management improves.

To illustrate the magnitude of the problem, Toronto Bay (Figure 4) alone receives inputs from 11 CSOs and 17 storm sewers, as well as the Don River (which itself receives effluent from 30 CSOs and 872 storm sewers). Every year, an estimated 9,800 tonnes of suspended solids, 2,800 kg of lead, 5,600 kg of zinc, 47 kg of total polyaromatic hydrocarbon (PAH) and 23 tonnes of total phosphorus are contributed to Toronto Bay. Even in dry weather, inputs to the Bay still exceed provincial water quality objectives for phosphorus, copper and lead despite substantial reductions in these pollutants (40%, 50% and 75% respectively) over the past two decades (Boyd et al, 2000).

In this chapter, we review the effects of pollution by bacteria, nutrients and contaminants. We compare conditions in 1987, when the Toronto Area of Concern was designated, with current conditions, and provide conclusions about the sources of the problems, and how they should be addressed.

Rosemary G. Hasner, TRCA

Post-rainfall flood waters laden with sediments.

2.1 BACTERIA

"Progress is being made towards restoration of designated beaches, but rivers, creeks and areas around waterfront outfalls remain polluted."

Toronto Bay Initiative

Toronto Bay Initiative hosts an annual plunge in the Bay to educate the City's residents about water quality.

The RAP goal for Toronto waterfront beaches is: *"Lake water at bathing beaches contains less than 100 E. coli/100ml of water for over 95% of the swimming season"* (Clean Waters, Clear Choices, 1994). This goal is based on the provincial water quality objective, which is intended to protect people engaged in water contact recreation and may also indicate other more harmful agents in the water. The principal cause of fecal coliform contamination of designated beaches on the Toronto waterfront is discharges from urban storm sewers and combined sewer overflows (see Table 3).

In the late 1980s, the RAP Stage 1 report noted that direct sewer discharge was the major cause of elevated E. coli along the Eastern Beaches, while in the Sunnyside area the beaches were affected by both direct discharges and the Humber River. The central waterfront area was affected by direct discharges and by the Don River. Upstream agricultural inputs of bacteria played a relatively minor role at lakefront beaches during dry weather, because of time to travel down the river and natural bacteria die-off, but during wet weather, agricultural inputs contributed relatively more to the problem.

By 2000 (see Figure 5) there were still significant numbers of postings at many of Toronto's waterfront beaches, with the exception of the Toronto Islands (Hanlan's Point, Centre Island and Ward's Island), Clarke (Cherry) Beach and the Eastern Beaches (Woodbine, Beaches Park, Kew Beach and Balmy). The Toronto Islands and Clarke Beach have always been least affected by sources of bacteria and continue to meet bathing criteria most often. See Figure 2 (previous chapter) for locations of these beaches.

BEACH watch
Pollution in need of a solution

Citizens Willing to Help Clean Up City Beaches

A day at the beach shouldn't have to end at the water's edge. That's the message the Toronto Environmental Alliance (TEA) delivered to local residents through its Beach Watch program, launched this summer to promote clean beaches by 2006.

Beach-goers agreed.

Toronto's beaches may look busy on a hot summer day, but look beyond the sand and no one is swimming. TEA's Beach Watch Patrol surveyed 640 citizens, of whom 88% admit they stay out of the water because of pollution, and 99% want the city to clean up its beaches. More significant, 80% are willing to personally take action to reduce pollution by disconnecting their home downspouts (raingutters) from the nearby storm sewer, install a rainbarrel, replace pavement on their property with grass and stop spraying pesticides. Citizens surveyed are also willing to pay for clean up, with 75% enthusiastic that they would come to the beach more often if they could swim.

Citizens also had a few tips for the City. "No Swimming" signs need details on the type of pollution, source and health risks. Lifeguards and Public Service Announcements can help educate the public about pollution and solutions. Few (7% of those surveyed) use the City's beach hotline or website to get information.

Beach Watch received generous support from Labatt People In Action; TD Canada Trust Friends of the Environment Foundation; and Sparks Communications.

TRCA

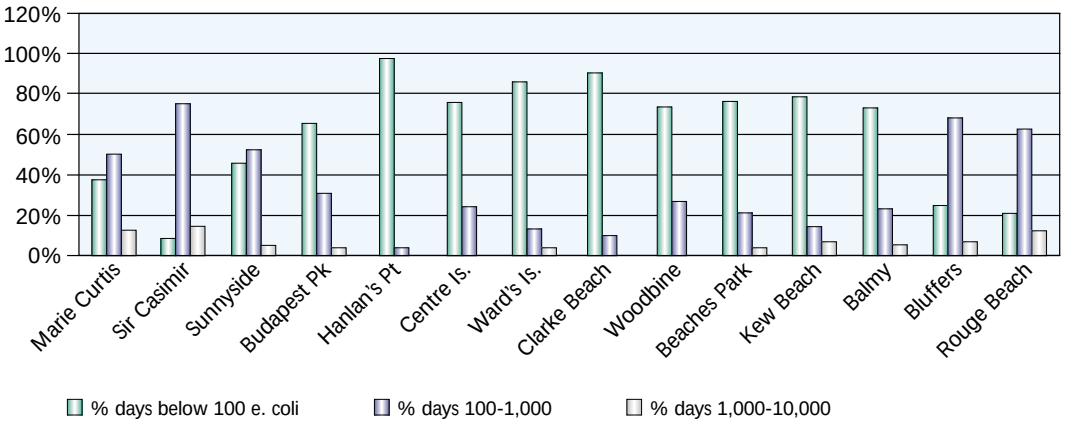
A posted beach is a warning that waters may be unsafe for swimming.

Posted versus Closed

A posted beach is a warning that waters may be unsafe for swimming. A posting occurs if sampling reveals that bacteria levels exceed the geometric mean set by provincial guidelines. A closure occurs when there is a hazard concern such as a toxic spill or abundance of blue-green algae. Readers should be aware that is it not mandatory under provincial regulation to test beach water quality and post warning signs.

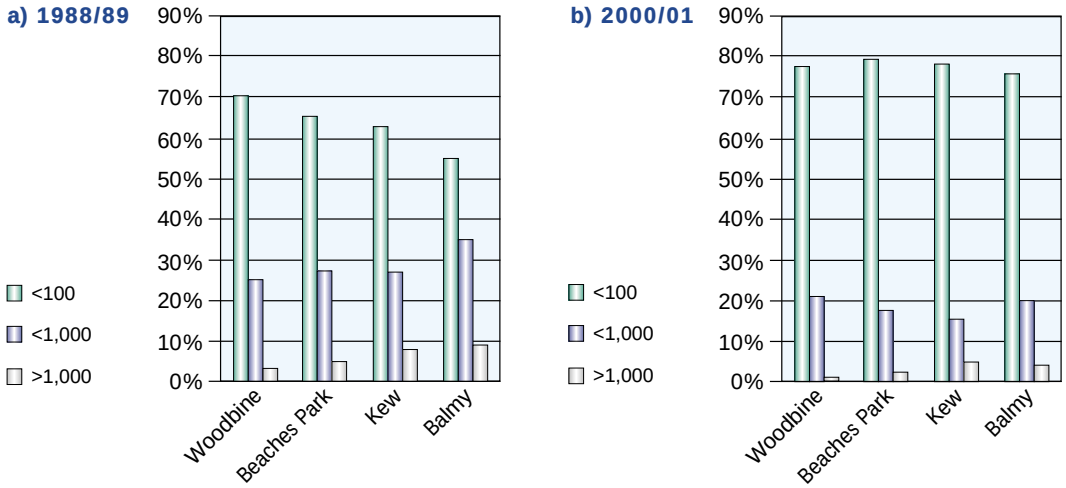
In the City of Toronto, designated swimming beaches are sampled seven times per week. Toronto's waterfront beaches have rarely been closed, although most of them are regularly posted when water sampling indicates that E coli levels exceed the provincial guideline.

Figure 5.
Bacteria counts at Toronto waterfront beaches, 2000.



Bars show percentage of sampling days (range of 47-77 days, median = 48) in which E. coli *exceeded 1,100, and 1000 counts per 100/ml.in the summer of 2000. Data provided by the City of Toronto, Works and Emergency Services.*

Figure 6.
Bacteria counts in the Eastern Beaches, 1988-89 and 2000-01.



Bars show percentage of sampling days (range of 47-77 days, median = 48) in which E. coli *exceeded 1,100, and 1000 counts per 100/ml. Data provided by the City of Toronto, Works and Emergency Services.*

City of Toronto WES

City of Toronto WES

The Eastern Beaches storage tanks, shown at left inside prior to operation and above ground where the tanks lie under the beach, have reduced the number of beach postings in the area.

Improvements at the Eastern Beaches are largely due to the installation of two underground storage tanks (1990 and 1995) to store stormwater and sewage after rainfall events until the Ashbridge's Bay Treatment Plant has the capacity to treat them. As a result, *E. coli* counts at Woodbine, Beaches Park, Kew and Balmy beaches have been reduced (Figure 6) from pre-1990 levels to the point that bathing criteria are met nearly 80% of the swimming season.

In the Western Beaches area, a 3.7km tunnel extending from Parkside Drive to Strachan Avenue, with three huge storage shafts and a combined capacity of 85,000 cubic metres, has recently been built to collect and treat combined sewer flows. When fully operational in spring 2002, it is expected to reduce postings at the Sir Casimir Gzowski, Sunnyside and Budapest beaches by about 75%, creating significant improvements in recreational opportunities.

Marie Curtis beach in Etobicoke, and Bluffers and Rouge beaches in Scarborough are primarily affected by waterfront stormwater outfalls and pollution loads from the rivers and creeks. The City of Toronto's Wet Weather Flow Plan, currently being prepared, will recommend measures to reduce pollution from these sources.

In addition to designated beaches, the public long term goal is to reduce bacteria levels to provide safe conditions for water-contact recreation throughout the waterfront, rivers and creeks. In Toronto Bay for example, bay waters generally meet the criterion for water-contact recreation during dry weather. However, wet weather flows typically cause sudden and dramatic increases in bacterial levels. Bacteria levels in the rivers and creeks are currently so high that water-contact recreation is unsafe over 70-80% of the time in Etobicoke and Mimico Creeks, and over 98% of the time in Highland Creek. In the Don, the guideline is exceeded over 74% of the time, with some tributaries containing E.coli counts as low as 20 per 100 ml in dry weather but regularly over 100,000 in wet weather conditions. In the Humber and Rouge, the 100 count is exceeded only about 5-25% of the time, depending on sampling location (TRCA, November 1998).

CONCLUSIONS

Significant progress is being made towards restoration of water quality at designated waterfront beaches, but rivers and creeks remain problems in their own right, as well as sources of bacterial contamination to the waterfront. The key actions required to address this issue are to:

- improve stormwater management in the watersheds to reduce pollution contributions from non-point sources such as agricultural and urban runoff,
- eliminate cross-connections of sewage pipes to the stormwater system, and
- eliminate combined sewer overflows and water pollution control plant by-passes.

From Panfish to Trophy fish: a Profile of Fishing and Fish Consumption in the Toronto area (Kraft, 2000)

From surveys of 1,531 individuals fishing along the Toronto waterfront and adjacent municipalities, between '95-'97

- 77% of people had not eaten fish caught in the Toronto area during the 12 months prior to be interviewed
- of the 23% who had eaten fish in the past 12 months, 60% said they had eaten 1-11 meals over that time, 19% had eaten 12-25 meals, and 15% 26-95 meals
- most common fish eaten were rainbow trout, largemouth bass, smallmouth bass, common carp, brown trout, Chinook salmon, catfish, yellow perch, northern pike, and walleye
- only 37% of the consumers used the Guide to Eating Sport Fish
- only 3% reported eating other wildlife in the past 12 months (mainly mallard and Canada goose); of those, 53% only consumed 1-5 meals during past 12 months

2.2 CONTAMINANTS

Contaminants in the water and sediments contribute to restrictions on fish consumption as well as restrictions on dredging operations. They may also be a factor in the degradation of fish and wildlife populations, although more research is required to determine this.

2.2.1 Restrictions on Fish Consumption

"Decreased contaminant concentrations but advisories remain."

The 2000-2001 *Guide to Eating Ontario Sport Fish* (MOE/MNR, 2000) has the following advice for people fishing on the Toronto waterfront and the lower reaches of the Humber and Rouge. It recommends no consumption of lake trout larger than 55cm, and only limited consumption of Chinook salmon, brown trout, and carp of the same size, whether taken offshore or nearshore between Humber Bay Park and Ashbridge's Bay. In addition, restrictions are placed on consumption of smaller fish such as white perch, rainbow smelt, rock bass, and brown bullhead from nearshore areas. The contaminants of concern continue to be PCB (polychlorinated biphenyl), mercury and mirex, as they were in 1987 when Toronto was designated an Area of Concern. Although trends in consumption advisories are difficult to assess (mainly due to changes in sampling, testing and reporting methods), raw data show that contaminant levels have been going down, although the rate of decrease has slowed in recent years (A. Hayton, MOE, pers. comm.). Nevertheless, the advisories remain.

Mercury levels in Toronto fish are generally similar to those found in fish collected in less urbanized areas of the Lake Ontario basin. No sources of mirex exist in the Toronto area and contaminant levels in fish are from lakewide pollution, mainly from Niagara River inputs.

So the local contaminant of concern that must be addressed through actions in the Toronto area is PCB. The Stage I report noted that studies of young-of-the-year spottail shiners from 1977 - 1987 showed that contamination varied across the waterfront, with significantly higher PCB residues in fish from Humber Bay than those from Bluffers Park and the Rouge River (Environment Canada et al. 1989).

Monitoring undertaken in 1992 in the tributaries by the Ontario Ministry of the Environment (MOE, 1994) showed that PCB levels in forage fish consistently exceeded the IJC guideline for the protection of fish-eating birds and mammals in 92% of the stream sites sampled. In the Humber and Don Rivers, 4 of 5 sites and 5 of 5 sites, respectively, had common shiner populations with PCB residues above the guideline. All fish collected in Etobicoke and Mimico Creeks had PCB above the guideline, but it should be noted that few fish were found in Mimico Creek. In the Rouge watershed, residues in common shiners were surprisingly highest upstream of Markham and lowest at the Glen Rouge Site at Hwy. 401.

TRCA

The 2000-2001 Guide to Eating Ontario Sport Fish recommends only limited consumption of salmon caught on the Toronto waterfront.

TRCA

Fishing on the Toronto waterfront.

An analysis of wet weather flow from waterfront outfalls in 1989/1990 showed that average event mean concentrations for PCBs and other contaminants generally exceeded provincial water quality objectives or guidelines (PWQO/PWQG) (Theil and Beak, 1995). A 1991/1992 tributary discharge study revealed both dry and wet weather sources of PCBs from Toronto streams. Waterborne PCB levels frequently exceeded the PWQO, confirming that the Etobicoke, Mimico, Humber and Don watersheds are problem sources of PCBs, particularly in wet weather (Table 4).

Table 4.
Percent of samples from Toronto area watersheds in which PCB concentrations exceeded the PWQO of 0.001 µg/L in 1991-92.

LOCATION	DRY FLOW	WET FLOW
Etobicoke Creek	38%	63%
Mimico Creek	6%	67%
Humber Creek	32%	44%
Don River	13%	84%
Highland Creek	0%	8%
Rouge River	9%	6%

Results reflect a total of 221 samples.
Source: MOE, 1999

CONCLUSIONS

Fish consumption remains an impaired use on the Toronto waterfront. The main contaminant from **local** sources contributing to the fish consumption advisories is PCBs, with mercury and mirex a result of historical sources or currently originating elsewhere in the Great Lakes.

Inputs of PCBs to the waterfront are from CSOs, water pollution control plant bypasses, and the rivers and creeks. Most of the PCBs are contributed in wet weather conditions, with some dry weather contributions, especially in Etobicoke Creek and Humber River. The specific sources are not known, and Environment Canada and the Ontario Ministry of the Environment are currently conducting a study to track down sources in the Etobicoke watershed. The City of Toronto has 148 storage sites (down from 371 in 1995) where PCBs are stored until they can be properly disposed of, but these are considered to be well-secured.

Endocrine Disruptors

Evidence has been presented in recent years that the endocrine systems (gland and harmone systems that guide development, growth, reproduction, behaviour and other bodily functions) of certain fish and wildlife have been disrupted by chemicals that contaminate their habitats. Although effects have been observed, it has been difficult to prove that a specific chemical caused a particular endocrine effect. However, in many cases, the chemicals thought to be associated with the effects have already been identified as problem substances due to their toxicity and persistence. Examples include DDT, PCB, and certain heavy metals (US EPA, Feb. 1997). No studies have been conducted in the Toronto Area of Concern.

United States Environmental Protection Agency. February 1997.
Fact Sheet: EPA Special Report on Endocrine Disruption. Office of Research and Development

2.2.2 Degradation of Fish, Wildlife and Plankton Communities

"Probably not impaired, but requires further assessment."

TRCA

Further study of the incidence and cause of fish tumours is required to assess extent of impairment.

When the Toronto Area of Concern was designated in 1987, there were concerns that contaminants in the water and sediments were causing harmful effects on fish and wildlife through deformities, tumours and reproductive problems, and on the diversity and health of phytoplankton and zooplankton communities. However there was insufficient information to properly assess these potential problems.

Fish Tumours and Deformities

Unequivocal information on fish tumours and deformities across the Toronto AoC is still not available. Anecdotal reports from biologists working along the Toronto waterfront are that serious external deformities are rarely observed. However, surveys of fish in the tributaries reveal fairly high incidence of various types of tumours.

Surveys of epidermal papillomas and liver tumours in white suckers from the Don, Humber and Rouge Rivers are reported in Table 5. Lip papillomas were found in white suckers from the three sites. The prevalence of lip papillomas (10-32%) is similar to that found at other urban sites on Lake Ontario (Hamilton Harbour 66-73%, Ganaraska River 30-40%, and Sixteen Mile Cr. 30-41%). Viruses have been implicated in the etiology (causes or origins) of lip papillomas in white suckers, suggesting that the lip papilloma may not be a useful indicator of environmental conditions.

Liver tumours are useful indicators of environmental conditions, particularly the occurrence of hepatocellular (liver cell) and cholangiolar (bile duct) carcinomas. The prevalence of liver tumours was highest in white suckers from the Don River and lowest in the Rouge River. Unfortunately, there were only 64 fish in the Don River sample and the survey should be repeated to confirm findings.

Table 5.
Incidence of tumours and papillomas in white suckers in the Don, Humber and Rouge Rivers.

Location	Year	Number of Fish	Lip Papillomas (%)	Body Papillomas (%)	Ha (%)	HCa (%)	Ca (%)	Cca (%)	% Total Liver Neoplasms	Total Carcinomas (%)
Don	1994	64	10.9	0.0	1.6	1.6	3.1	6.3	12.5	8.7
Humber	1987	192	29.6	not available	1.6	0.5	1.6	1.0	4.7	1.3
Humber	1996	200	34.5	3.0	2.0	1.0	1.5	1.0	5.5	1.5
Rouge	1987	199	9.9	13.5	0.5	0.0	2.5	0.5	3.5	0.5
Rouge	1994	121	32.5	1.0	0.0	0.0	3.3	0.8	4.1	0.8

Source: Victor Cairns, Department of Fisheries and Oceans, Personal Communication.
Ha= hepatoma
Hc= hepatocellular carcinoma
Ca= cholangioma
Cca= Cholangiocarcinoma

Wildlife Deformities and Reproductive Problems

TRCA

Cormorant nests on the Toronto waterfront have increased from zero in 1976 to over 3,000 in the year 2000.

In the early 1970s, there were documented effects of chlorinated organics on the reproductive success of herring gull, black-crowned night-heron, and other colonial waterbird species throughout the Great Lakes. Congenital anomalies such as crossed bills, malformed eyes, and extra limbs were abnormally prevalent in chicks of some fish-eating birds in Lake Ontario.

The initial resurgence of cormorant numbers in the Great Lakes following the ban of DDT was attributed to declining contaminant levels and an abundant food supply (Price and Weseloh, 1986). Levels of DDE in herring gull eggs declined 91.6% between 1974 and 1997 at Toronto Harbour, while levels of PCBs were down 93.5%, and 2,3,7,8-TCDD ("dioxin") levels were down 80.2% (Weseloh and Pekarik, 1999). These represent substantial declines in contaminant burdens, which should be accompanied by increased reproductive success and decreases in deformities. However, a recent assessment by MOE showed that PCBs in juvenile fish in the Toronto area remain elevated above the IJC guideline for protection of fish-eating birds and mammals (MOE, November 1999).

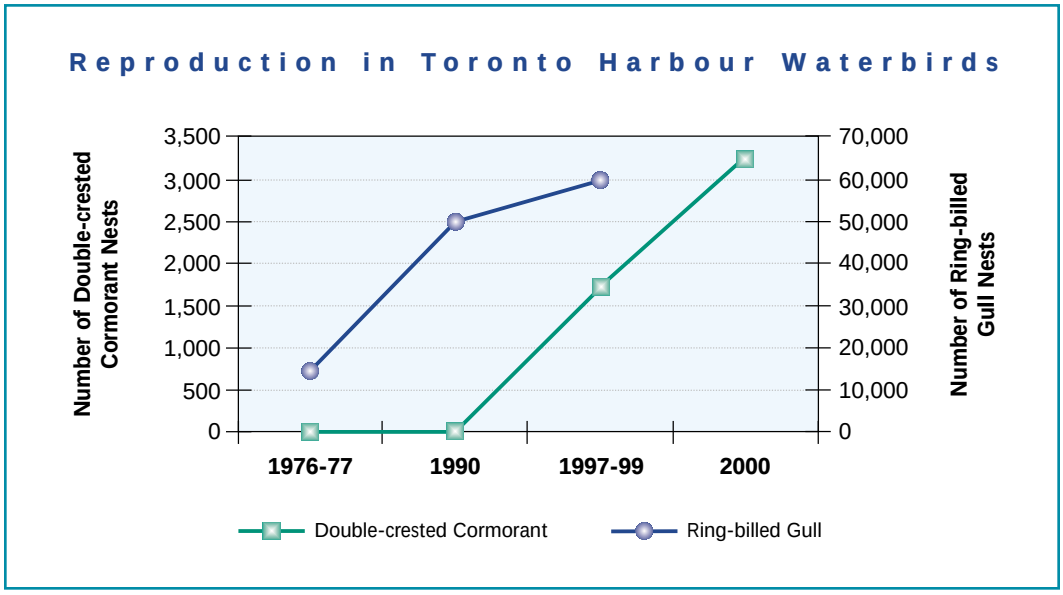
A recent study by the Canadian Wildlife Service (Bishop et al. 1996) found elevated concentrations of PCB (0.5 - 3.3 ppm) and DDE (0.06 - 0.35 ppm) in snapping turtle eggs collected in areas to the west and east of Toronto (Hamilton Harbour, Cranberry Marsh in Oshawa and Lynde Creek in Whitby), suggesting that contaminant burdens may still be of concern in the region.

Rosemary G. Hasner, TRCA

The number of black-crowned night-heron nests in the Toronto Harbour increased from 56 in 1976 to over 1,200 in 2000. A subsequent decline to 769 in 2001 may reflect lack of suitable habitat or competition with other species.

Despite the possibility of unacceptably high levels of contaminants, surveys of reproductive success by the Canadian Wildlife Service (C. Weseloh, pers. comm.) show that there is very little population degradation among waterbirds at the Toronto waterfront. The number of cormorant nests has increased from 0 in 1976-77, to 3 in 1990, and over 3000 in the year 2000 (Fig. 7), while ring-billed gull nests have increased by a factor of 4 over the same time period. Herring gull nests have also increased, from 57 in 1976-77 to 111 in 1997-99. 1n 1998, hatching success of herring gulls was assessed on peninsulas A and B at Tommy Thompson Park. Fifty-seven nests showed an average clutch size of 2.6 eggs/nest and an overall hatching success of 71.9% (CWS, unpubl. data). These figures are comparable to those from clean control areas elsewhere on the Great Lakes and in North America (Weseloh et al. 1979, Pierotti and Good 1994).

Figure 7.
Increased nesting in Toronto-area waterbirds.



Data from Canadian Wildlife Service

Phytoplankton and Zooplankton Communities

Local stressors affecting phytoplankton and zooplankton communities are typically nutrients and toxic contaminants. Along the Toronto waterfront, nutrient levels have declined except near outfalls and river mouths, and are not expected to negatively impact the overall waterfront community. However no studies have been undertaken to determine the toxicity of the nearshore waters to phytoplankton and zooplankton species.

Rosemary G. Hasner, TRCA

Further studies are required to verify preliminary analysis of phytoplankton and zooplankton.

CONCLUSIONS

Although existing information suggests that the degradation of fish and wildlife populations, and phytoplankton and zooplankton communities in the Toronto area is not widespread or severe, further studies are required confirm this. Specifically, we recommend:

- a survey of the incidence of liver tumours and external deformities in white suckers and brown bullheads, to compare the situation in Toronto with less polluted areas on the Great Lakes;
- a formal survey of the incidence of deformities among birds or snapping turtles; a survey of contaminant levels in young-of-the-year forage fish in more locations than is currently sampled; and/or an ecological risk assessment to assess the occurrence of deformities in wildlife;
- bioassays to assess the survival, growth, and reproduction of phytoplankton and zooplankton in Toronto waterfront and watershed waters in order to determine whether phytoplankton and zooplankton are degraded due to toxic contaminants.

Salt – A New Substance of Concern

Environment Canada released its five-year analysis of road salt in August 2000. The draft Priority Substances List Assessment Report classified road salt as an environmental toxin of significance when used in present concentrations and quantities for de-icing.

The Ontario Provincial Water Quality Standard cites 250 mg/L. as the upper limit for chlorides, while natural background amounts range from 10-50mg/L. Monitoring of storm sewer outfall mixing zones in rivers and creeks across the City and in parts of York Region revealed consistently elevated chloride levels, with concentrations exceeding PWQS by as much as 156 times. Winter averages for the Don River range from 570 - 1250 mg/L. in the winter with estimated summer concentrations of ~250mg/L. (City of Toronto, W.E.S., Feb. 2001)

In addition to water quality concerns, salt spray significantly damages roadside vegetation. City of Toronto estimates that yearly average salt use of 130-150,000 tonnes can be cut by at least 40% with the implementation of comprehensive Best Management Practices. Consideration should also be give to alternative de-icers such as CMA where snow melt discharges remain high in chloride concentration. Completion and implementation of the City's Wet Weather Flow Plan will move us closer to achieving this target and addressing one of the recommendations in the RAP Stage 2 report: "reduce the total amount of sodium chloride and other chemicals used on area roads" (Action 50, *Clean Waters, Clear Choices*, 1994).

2.2.3 Restrictions on Dredging Activities

"Improving, but still impaired in specific areas."

Waterfront Regeneration Trust

Dredging is required in a few locations on the Toronto waterfront for navigation or flood protection purposes.

Contaminant levels in sediments have always shown considerable variation across the Toronto waterfront, with high levels of nutrients, organics, and metals in areas of poor water circulation (embayments, slips) and near tributary mouths and sewage/water treatment plant discharges. When the Toronto waterfront was designated an Area of Concern in 1987, many areas contained sediment deposits that exceeded the Provincial guideline for disposal in open water, including Humber Bay, the Inner Harbour, Keating Channel, Ashbridge's Bay, and at Highland Creek near the water pollution control plant.

Sediment quality has improved since 1987, with much of the improvement attributable to various control measures like sewer use by-laws and the elimination of leaded gas. However, there are still significant quantities of sediment being contributed from construction sites throughout the watersheds.

At present, sediments from three locations where dredging is undertaken still exceed open-water disposal guidelines and require confined disposal. In the Keating Channel, 35,000-40,000 cubic metres of sediment from runoff and erosion upstream in the Don River are removed each year. Dredged material is placed in the Confined Disposal Facility (CDF) on the Leslie Street Spit. In the Inner Harbour, approximately 3,000 cubic metres of sediment are dredged every three years and transported to the CDF.

Maintenance dredging of the opening into Ashbridge's Bay Park is done every few years. The most recently dredged material was transported to the CDF.

Sediments dredged from the Eastern and Western Gaps are not from the watersheds but are the result of erosion processes along the waterfront. They are suitable for open water disposal, and Eastern Gap sediments have been used to create parkland enhancements at Tommy Thompson Park.

CONCLUSIONS

Rosemary G. Hasner, TRCA

One source of excessive sediment is poor construction practices.

Although contaminant levels in dredged areas of the Toronto waterfront have declined from historic levels, they still limit the open-water disposal of dredged materials. Future contributions of contaminated sediments should be reduced by implementing source controls in the watersheds (through municipal sewer use by-laws, and Toronto's Wet Weather Flow Management Master Plan). It will also be necessary to ensure that future activities do not re-suspend deep sediments, for example in association with lowered lake levels, new dredging activities and/or lakefill construction.

2.3 NUTRIENTS, TURBIDITY, AND AESTHETICS

Waterfront Regeneration Trust

The Port Authority regularly skims litter and debris from the surface of the Inner Harbour.

Nutrient enrichment and high volumes of silt and muddy substrates are the most likely cause of the degradation of waterfront benthic invertebrate communities, which are the base of much of the aquatic food web. Aesthetic quality is degraded by turbidity, oily films, odours, garbage and other debris, and the nuisance growth of algae.

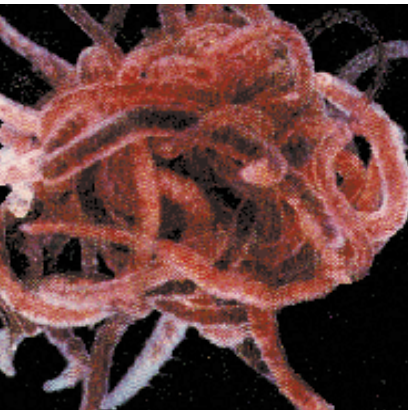
When Toronto was designated an Area of Concern, nutrient levels across the Toronto waterfront often exceeded the provincial water quality objectives, although they were much lower than they had been in the 1960s. Significant reductions in phosphorus had already been achieved due to controls on the use of phosphates in laundry detergents, and improved treatment of sewage at the water pollution control plants.

More recently, monitoring of waterfront water quality between Mimico Creek and Ashbridge's Bay in 1997 confirmed that phosphorus levels are still declining (MOE, November 1999). Nutrient levels and water clarity in the nearshore have improved to the extent that wild celery is now growing in places in Toronto Bay (Gord MacPherson, TRCA, pers. comm.). In 2000, Toronto Region Conservation initiated water quality surveys, including an assessment of phosphorus, at 16 waterfront sites in order to provide more systematic information about changing conditions.

Compared to the waterfront, water in the rivers and creeks still consistently exceeds the provincial water quality objectives (PWQO) in both wet and dry weather. A summary of the Ontario Water Quality Monitoring Network data for 1990-1996 (TRCA, November 1998) indicated that phosphorus fails to meet the PWQO over 40% of the time in all watercourses, except the headwaters of the Humber (20%). In the Don, the PWQO is exceeded 80-100% of the time.

2.3.1 Degradation of Benthos

"Pollution tolerant communities occur near storm and combined sewer outfalls, and mouths of rivers and creeks."



Trefor Reynoldson

Oligocheate worms are common in Toronto sediments, being tolerant of polluted conditions.

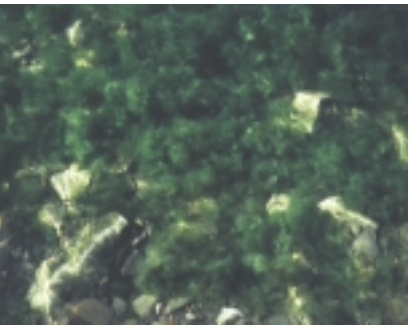
The health and composition of benthic invertebrate communities are generally affected by contaminants, nutrients and substrate types. A comprehensive synthesis of information regarding sediments and the benthic community of the Toronto Harbour from 1970 to 2001 has recently been completed (TRCA, 2001-DRAFT). This synthesis shows that the structure of the benthic community in the Toronto Harbour does not appear to respond to contaminant levels in substrates. Copper and lead levels have declined over time, and although problem areas (i.e., areas exceeding MOE Sediment Quality Guidelines) still exist near CSO discharges, metal bioavailability is low. It appears that the physical characteristics of the substrates (their fine sediment and organic content) are more important in determining the types of benthic communities in the harbour. Areas of organic enrichment continue to support benthic communities dominated by pollution tolerant forms.

CONCLUSIONS

The benthic invertebrate community of the Toronto waterfront is still adversely affected by the fine silts and organic muds in the areas near stormsewer and CSO outfalls and the mouths of the rivers and creeks. Measures required to improve this situation include implementation of the City of Toronto's Wet Weather Flow Plan, improved stormwater management in the upstream municipalities, and reductions in sediment inputs from construction sites and streambank erosion.

2.3.2 Undesirable Algae

"Nuisance occurrences of algae still occur along the Etobicoke waterfront and in localized areas along the Toronto Islands and Scarborough waterfront."

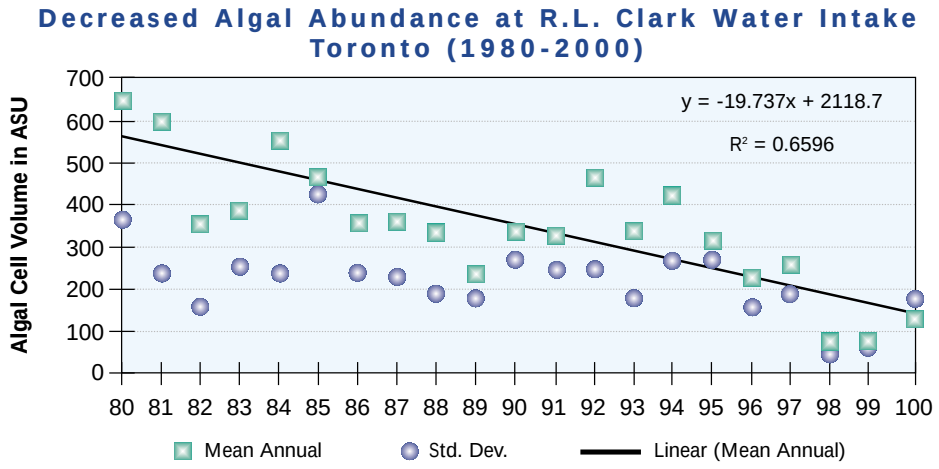


Halton Region Conservation Authority

Algae growing on rocky substrate.

Excessive nuisance growth of algae and blooms of phytoplankton are not a major feature of the Toronto waterfront, except for localized problem areas. For example, as shown in Figure 8, algal densities have decreased at the R.L. Clark water intake since the 1970s, indicating a major improvement in water quality.

Figure 8.
Declining algal abundance on the Toronto waterfront, 1980-2000.



Declines prior to 1988 reflect reduced nutrient loading. Post 1988 declines reflect decreased nutrient loading as well as filter feeding by zebra and quagga mussels. Data courtesy of Environmental Monitoring and Reporting Branch, MOE.

Cladophora, the most common form of nuisance algae in the Toronto area, prefers cold water (< 18°C), hard substrate, phosphorus concentrations in excess of 5 µg/L and depths of 6m or less (T. Howell, MOE, pers.comm.). It may therefore grow in deeper waters in early summer, being fed by storm-derived nutrient pulses, then senesce (reach maturity) and wash inshore when waters become warmer. No systematic surveys of *Cladophora* have been undertaken along the Toronto waterfront. However, personal surveys (T. Howell, MOE) reveal that it is abundant in the Toronto area, whereas it does not occur in areas of Lake Ontario where habitat is suitable but lack nearshore nutrient sources.

Along the western Toronto waterfront (Etobicoke Creek to Mimico Creek), nuisance algae are an unpleasant problem for local residents, boaters and park users. This is the only stretch of Toronto waterfront where extensive natural rock substrate exists for the attachment of *Cladophora*. Nuisance algae have been observed in the vicinity of most stormwater outfalls along the entire Toronto waterfront (Milo Sturm, and others, personal observation), suggesting that the high contributions of nutrients from urban and agricultural runoff are a causal factor. High concentrations of nuisance algae were also observed on the shores of the Toronto Islands in 2001, probably related to the low water levels (J. Kidd pers.comm.). In addition, they also occur periodically in some areas of the rivers and creeks.

Algae as a biomonitor for upstream contributions of nutrients

The TRCA, in conjunction with Prof. Marianne Douglas at the University of Toronto, is developing and implementing a protocol for monitoring periphytic (attached) algae in the streams, as a cost-effective "early-warning" system of change in the watersheds. To date, the protocol has been pilot tested in the Humber River. When fully implemented, the resulting information will be extremely useful to the RAP in determining sources of nutrients requiring control.

CONCLUSIONS

Although no formal surveys have been undertaken, the existence of nutrient enrichment in the nearshore areas of Toronto's waterfront, combined with anecdotal observations of problem algae growth in a number of locations, suggest that improvements will result from nutrient reductions in stormwater and treatment plant effluents, and the elimination of CSOs.

2.3.3 Other Aesthetic Issues

"Aesthetic quality is degraded in many parts of the waterfront and tributaries."

Waterfront Regeneration Trust

Spills, stormwater runoff, and litter all contribute to degraded aesthetics.

In addition to the problems caused by undesirable algae, there are several other causes of degraded aesthetics in the Toronto Area of Concern. Spills can cause objectionable deposits, unnatural colour and sometimes unpleasant odours, but they are not widespread nor persistent along the waterfront and in the watersheds. Sheltered embayments along the waterfront, as well as the rivers and creeks, are a murky brown and may smell unpleasant following heavy rainfall, but usually return to a normal colour and odour within a day or two. Garbage, litter and other debris are found throughout the river valleys and along the waterfront. Floating litter is routinely collected from quays along Toronto Bay.

In the past, there have been no systematic surveys of aesthetic quality in the Toronto waterfront and watersheds. In 2001 TRCA initiated a community-based visual survey for the public to assess the aesthetic quality of their local stretch of stream or waterfront (called Stream-watch and Waterfront-watch respectively).

CONCLUSIONS

Degraded aesthetics occur in localised areas throughout the Toronto Area of Concern but are not a persistent problem throughout the area. We recommend increased efforts in cleanup programs, litter reduction, spill prevention, erosion control, management of construction sites, and stormwater management.

Rosemary G. Hasner, TRCA

Clean up activities.

The Contribution of Spills

A Ryerson study of spills in the Toronto area reports about 3.8 million litres of oil spilled to Lake Ontario from the GTA between 1988 and 1997, of which the City of Toronto contributed 480,000 litres. The largest volume of oil was spilled from storage depots and service stations, jointly producing about 68% of total spill volume within the City of Toronto. The primary causes were human error or equipment failure. Upstream, in the "905" municipalities of the RAP, the MOE Spills Action Centre recorded 3350 oil spills between 1988 and 1997. The largest number of spills was on roads, contributing 30-37% of total spill volume within each region (Li, 2001a and 2001b).

3. Unhealthy Habitats

Rosemary G. Hasner, TRCA

Toronto Region Conservation's Natural Heritage Strategy will include indicators and targets for frogs, birds, and mammals.

The aquatic habitat health of the Toronto waterfront and watersheds is reflected in the coastal wetlands, river mouths, and embayments on the waterfront, and riparian vegetation, instream barriers, and wetlands in the tributaries. Fish communities along the waterfront and in the tributaries are indicators of the health of these habitats.

This chapter focusses primarily on fish because they have been the subject of most research and remedial action for the Toronto and Region RAP to date. However, other wildlife – reptiles, amphibians, birds, mammals and insects – also reflect ecosystem health of the waterfront and watersheds. Toronto and Region Conservation is developing a Natural Heritage Strategy, which includes indicators and measures for selected species of frogs, birds and mammals. Mapping of mobility, sensitivity, abundance, habitat dependence and other criteria for these species is underway, and the next step will be to establish targets.

3.1 HABITATS

"Habitat quantity and quality are increasing, especially along the waterfront, but considerable further work is required."

Along the waterfront over the past two centuries, wetlands were filled in, the mouth of the Don River replaced with an concrete channel, vegetation removed and the shoreline hardened with armoured walls and piers. These changes eliminated spawning, nursery and forage areas for fish populations which were resident along the waterfront, as well as physical habitat for birds and wildlife. Habitat losses and changes within the watersheds have also impaired the health of fish and wildlife populations. Hardening of streambanks, channelizations, enclosures, infilling of floodplains, barriers such as dams, and removal of streambank vegetation, have all resulted in the loss of habitats and riverine functions required to support fish and wildlife.

Waterfront Regeneration Trust

Lakefilling and hardened shorelines destroyed much of the original habitat of the Toronto waterfront.

3.1.1 Waterfront: Coastal Wetlands, River Mouths, and Embayments

Coastal Wetlands

Ontario Ministry of Natural Resources

Rehabilitating the Rouge River Marshes.

Coastal wetlands are particularly valuable habitats. There are four coastal wetlands on the Toronto waterfront, all of them provincially significant: the Humber River Marshes, Toronto Island Wetlands, Highland Creek Wetland Complex and the Rouge River Marshes. They represent 124 remaining hectares of wetland from over 835 hectares that historically existed along the Toronto waterfront.

Loss of wetland area has been attributed to filling and dredging over the past 150 years, and significant losses of emergent and submergent vegetation are a direct result of water quality impairment. Urbanization in the watersheds continues to cause increased turbidity and sedimentation within the wetlands. Combined with the feeding activity of carp and the over-abundance of Canada geese, communities of submergent and emergent macrophytes have drastically decreased over the past fifty years (OMNR, 1998).

In addition to rehabilitating these surviving coastal wetlands, efforts have been extensive to create new wetlands, in some cases nearby but also in new locations. Over 20 hectares of wetlands were created on the waterfront during the 1990s, for example at Colonel Sam Smith Park, Mimico Creek Estuary, Humber Bay Park, Toronto Bay, and Bluffers Park.

Rosemary G. Hasner, TRCA

The mouth of Highland Creek. The wetland complex is upstream on the left side.

River Mouths

Estuarine habitat in Mimico Creek extends upstream from the mouth for a distance of about one kilometre. Currently, 11 fish species are located in the Mimico Creek estuary, 14 less than historical levels. The addition of lakefill and the subsequent creation of 1.93 ha of wetland habitat at the river mouth since 1992, have enhanced the potential to attract lacustrine (lake) fish species. However, sediment loading continues to limit the potential of both the Etobicoke and Mimico river mouth wetlands (TRCA, 1998).

The mouth of Etobicoke Creek is channelized with vertical concrete breakwalls at the entrance to the lake, and provides habitat for 15 species. This number of species, 20 less than occurred historically, demonstrates that the estuary is heavily degraded (TRCA, 1999a).

The channelized Don River mouth provides little habitat value, and the Humber and Rouge River mouths are discussed above (coastal wetlands).

Rosemary G. Hasner, TRCA

Erosion treatment and habitat creation at Humber Bay Shores.

Embayments

The creation of embayments through lakefill parks in the 1980s (Colonel Samuel Smith, Humber Bay, Ashbridge's Bay and Bluffers) improved habitats and fish abundance, but also provided more zones of deposition and potential for bioaccumulation of contaminants. More recent waterfront park projects, such as the Humber Bay Shores between Mimico Creek and Humber River, provide a greater variety of new habitat features, and avoid the creation of embayments where contaminated sediments could accumulate.

3.1.2 Stream and Valley Habitats

Since the *Clean Waters, Clear Choices* report in 1994, work on tributary aquatic habitat has focussed on mitigating instream barriers, increasing woody riparian vegetation to provide shade and organic material to the watercourse, and rehabilitating or creating wetlands.

Rosemary G. Hasner, TRCA

Riparian, or stream side, vegetation is essential to maintain healthy streams.

Riparian Vegetation

Agencies (CWS, MOE, OMNR, 1998), have proposed a generic target for all RAPs that 75% streambanks should have intact woody vegetation. At present, the figure ranges from 17% to 43% in the Toronto watersheds (see Table 6). It has been calculated that an additional 835 km are required in these six watersheds in order to meet the 75% target (Bernie McIntyre, TRCA pers. comm.). Most agree that this target is virtually impossible to meet in the most highly urbanized watersheds. TRCA is or will be establishing specific targets for each watershed through its report card process (see for example the *Humber Report Card*, July 2000 and the *Don Report Card: A Time for Bold Steps*, 2000).

Rosemary G. Hasner, TRCA

Weir at Lawrence on the East Don before – a barrier to fish migration.

Instream Barriers

Instream barriers are large structures (e.g. weirs) as well as culverts at road crossings that may present permanent or seasonal barriers to the passage of fish. Table 6 shows the total number of barriers identified in each tributary, as well as the number of barriers that have been mitigated. In the past few years, extensive effort has gone into mitigating the large permanent barriers which can block fish access to entire subwatersheds. Environment Canada and TRCA estimate that 75% of the priority barriers have been (or are in the process of being) mitigated (pers. comm. J. Vincent). The *Humber Report Card* (TRCA, July 2000) reported that trout and salmon from Lake Ontario can now migrate up the East Humber to appropriate spawning grounds for the first time in 100 years because in-stream barriers have been mitigated.

Rosemary G. Hasner, TRCA

Weir at Lawrence on the East Don after mitigation – no barrier to fish!

Watershed Wetlands

Table 6 shows how little wetland habitat remains in the watersheds of the RAP area. The goal of increasing the area of wetland is essential for groundwater recharge, stream flow, water quality, and wildlife habitats. *A Framework for Guiding Habitat Rehabilitation in Great Lakes Areas of Concern* (CWS, OMOE and OMNR, 1998) suggests a generic target of 10% wetland coverage in a watershed.

This target will obviously be difficult to meet in some of the heavily urbanized watersheds in Toronto, and specific targets are provided in some of the watershed report cards and strategies. For example, the report card for the Humber (TRCA, July 2000) adopted the interim target of 10% until an appropriate target can be set, while *A Time for Bold Steps*, the most recent Don report card (TRCA, 2000) has set a target of 0.05% wetlands cover for the Don watershed. The Natural Heritage Strategy currently being developed by TRCA will provide further guidance for the remaining watersheds.

Gera Dillon, City of Toronto

Spadina Quay wetland – new habitat for pike and home for public art.

TRCA

Shoreline restoration at Heart Lake, Etobicoke Creek.

Table 6.
Status of woody riparian vegetation, fish barriers, and wetlands in Toronto RAP-area watersheds.

	ETOBICOKE CREEK	MIMICO CREEK	HUMBER RIVER	DON RIVER	HIGHLAND CREEK	ROUGE RIVER
RIPARIAN						
Approx. stream length with woody riparian vegetation (%)	17%	23%	43%	35%	32%	49%
Stream length requiring planting in order to achieve 75% target (km)	130	33	400	124	32	116
BARRIERS						
Number of identified barriers	61	73	112	68	>90	~77
Number of barriers that have been modified to allow fish passage	0	1	7 have been notched; four fishways constructed; 1 x 100 m bypass channel constructed	6	0	one major fishway; four minor fishways; two rocky ramps; three dams have collapsed
WETLANDS						
% of watershed with wetland cover	0.5%	no evaluated wetlands	1.1%	0.12% *	0.23 % *	1.4%

** The Don and Highland figures include all wetlands (Provincially significant evaluated wetlands, as well as newly created wetlands). All other figures include only Provincially significant evaluated wetlands.*
Sources: TRCA, 2000; TRCA, July 2000; M. Heaton, OMNR pers. comm.; B. McIntyre, TRCA, pers. comm.; TRCA, 1998

CONCLUSIONS

Habitat creation and rehabilitation efforts over the past ten years have resulted in localized areas where habitats are in good condition. Overall however, habitats remain degraded. Required actions include implementation of existing waterfront plans such as *A Living Place*, the *Port Union Waterfront Improvement Project*, and the *Coastal Wetlands Rehabilitation Plan*, and the individual watershed strategies and fisheries management plans. As well, an integration and review of existing waterfront fish and wildlife and habitat plans is recommended in order to link watershed and waterfront plans.

3.2 FISH COMMUNITIES

"Fish diversity and biomass have responded positively to habitat rehabilitation in localized areas."

TRCA

The pumpkinseed sunfish uses near-shore Lake Ontario and tributaries.

This section discusses fish communities on the waterfront and in the tributaries. Some target species identified in watershed fish management plans (e.g., redside dace and brook trout in head-waters areas) are local fish, and their presence or absence, while reflecting watershed health, is not directly linked to the health of the waterfront. Other species, such as suckers, salmon, and perhaps eels, are migratory, reflecting the conditions in both the watersheds and the lake. Salmonids tend to be species of the open water and range far through Lake Ontario. Still others, such as bass, pike and perch move freely between river mouth marshes and the open lake to complete various stages of their life cycle and tend to be more dependent on nearshore environments and lower river reaches.

3.2.1 Waterfront

Monitoring of 11 sites in 1989 indicated that the fish community along the Toronto waterfront was comprised of 34 species, with alewife, white sucker, gizzard shad, and spottail shiner being the most abundant (OMNR, 1989). A TRCA analysis of monitoring at 9 sites in 1989 indicates that piscivores (fish that eat other fish) accounted for a very small portion – six species and less than 4% of the 1989 fish community, as shown in Figure 9 (Gord MacPherson, 2001).

Waterfront Regeneration Trust

Gravelly or sandy shallows of open coast habitat, such as the Eastern Beaches, are used by some fish species for spawning.

Waterfront Fish and Habitat targets from Clean Waters, Clear Choices (1994)

Waterfront aquatic habitat targets:
- open coast habitat is suitable for spawning populations of salmonids (trout)
- sheltered bays are rehabilitated for northern pike, smallmouth bass, and largemouth bass spawning, nursery and feeding
- rivermouths and estuaries are rehabilitated for largemouth bass and northern pike production
- rubble/rock slopes are rehabilitated in fast-flowing river areas for smallmouth bass
- remaining wetlands are protected and an additional 75 ha or more provided
- lakefilling produces no net loss of aquatic habitat

Waterfront fish community targets:
- Tests on fish confirm that ambient waters and sediments do not cause death, long-term health or reproductive effects
- Biomass of resident piscivores increased to 20%, and specialist fish to 40%
- Formerly abundant fish populations are rehabilitated where locally depressed or extinct
- Proportion of native species is increased towards 100% of total fish community

A recent TRCA summary of 11 years of monitoring from 1989 - 2000, indicates that the water-front fish community appears to have improved, particularly at sites where habitat rehabilitation has been undertaken (TRCA, 2001-Draft). Although no direct testing of fish health or reproduction has taken place, fish surveys show important changes. TRCA conducted monitoring in 1999 at the same 9 sites previously studied in 1989, and the draft analysis indicates that the community had increased by four species to 38, but that common carp and white suckers continued to dominate the biomass (Figure 10).

The TRCA summary goes on to note that the most impressive trend in the fish community characteristics, is the total increase in piscivore biomass since 1988. Figure 11 (Gord MacPherson, 2001) shows that biomass of piscivores is nearing 20%, the target established in the Stage 2 report. The number of piscivorous species has increased from 6 in 1989 to 8 in 1999 with the relative biomass of northern pike, smallmouth bass and largemouth bass more than doubling to a current 7.9% of the fish community. This biomass improvement reflects the abundance of Northern pike along the waterfront, especially within Toronto Bay, where the species is very abundant and now uses north shore habitats that were void of fish in 1988. Other recent changes include colonization by zebra mussels, improved water clarity in the Bay, shoreline naturalization to remove walls and return wildlife habitat (e.g., Spadina Quay, Harbour Square), and the development of extensive submerged aquatic macrophytes (e.g., wild celery).

Figure 9.
1989 waterfront fish community biomass.

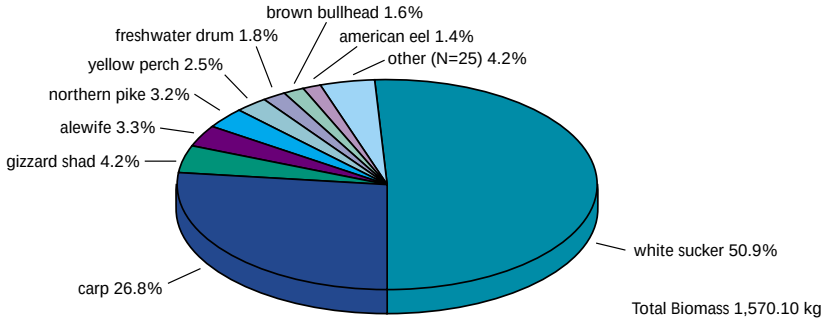


Figure 10.
1999 Waterfront fish community biomass.

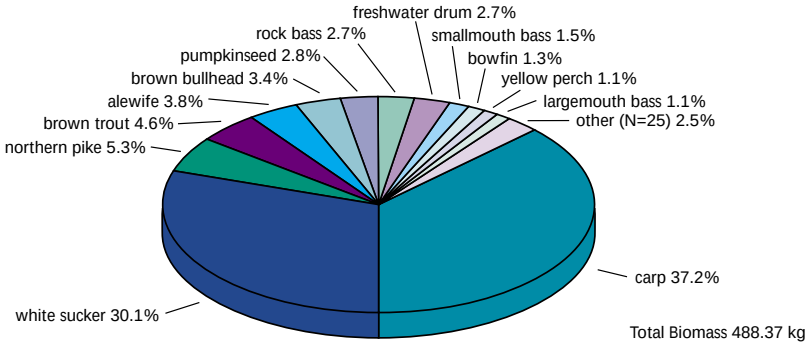
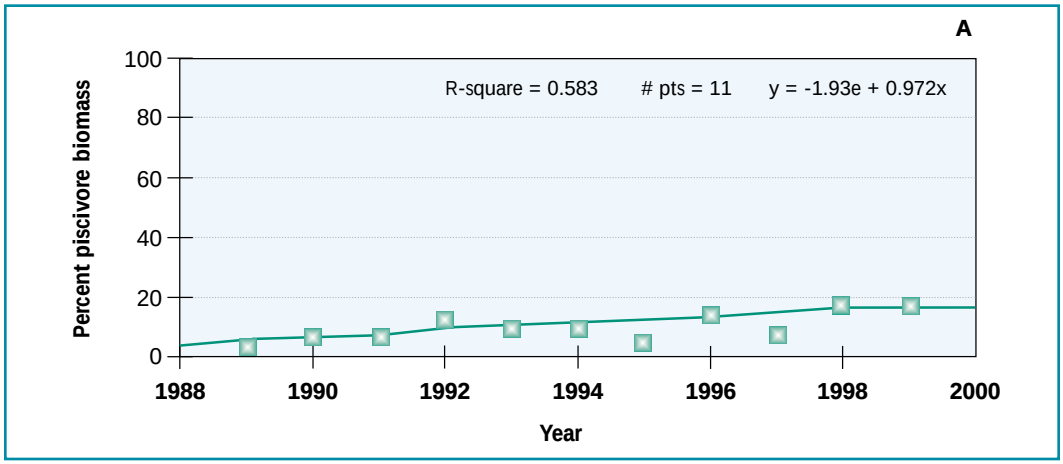


Figure 11.
Increase in piscivore biomass 1988-2000, relative to the RAP 20% target.



Finally, TRCA's Index of Biotic Integrity (IBI) analysis shows scores have been increasing along the Toronto waterfront (TRCA 2001-Draft). Fourteen characteristics of fish populations, including aspects of species richness, trophic structure, abundance, and condition, are used to assess community health. Tommy Thompson Park figures, which have nearly tripled since 1988, demonstrate the dramatic increase in IBI score where a concerted habitat creation and mitigation effort has been undertaken.

3.2.2 Rivers and Creeks

Bernie McIntryre, TRCA

Rainbow Trout.

The Stage 1 RAP report (Environment Canada et.al, 1989) contained very little discussion or analysis of tributary fisheries, except to note the presence of certain species such as Brook trout, brown trout, and rainbow trout in headwaters of parts of the Humber and Rouge watersheds, mid-reaches characterized by minnows, suckers, darters and sunfish, and some seasonal migration of Chinook and Coho salmon, brown and rainbow trout in the Humber and Rouge.

Since then Toronto Region Conservation and the Ministry of Natural Resources have prepared draft Fish Management Plans, which include extensive fish community targets for each subwatershed, for each of the Toronto rivers and creeks. Table 7 is a summary of the fisheries conditions in each watershed.

Table 7.
Summary of fisheries conditions in each watershed.

	Cumulative number of species recorded up to 1980s*	Number of species recorded in most recent survey (mid-late 1990s)	Index of Biotic Integrity Scores (mid-late 1990s)
Etobicoke Creek	62	27 (3 introduced)	no Very good, 5 Good, 12 Poor, 11 Fair
Mimico Creek	33	14 (2 introduced	no Good or Very good, 5 Fair, 9 Poor
Humber River	74	64 (10 introduced)	1 Very good, 33 Good, 36 Fair, 10 Poor
Don River	33	21 (4 introduced)	24 Poor or Fair, 8 Good or Very good
Highland Creek	40	23 (4 introduced)	no Good or Very good, 8 Fair, 17 Poor
Rouge River	55 (possibly 60-70)	51 (9 introduced)	Steedman (1987) reported IBI scores of fair to good in headwaters of the main and Little Rouge; fair to poor in middle reaches, and fair to good in lower reaches

**includes some introduced species, for example Chinook salmon introduced in 1870s and Common carp introduced in 1880s*
Sources: TRCA et al. 1998; MTRCA and OMNR, 1992; TRCA, 1999a; TRCA, 1999b; TRCA, July 2000; TRCA, 2000; Steedman, 1987.

CONCLUSIONS

The waterfront fish community appears to be improving, particularly in locations where improvements in physical habitat have been made. The strongest indicators of improvement are increasing percentage of piscivores (fish that eat other fish) in the community, increasing community diversity, and increasing IBI scores (Index of Biotic Integrity – a biological rating the considers the number of species and composition, local indicator species, and other factors).

A comparison of current fish communities in the tributaries with their status in 1987 is difficult, but available information appears to indicate a decline. The good news stories such as the presence of target brown and Brook trout and redside dace in subwatersheds of the Humber, combined with strong efforts by TRCA, Environment Canada, MNR, municipalities, and community groups at rehabilitation, are unfortunately offset by the ongoing degradation of the watercourses due to erosion, sedimentation, and pollution.

Rosemary G. Hasner, TRCA

The Humber, although under stress, contains some of the best riverine habitat in the Toronto area.

4. A Call to Action:

Clean Waters and Healthy Habitats

4.1 INTRODUCTION

Gibson, 1984

Elizabeth Frances Hale's view of Palace (Front) Street in 1804.

Chapters 2 and 3 demonstrated the progress that has been achieved so far to restore clean waters and healthy habitats to the Toronto waterfront and watersheds. This progress is the result of a myriad of actions taken by governments, community groups, businesses, industries and home-owners in response to the 1994 Remedial Action Plan – *Clean Waters, Clear Choices*. A recent review of the 53 recommendations in that plan showed that while a few of the recommended actions have been completed, most of them are ongoing activities that require long term commitments to all phases – planning, environmental assessment, design, construction or implementation, maintenance and monitoring. Just as it took many decades to create the environmental degradation we are experiencing today, it is clear that sustained effort is needed to repair the damage, and to avoid further degradation from new activities.

To achieve our vision for a healthy waterfront and watersheds, progress is needed on several fronts:

- Clean Waters
- Healthy Habitats
- Sustainable Watersheds
- Education and Involvement
- Monitoring and Research

4.2 CLEAN WATERS

Priority Actions:

Kenaidan Contracting Ltd.

Stormwater management facilities, such as this one (seen under construction) at Pearson International Airport, are essential to restoring clean water.

- Complete and implement the City of Toronto Wet Weather Flow Management Master Plan.
  Partners: City of Toronto, federal and provincial governments, TRCA, private sector, the public and NGOs.
- Complete and implement stormwater retrofit strategies in middle/upper watersheds.
  Partners: TRCA and municipalities.
- Remediate dry weather flows from waterfront outfalls, by eliminating sanitary cross connections and spills.
  Partners: municipalities, MOE and industries.
- Increase implementation of best management practices for urban and rural businesses and industries.
  Partners: municipalities, universities/colleges, landowners, Ontario Centre for Environmental Technology Advancement, Provincial ministries, TRCA, businesses and industries.
- Increase pollution prevention through improvements to sewer use by-laws and storm-water policies where necessary, increased by-law enforcement, and better spills prevention.
  Partners: municipalities, EC, MOE, NGOs, businesses and industries.

EC = Environment Canada; MOE = Ontario Ministry of the Environment;
NGOs = non-government organizations; TRCA = Toronto and Region Conservation Authority

Background

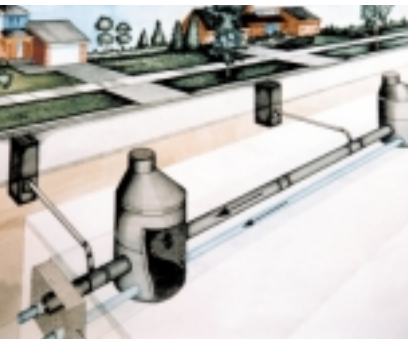
City of Toronto, WES

Managing water where it falls – at source. Planting a rain garden helps collect and infiltrate water, while creating habitat diversity and reducing water consumption.

Contaminated urban run-off and combined sewer overflows are the single most damaging influences on the health of our rivers, creeks and nearshore Lake Ontario. Since the Toronto and Region Area of Concern was designated in 1987, important progress has been made to improve stormwater and sewage infrastructure, but in such a large system – six watersheds draining 210,000 hectares – fully restoring health to our aquatic environment is a long-term proposition.

Progress to date in improving water quality along the Toronto waterfront has been achieved by improving sewage treatment, reducing pollutant inputs to the system, and reducing CSOs with such projects as the Eastern Beaches Detention Tanks. Efforts now must focus on source control to reduce flows and pollution levels, combined with treatment of stormwater and combined sewage where source controls cannot achieve the desired results.

The City of Toronto's Wet Weather Flow Management Master Plan (WWFMMP)will provide a blueprint for remediation and management of stormwater and combined sewer overflows for the entire City – a significant contribution to restoring beneficial uses for the Toronto RAP. It is based on a watershed approach and uses modelling to evaluate alternative strategies to improve wet weather flows and quality. The plan emphasizes natural systems, with a hierarchy that gives priority to source control (dealing with rain and snow where it falls), followed by conveyance measures and "end-of-pipe" treatment.



City of Toronto, WES

Managing stormwater in the system – conveyance control. Diagram of the exfiltration system installed in parts of Etobicoke.

In addition to the WWFMMP, complementary initiatives to improve dry weather water quality in the City of Toronto include disconnection of illegal connections of sanitary sewers to the stormsewer system, spills prevention, implementation of the revised sewer use by-law, and development of a stormwater policy.

Upstream from the City of Toronto, a range of activities are underway to improve surface and groundwater quality. They include stormwater pond retrofits, lot-level controls, and improved management of pet and rural livestock wastes. Figure 12 shows the distribution of stormwater ponds in the 905 areas. Of the total 548 existing ponds in the Toronto watersheds, 348 are designed to provide both quantity and quality control and 10 have been retrofitted to provide quality control. A further 45 have identified to retrofit for quality control and 58 identified for the addition of a quantity/quality control facility. Consideration should also be given to providing stormwater management for those urban areas, roads and highways that were developed before stormwater controls were mandatory.

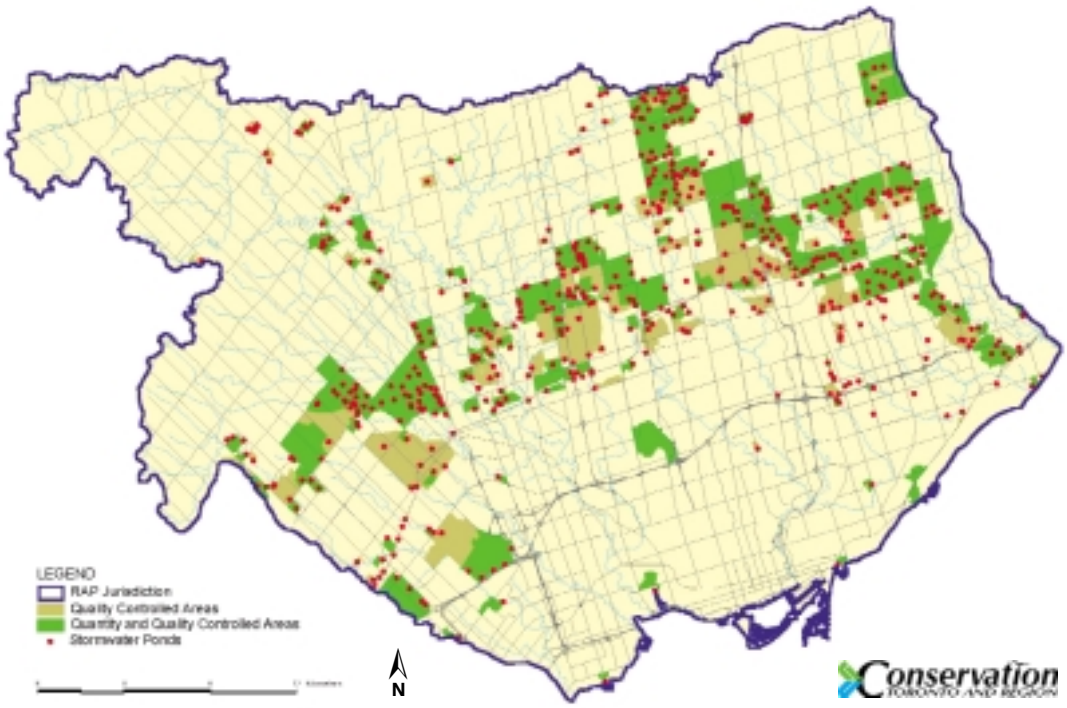
Rosemary G. Hasner, TRCA

Managing stormwater where it empties into a stream a lake, using ponds or underground infrastructure, is end-of-pipe treatment. This pond in Vaughan is shown under construction.

TRCA

Enhancements to improve water quality at Terraview/Willowfield Park on the Don River.

Figure 12.
Stormwater Management in the RAP watersheds.



An important complement to the **actions** that have been taken to restore environmental quality over the past decade is the emergence of a significant shift in attitudes to the management of water in our watersheds (Table 8). This provides a more holistic and collaborative approach to solving problems, along with an opportunity to seek multi-facetted solutions that maximize benefits and reduce costs.

Table 8.
Paradigm shift in attitudes to stormwater management.

FROM:		TO:
command and control by upper levels of government	→	local involvement in decision-making
focus on chemical condition of the water	→	include physical and biological dimensions
impact mitigation	→	functional restoration
focus on engineered solutions	→	integration of non-structural solutions, for maximum effectiveness and to manage costs
end-of-pipe control	→	system control (throughout the water cycle)
simplistic flow control	→	comprehensive, watershed-based approaches that integrate water quantity and quality, public health, habitats, shoreline protection and recreation opportunities
why it can't be done	→	how can we do it

Waterfront Regeneration Trust

Disconnect your downspout and direct the rain into the garden.

Ontario Ministry of the Environment

Education and promotion of best management practices can prevent degradation of streams caused by agricultural activities.

CURRENT INITIATIVES – Water Quality

SOURCE CONTROL

Lot Level Management. Keeping rainwater and snowmelt on individual properties as long as possible allows for groundwater infiltration and reduces the amount of water that the municipality has to handle in the sewer system, alleviating the problems of downstream flooding, combined sewer overflows and stormwater pollution. The City of Toronto has a Downspout Disconnection program to encourage property owners to disconnect their downspouts wherever feasible and direct the water to their gardens, rain barrels or ponds.

Water Conservation. Water conservation reduces the amount of sewage that has to be handled at our water pollution control plants, or that contributes to combined sewer overflows following heavy rainfall events. It also reduces the amount of treated water that municipalities must supply to consumers and saves money on residential and industrial users' water bills. Most municipalities now have some form of program intended to reduce water consumption. For example, after only three years in action, York Region's Water for Tomorrow program has reduced daily water use in the region by 11.2 million litres, well ahead of their goal of 19 million litres/day over six years. The City of Toronto is currently developing a Water Efficiency Plan.

Construction Practices. Soil and other materials washed from construction sites is a significant source of sediments to the rivers, creeks and waterfront. The TRCA in conjunction with other agencies is undertaking a review of sediment controls at construction sites, including a pilot project to demonstrate potential benefits of alternative approaches. Further work is proposed to develop a model by-law for improved sediment control at construction sites.

Agricultural Practices. Agriculture is a major land use in the upper parts of the Etobicoke, Humber and Rouge watersheds. Historically, agricultural practices have included removal of natural habitat areas, changes to water regimes, soil erosion, and pollution from fertilizers and chemicals. Programs like the Rural Clean Water Program, Environmental Farm Plan and farm weeks/fairs hosted by many agricultural organizations promote best management practices, technology and innovation for agricultural operators. Programs such as the Managed Forest Tax Incentive Program, Wetland Habitat Fund and Ecological Gifts Program provide financial assistance for protection and restoration of natural heritage features like forests and wetlands.

Groundwater Protection. There are a number of aquifers in the Toronto RAP area, with the Oak Ridges Moraine being the largest and best known. Until recently, groundwater studies have focussed on limited areas of some of the watersheds (for example water quantification and wellhead protection studies in some headwater areas of the Humber River). In 2000, Durham, Peel and York Regions and the appropriate Conservation Authorities began a comprehensive Groundwater Management Strategy for the three regions. It will establish consistent policies, coordinate data collection and management, develop groundwater management methods and provide a tri-regional implementation framework. More specifically on the Oak Ridges Moraine, the Province's August-September 2001 consultation paper "Share Your Vision for the Oak Ridges Moraine" proposes further work to determine setbacks to protect hydrologically sensitive features, develop a wellhead protection strategy, assess recharge requirements, and establish a sustainable approach to water-taking.

POLLUTION PREVENTION

Sewer Use By-Laws. The City of Toronto updated its Sewer Use By-Law in 2000. It provides greatly improved control of discharges to sewers, with strict discharge limits for specific pollutants, and requirements for industries to prepare pollution prevention plans. Outside Toronto, the Regions of Peel and York are responsible for sanitary sewers, and the local municipalities for storm sewers. Most of their sewer use by-laws do not yet have as strong a focus on pollution prevention as the City of Toronto by-law.

Household Hazardous Wastes. There are now many programs designed to reduce the use and improper disposal of household hazardous materials. For example, the City of Toronto provides drop-off depots, a toxic taxi service, and environment days hosted by councillors to ensure that the public can safely dispose of hazardous wastes from their homes or businesses.

City of Toronto

Monitoring sewer use in the City of Toronto.

INFRASTRUCTURE

Stormwater Management. Since most of the City of Toronto was developed before stormwater controls were even considered, most stormwater is discharged through 2373 stormwater outfalls and 71 combined sewers directly into the rivers, creeks and Lake Ontario. During the 1990s, several projects were implemented to address stormwater flows in local areas, for example the Dunkers Flow Balancing System (near Bluffers Park in Scarborough) and a Stormwater Exfiltration System installed in parts of Etobicoke.

In areas of Toronto and in the 905 municipalities of Peel and York regions developed after 1975, stormwater is often held back in management ponds. The original intent was primarily to control downstream flooding by retaining water and releasing it gradually to creeks and rivers, with little consideration for water quality. However, new ponds now provide both quality and quantity control, and a major program is underway by the TRCA in partnership with a number of municipalities to retrofit many of the original quantity ponds (see Figure 12).

Best Management Practices. In addition to retrofitting existing infrastructure and developing new facilities, municipalities have been working to improve management practices, such as regular cleaning of catch-basins, reductions in use of road salt and pesticides, sewer rehabilitation, and erosion control.

Combined Sewer Overflows. In Toronto's Eastern Beaches, two underground storage tanks were put into operation in 1990 and 1995 to store stormwater and sewage after rainfall events until the Ashbridge's Bay Treatment Plant has the capacity to treat them. In the Western Beaches, a 3.7km tunnel with three huge storage shafts and a combined capacity of 85,000 cubic metres has recently been built to collect and treat combined sewer flows.

Sewage Treatment. While sewage treatment plants are designed to remove solids, phosphorus, nitrogen, oils, greases, bacteria and viruses, the resulting effluent is still a major source of nutrients, metals and organic chemicals to the Lake. There are ongoing programs to improve sewage treatment through the City of Toronto Works Best Practices Project. For example, new anaerobic digesters are under construction at the Ashbridges and Highland Creek plants. At the Ashbridges Bay Treatment Plant, work is underway to phase out incineration of biosolids (sludge) and put them to beneficial uses such as agricultural application; and to reduce the use of chlorine by replacing it with UV disinfection.

Waterfront Regeneration Trust

Ashbridge's Bay Sewage Treatment Plant.

4.3 HEALTHY HABITATS

Priority Actions:

- Complete implementation of the *Port Union Waterfront Improvement Project,* the *Integrated Shoreline Management Plan: Tommy Thompson Park to Frenchman's Bay, A Living Place*, the *Coastal Wetlands Rehabilitation Plan* and other plans for maximizing habitat (including a wetland at the mouth of the Don River).
  Partners: City of Toronto, TRCA, MNR, Toronto Waterfront Revitalization Corporation, other federal and provincial agencies and community groups such as Toronto Bay Initiative and Task Force to Bring Back the Don.

- Complete and implement watershed fish management plans.
  Partners: TRCA, DFO, MNR, EC and municipalities.

- Continue woody riparian vegetation planting and the mitigation of priority barriers.
  Partners: TRCA, MNR, Ontario Streams, EC, municipalities and community groups.

- Complete and implement the Natural Heritage Strategy to protect, restore and create terrestrial habitats in all watersheds.
  Partners: TRCA, DFO, MNR, MMA, EC and municipalities.

Toronto Bay Initiative

Community planting at Spadina Quay wetland, Toronto Bay.

DFO = Department of Fisheries and Oceans; EC = Environment Canada; MOE = Ontario Ministry of the Environment; MMA = Ontario Ministry of Municipal Affairs; MNR = Ontario Ministry of Natural Resources; NGOs = non-government organizations; TRCA = Toronto and Region Conservation Authority

Background

Rosemary G. Hasner, TRCA

Waterfront habitat at Humber Bay Parks East and West.

The priority actions to fully restore the waterfront fishery involve water quality improvement and habitat creation. This includes elimination of combined sewer overflows, stormwater management, sediment control, coastal wetland rehabilitation, sheltered embayment rehabilitation, and creation of offshore shoals. As shown in Chapters 2 and 3, remarkable progress has already been made, but there is increasing recognition that improving physical habitat structure, and improving water quality and flow patterns, must be undertaken in conjunction with each other.

A 1994 assessment of waterfront fish communities from 1989-1993 proposed fish community management targets (OMNR, 1994). There has also been considerable attention to developing draft fish management plans for the rivers and creeks, and there is a Lake Ontario Fisheries Management Plan focussing on lake-wide fish management needs. In addition, the Toronto Bay Initiative has developed a plan for habitat restoration in the Bay *(A Living Place)*, and an integrated shoreline management plan exists for the waterfront east of Tommy Thompson Park.

Implementation of these plans, as well as individual watershed strategies, is the priority action required. In addition, the RAP partners should consolidate and review waterfront fish community and habitat targets and requirements, including linkages to upstream and lakewide habitat. This should be undertaken as a cooperative effort among waterfront, watershed and lake-wide fish managers.

At the watershed level, TRCA is preparing a comprehensive Natural Heritage Strategy – a critical tool for monitoring regional ecosystem health and informing planning, acquisition and restoration decisions. In addition, the Region of York recently released a *York Region Greening Strategy* (York Region, May 2001) that provides strategic directions for naturalization projects, acquisitions, corporate green partnerships, education, monitoring and information management.

4.4 SUSTAINABLE WATERSHEDS

Priority Actions:

- Implement watershed strategies for Etobicoke-Mimico, Humber, Don, Highland and Rouge.
  Partners: TRCA, municipalities, NGOs, EC, MOE, residents.
- Develop and implement strategies related to the Oak Ridges Moraine and Ontario Smart Growth.
  Partners: Province of Ontario, other levels of government, TRCA, NGOs.
- Integrate sustainability principles and RAP objectives into Toronto Waterfront Revitalization, official plan reviews, and other municipal planning and development approval processes.
  Partners: Federal and Provincial governments, TRCA, WRT, Toronto Waterfront Revitalization Corporation and municipalities.

Rosemary G. Hasner, TRCA

Release of the second Report Card by the Don Watershed Regeneration Council, 2000.

EC = Environment Canada; MOE = Ontario Ministry of the Environment; NGOs = Non-government Organizations; TRCA = Toronto and Region Conservation Authority; WRT = Waterfront Regeneration Trust

Background

Daphne Svenningson

Monarch butterfly.

Restoring clean water and healthy habitats will go a long way towards improving watershed health, but a more comprehensive approach is required to sustain the benefits. A sustainability perspective requires that we not only remediate damaged environmental features and systems – the fundamental premise of RAPs – but also protect healthy ones. In addition, it requires an integrated approach to decision-making that replaces economic and social practices that harm the environment with ones that promote environmental, social and economic health. In the words of Gro Brundtland, the overall goal is "to meet the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development,1987).

One of the great strengths of the Toronto and Region RAP process is the excellent work being done by multi-stakeholder groups in most of the watersheds. Although each watershed group is at a different stage in its work, a review of their most recent publications gives a clear sense of the priority actions in each watershed, and the common themes among them.

Table 9.
Milestone watershed publications.

	Etobicoke/ Mimico	Humber	Don	Highland	Rouge
Draft Fish Management Plan	1998	1998	1997	1998	1992
State of the Watershed Report	1998	1994	1992	1999	—
Watershed Strategy	2001	1997	1994	Strategic direction is provided in the State of the Watershed Report	Rouge Park Management Plan 1994 and Rouge North Management Plan 2001
Report Card 1	—	2000	—	—	—
Report Card 2	—	—	2000	—	—

Rosemary G. Hasner, TRCA

The Humber Alliance, one of the multi-stakeholder groups contributing to implementation of the RAP.

Watershed Priorities

The **Etobicoke-Mimico Watersheds** Task Force is about to publish its strategy Greening Our Watersheds. The draft strategy's five priority actions are to improve water management, promote sustainable urban growth, secure green open spaces, expand environmental education, and protect and restore natural habitats.

The 2000 **Humber River Watershed** Report Card, prepared by the Humber Watershed Alliance, concluded that most aspects of the watershed were in fair or poor health, that the system was under significant stress, and that development pressures pose the threat of increased stress. The Alliance recommends priority be given to stormwater ponds/controls, riparian reforestation, wetland creation, river barrier mitigation, and community involvement/education.

The 2000 **Don Watershed** Report Card, prepared by the Don Watershed Council, is titled A Time for Bold Steps to emphasize the fact that, while there has been considerable progress in re-creating habitats (130 regeneration projects between 1997 and 1999 alone), they are mostly small scale projects like tree-plantings and wildflower gardens. The bold steps that are now required will deal with the most destructive forces in the river – wide fluctuations in the flow regime, massive amounts of stormwater pollution and sediments, and CSOs. The priority actions are therefore to complete and implement the Wet Weather Flow Plan in Toronto and undertake similar actions in the upstream municipalities.

A State of the Watershed Report was published for the **Highland Creek Watershed** in 1999. This will provide a sound basis for preparation of an integrated strategy, when considered in conjunction with TRCA's natural heritage inventory, draft fisheries management plan and the City of Toronto's Wet Weather Flow Plan.

The **Rouge River Watershed** does not have a single coordinated group working on the entire watershed. However the Rouge Park Alliance, while responsible primarily for the Rouge Park, also provides leadership for a watershed perspective. The Rouge Park's General Manager acts as TRCA's watershed specialist for the Rouge catchment area. The Rouge Park Management Plan (1994) and the Rouge North Management Plan (2001) include an emphasis on ecological planning principles in a broader, watershed context.

Two important over-arching concerns in all the watersheds relate to climate change, and the form and practice of future urban growth. With respect to climate change, issues of concern include changes to groundwater infiltration and discharge, cold water fisheries, freezing and thaw patterns, flooding and stormwater regimes. In addition to actions to reduce climate change, we need to ensure that natural systems are healthy and diverse, to increase their ability to adapt to the inevitable changes in the physical environment.

Continued urban growth places increasing stresses on an already stressed ecosystem. The population of the GTA is currently 4.6 million, and expected to soar to 6.7 million by 2021. The trend in the areas of the RAP watersheds (mostly north of the City of Toronto) that have accommodated urban expansion over the past few decades, has been towards low density sprawl that replaces vast acreages of agricultural and natural lands with buildings, roads and other paved surfaces. Although policies and regulations at all levels of government are now in place to ensure much greater protection of habitats, hydrological balance and water quality than ever before, it is simply impossible to prevent all impacts of such massive land use changes. Two current initiatives of the Province of Ontario may help to reduce some of this pressure: the Oak Ridges Moraine Long-Term Strategy and Smart Growth Ontario.

Rosemary G. Hasner, TRCA

Sprawling urban growth threatens the sustainability of our watersheds.

The Future of the Oak Ridges Moraine

The headwaters of the major rivers in the Toronto area – Rouge, Don and Humber – are in the Oak Ridges Moraine. These areas contain habitats, recharge areas and aquifers that are of critical importance to healthy watersheds. At time of writing, the Province of Ontario is holding consultations on an August-September 2001 proposal called "Share Your Vision for the Oak Ridges Moraine". Based on these consultations, the Advisory Panel on the Oak Ridges Moraine recently strengthened its previous recommendations: 62% of moraine lands are now recommended for protection as Core or Linkage Areas (up from 53%). 100% of the moraine's natural features are recommended to be protected, with 80% to 90% of those features located in the Core or Linkage Area designations. Linkage Areas are now recommended to be a minimum of 2 kilometres in width. However, there are still some outstanding issues of concern, such as the potential for aggregate extraction in Linkage Areas and the possibility of increased municipal water-taking prior to water budgets being completed. It is hoped that expected legislation will address these issues and provide for the long term protection of the ORM.

Rosemary G. Hasner, TRCA

Air pollution from unsustainable transportation practices is contributing to ecosystem degradation.

In summary, all the watershed groups have identified wet weather flow (stormwater and combined sewers) as a priority issue, highlighting the importance of implementing the City of Toronto's Wet Weather Flow Plan in conjunction with improvements to stormwater management in the upstream municipalities of the middle/upper watersheds. Another major issue for the watersheds is ongoing urban development, and the need to apply smart growth principles to ensure greenspace acquisition, habitat protection and restoration, groundwater protection and establishment of urban boundaries. A third clear priority is public education and involvement, discussed in the following section.

Rosemary G. Hasner, TRCA

View from the Oak Ridges Moraine.

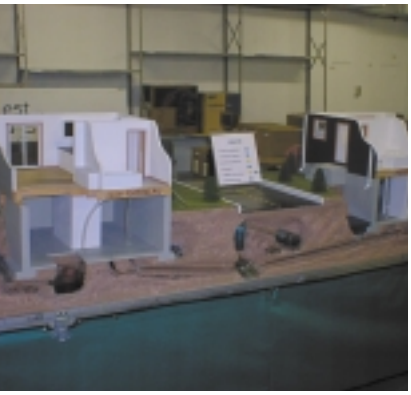
4.5 EDUCATION AND INVOLVEMENT

Priority Actions:

- Increase activities to engage citizens and businesses in lot-level water management, water conservation, reduction and proper disposal of household and garden chemicals, and improved habitat and shoreline management.
  Partners: municipalities, TRCA, watershed groups, WRT, NGOs, universities, colleges and schools.

- Build public and political support for remedial action.
  Partners: all levels of government, watershed groups, WRT, NGOs.

NGOs = non-government organizations; TRCA = Toronto and Region Conservation Authority; WRT = Waterfront Regeneration Trust



J. F. Sabourin and Associates

Creative three dimensional model to demonstrate rain runoff.

Background

Public concern about clean water and healthy habitats is part of the overall level of awareness about the importance of environmental quality. For example, a June 2000 Angus Reid public awareness survey of Don watershed residents recorded a high degree of environmental consciousness and stewardship. Nearly 50% of residents interviewed had reduced the amount of sidewalk salt, herbicides and pesticides used in the previous three years. However, survey respondents seemed unaware of many of the other ways in which they could help to clean up the Don River. Although 57% of them mentioned lifestyle changes that could help, they focussed on picking up garbage/litter, recycling and becoming better informed. The remaining respondents couldn't think of anything they could do to restore the Don River.

Rosemary G. Hasner, TRCA

The Yellow Fish Storm Drain Marking Program involves some 3,500 students each year in painting thousands of yellow fish near storm drains to raise public awareness of the connections between stormsewers, rivers and the Lake.

H2infO in Cyberspace

In the past five years, the advent of internet-based communications has opened up information sharing and education opportunities that are being fostered by agencies and non-government groups alike. For example, www.H2infO.org is a web-site provided by Riversides, Toronto Environmental Alliance and the Canadian Institute for Environmental Law and Policy (CIELAP) to inform and promote community-based action on water quality, quantity and flow issues.

Rosemary G. Hasner, TRCA

TRCA's field centres, Watershed on Wheels, and Aquatic Plants Program educate thousands of students each year with a range of lessons including clean waters, habitat restoration and conservation, wildlife, watersheds and ecosystems.

Public concern is also reflected in the number of community groups that focus specifically on the health of our creeks, rivers and the waterfront. For example, a report published in 1991 identified only four such groups – Black Creek Project, Save the Rouge Valley System, Task Force to Bring Back the Don, and Action to Restore a Clean Humber. Today, in 2001, there are at least 28 groups participating in a range of activities, including habitat restoration, lobbying, public education, and publicity events such as the Toronto Bay Initiative's annual big summer splash, the Paddle down the Don and Childrens' Water Festivals, to name just a few.

Municipalities, TRCA and a number of NGOs undertake a variety of initiatives intended to raise awareness of stormwater quantity/quality, habitat and wildlife issues and to encourage behaviour change towards water conservation, lot level management, pollution prevention and habitat stewardship. Nevertheless, the general public still has a minimal understanding of these issues, limited knowledge about ways they can reduce their personal contributions to the problems, and little motivation to change their behaviours. There is also an important relationship between individual and government actions. Waterfront residents are more willing to take individual action if they can see leadership from their governments. And they are more willing to support government programs if they understand the role of improved environmental conditions in encouraging economic vitality and providing a high quality of life. All these themes must be included in our education and involvement activities.

4.6 ASSESSING PROGRESS

Priority Actions:

- Implement the integrated Toronto and Region watershed monitoring program, developed by TRCA and its partners, to provide a complete picture of watershed health.
  Partners: TRCA, federal and provincial agencies, municipalities, academic institutions and community groups.

- Undertake the specific studies to confirm the status of the three beneficial uses currently listed as "Requires Further Assessment".
  Partners: EC, DFO, MOE, MNR, TRCA, and CWS.

EC = Environment Canada; CWS = Canadian Wildlife Service;
DFO = Department of Fisheries and Oceans; MOE = Ministry of the Environment;
MNR = Ministry of Natural Resources; TRCA = Toronto and Region Conservation Authority

Toronto Bay Initiative

A member of Toronto Bay Initiative takes a water sample of the Bay.

Rosemary G. Hasner, TRCA

A survey of fish tumours is one of the specific studies recommended to determine whether certain Beneficial Uses are impaired.

Background

The Toronto and Region Conservation Authority has developed a comprehensive monitoring framework that identifies the measures and indicators required to properly report on watershed health as well as on progress under the RAP. The program is designed to improve access to data, ensure timely reporting and avoid duplication of efforts. It will also focus monitoring programs to provide relevant information for assessing progress and for decision-making about environmental management. The framework has been developed in collaboration with agency, institutional and community stakeholders and will be implemented through a network of practitioners in the monitoring field, (municipalities, TRCA, federal and provincial agencies), as well as some community monitoring. The program is designed on a multi-year cycle, with not all monitoring taking place each year.

The monitoring program was developed over several years with extensive consultation. In 2001, TRCA secured funding from its municipal partners to undertake the monitoring identified for the first year. Long term funding for this program is essential to provide the comparative data needed to assess progress.

The monitoring framework includes a number of ongoing programs that are particularly relevant to the RAP, such as young of the year fish surveys. However, there are also some new studies that have been identified to address questions about the beneficial uses that require further assessment (RFAs). As discussed in Chapter 2, these would investigate fish tumours and other deformities, bird/animal deformities, and the degradation of phytoplankton and zooplankton. It is recommended that these specific studies be completed within the next three years. Further information about the proposed RAP research and monitoring program is included in a technical version of this report available from the Waterfront Regeneration Trust.

5. Conclusions

Waterfront Regeneration Trust

This report is the most in-depth evaluation of progress in removing Toronto from the "black list" of Areas of Concern around the Great Lakes since the 1994 report Clean Waters, Clear Choices. We conclude that progress has been made, but it is not sufficient to declare that remediation is complete, nor to provide the clean, green, healthy conditions that Toronto and the upstream municipalities need to provide a high quality of life for residents, tourists and business investments.

The Problems

In 1987, when Toronto was designated an Area of Concern, most of its waterfront beaches had high levels of bacteria that made them unsuitable for swimming for much of the summer season. Today, conditions have improved in the Eastern Beaches thanks to the installation of two combined sewer/stormwater detention tanks, and conditions will improve in the Western Beaches (Sunnyside area) in 2002 due to the installation of a major tunnel. However this infrastructure will not completely remove the problem in these two areas due to ongoing sources of pollution nearby, such as the Humber River. Furthermore, bacterial contamination continues to pose risks for swimming and other water contact recreation in many other parts of the waterfront, as well as in the rivers and creeks.

There are still advisories warning people not to eat certain types and sizes of fish because of high levels of contaminants, although they have been reduced in Toronto over the past two decades. Contaminants not only threaten human health, but also the health of other fish and wildlife in the food web.

Excessive algae growth along the shoreline and their subsequent decay is an unpleasant feature of the Etobicoke waterfront as well as other areas, particularly in the vicinity of stormwater outfalls. Other aesthetic issues along the waterfront and in the rivers and creeks are litter, oily scum, silt-laden waters and bad odours.

Finally, habitats for fish and other wildlife have been lost, fragmented and degraded. Many habitat restoration projects have been undertaken by agencies and community groups, and these areas are responding with increased fish diversity. However, degradation by pollution and excessive water flows during wet weather remains a significant barrier to further improvements in fish and wildlife communities, especially in the rivers and creeks.

The Causes

The single biggest cause of these problems is stormwater and combined sewer overflows. Rainfall and snowmelt generate large volumes of water, that carry oil, grease, eroded soils, metals, chemicals, road salt, animal feces and other pollutants into rivers, creeks and the lake. In the older parts of the city, combined sewers carry polluted stormwater together with more polluted sanitary sewage from our homes and businesses. Following heavy rainfalls, the combined sewers overflow into the rivers and lake instead of going to the water pollution control plants for treatment.

The variability in the water flows in our rivers and creeks is greatly increased by the impermeability of much of the urban landscape. Instead of infiltrating into the soil to replenish groundwater and provide year-round base flows to the watercourses, rainwater and snowmelt rush off the roads, buildings and other paved surfaces. The high flows create excessive scouring and erosion of the river banks, and the low flows are often insufficient to sustain aquatic life.

Other major influences on valley and stream habitats are the burying and channelization of watercourses, the imposition of dams and other barriers, and the stripping of riparian (streamside) vegetation. Along the waterfront, most of the original shoreline habitats have been lost through lakefilling, erosion controls, dredging, dockwalls, deforestation and destruction of wetlands.

The Solutions

Rosemary G. Hasner, TRCA

Since the root cause of most of the problems is stormwater and combined sewers, the prime target of both remedial and preventative action must be wet weather flows. In the City of Toronto, a Wet Weather Flow Management Master Plan is nearing completion at time of writing. It will identify the most effective combinations of controls that can be applied at the source (e.g. on individual properties), during conveyance of the water through the stormwater system, and before discharging into a watercourse or the lake (e.g. ponds, tanks and tunnels). Implementation of this plan is the most important priority for restoration of beneficial uses to Toronto's waterfront and watersheds.

However, Toronto's Wet Weather Flow Plan must be complemented by a number of other initiatives. In the upstream municipalities, programs to retrofit stormwater quantity control ponds to also control water quality should be completed. Consideration should be given to providing stormwater management for those urban areas, roads and highways that were developed before stormwater controls were required. And vigilance is required to ensure that stormwater management in new developments in all the watersheds accomplishes the best results possible.

Pollution should be reduced, and where possible eliminated. Mechanisms include reducing the use of hazardous chemicals, eliminating cross connections between sanitary and storm sewer systems, preventing spills, improving and enforcing sewer use by-laws, and applying best management practices to municipal infrastructure, construction sites, industries and agriculture.

Habitat improvements should continue along the waterfront and in the watersheds. Emphasis should be placed on rivermouth wetlands; areas of land use change such as Port Union, West Donlands and Toronto Portlands; removal of barriers in rivers and creeks; and restoration of shoreline/riparian cover. Protection of existing habitats is also essential, especially in areas of new development.

Toronto Tourism

The watershed focus provided by the various stakeholder groups for Etobicoke-Mimico, Humber, Don and Rouge watersheds should be continued, and expanded to include the Highland watershed. This will ensure that protection and remediation activities are focussed on the specific needs of each watershed, and that all the players are involved (governments, businesses, community groups, schools and other institutions, and individuals).

Increased efforts in education and involvement are essential to ensure that there is widespread public and political support for these actions, and that everyone plays their own part. For example, residents and other property owners can help to manage stormwater on their own properties and prevent pollution. Businesses, developers, farmers and industries can ensure that their activities sustain a healthy environment. Students can learn what's required to have clean waters and healthy habitats, and how they can participate. And decision-makers will benefit from a clearer understanding of the benefits of a healthy environment in relation to their other responsibilities, such as economic development, recreation and public health.

Delisting Toronto

In order to remove Toronto from the Great Lakes "black list" of Areas of Concern, we need to be able to clearly demonstrate that the beneficial uses specified in the Great Lakes Water Quality Agreement have been fully restored. At present, evaluation of how much remediation has been accomplished is difficult because monitoring programs do not provide all the information required. This report identifies a focussed list of monitoring and research needs for the RAP, which should be addressed by all the agencies participating in the integrated monitoring program developed by The Toronto and Region Conservation Authority.

A Last Word

Progressive waterfront cities all over the world are taking action to clean up degraded environments, recognizing that healthy conditions are essential to provide a high quality of life for residents, to provide an attractive setting for tourists, and to attract new companies that want to invest in places with an excellent standard of living. Think of London, Barcelona, Sydney, Chicago and Boston – to name just a few. The need for Toronto to take similar action was recognized in the report of Robert Fung's Waterfront Task Force (2000) which notes:

> ***"Revitalization will require the establishment of processes that can deliver, in a comprehensive and coordinated fashion, improvements to water quality, the remediation of polluted soils and the necessary flood protection actions….. Water quality improvements will encourage development and public activity at, and near, the water's edge…..Water quality should be improved to the point that it is more aesthetically pleasing, the Harbour and Don River fishery is enhanced in terms of diversity, and ideally that Toronto Bay meets provincial swimming and water contact activity standards."***

Accomplishing these goals will not be quick nor easy. It took some 200 years to degrade our waterfront and watersheds to today's conditions, and it will likely take decades to restore environmental health. However, progress to date is encouraging and demonstrates that much is possible.

We stand at a crossroad in determining the fate of Toronto's waterfront. With the recent launch of Toronto's Central Waterfront Plan and the establishment of the Toronto Waterfront Revitalization Corporation, it is timely to sort out priorities for action. This report presents a comprehensive and practical way to move forward to clean waters and healthy habitats. We welcome your feedback.

Rosemary G. Hasner, TRCA

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Center for Watershed Protection: www.cwp.org

City of Toronto: www.city.toronto.on.ca.

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Ontario Ministry of Municipal Affairs: www.mah.gov.on.ca

Ontario Ministry of Natural Resources: www.mnr.gov.on.ca

Peel Region: www.region.peel.on.ca

The Toronto and Region Conservation Authority: www.trca.on.ca

Toronto Bay Initiative: www.torontobay.net

Toronto Environmental Alliance: www.torontoenvironment.org

US Environmental Protection Agency site about RAPs: www.epa.gov/glnpo/aoc

Water Information Network (WIN): www.h2info.org

Waterfront Regeneration Trust: www.waterfronttrust.com

York Region Municipality: www.region.york.on.ca

GLOSSARY

Barry Linetsky

ALG — **Aquatic Life Guideline:** The International Joint Commission's water quality guidelines or objectives, established for the protection of aquatic life.

AoC — **Area of Concern:** In 1985, the International Joint Commission (IJC)'s Great Lakes Water Quality Board identified 43 Areas of Concern (AoCs) around the Great Lakes where ecosystem degradation was particularly pronounced.

BU — **Beneficial Use:** Those human and non-human activities which are dependent on the chemical, physical and biological integrity of the waters of the Great Lakes system; the impairment of which is described under Annex 2 of the Great Lakes Water Quality Agreement (GLWQA).

CSO — **Combined Sewer Overflow:** In sewage systems which carry both sanitary sewage and storm water runoff, the portion of the flow which goes untreated to receiving streams or lakes because of sewage treatment plant overloading during storms.

Delisting — When beneficial uses have been restored in an Area of Concern, or all local sources of impairment have been eliminated in the AoC, the IJC, and the US and Canadian governments can agree to remove the AoC from the list of areas not meeting the objectives of the GLWQA. To date, one AoC has been delisted – Collingwood Harbour in Ontario.

GLWQA — **Great Lakes Waters Quality Agreement:** an agreement between Canada and the United States expressing the commitment of each country to restore and maintain the chemical, physical and biological integrity of the Great Lakes Basin Ecosystem. The GLWQA was first signed in 1972, and amended in 1978 and 1987.

IJC — **International Joint Commission:** the IJC was established under the Boundary Waters Treaty between Canada and the United States, in 1909. There are six Commissioners, three from the USA and three from Canada. The Commissioners act impartially, reviewing problems and deciding on issues regarding shared waters.

Impaired — A designation for a degraded Beneficial Use.

Listing/delisting guidelines — A set of guidelines based on the 14 use impairments identified in the GLWQA, developed by the IJC to provide guidance to the US and Canadian governments and AoCs for listing and delisting.

PWQO — **Provincial Water Quality Objective:** set by the Province of Ontario's Ministry of the Environment.

RAP **Remedial Action Plan:** A plan to be developed with citizen involvement to restore and protect environmental quality at each of the Areas of Concern in the Great Lakes Basin. The RAP will identify impaired uses, sources of contaminants, desired use goals, target cleanup levels, specify remedial options, schedules for implementation, resource commitments by state, provincial and the federal governments, municipalities and industries, and develop monitoring requirements to assess the effectiveness of the remedial actions implemented.

RFA **Requires Further Assessment:** A designation for a Beneficial Use when more information and/or analysis is needed to assess whether it is impaired.

WPCP **Water Pollution Control Plant:** sewage treatment plant

WWFMMP **Wet Weather Flow Management Master Plan:** a plan under development by the City of Toronto to control and manage storm-water and combined sewer flows and snow melt across the City.

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Beth Williston	*Toronto and Region Conservation Authority*
John Wilson	*Task Force to Bring Back the Don*
Lewis Yeager	*Rouge Park Alliance*

Ric Symmes

About the Waterfront Regeneration Trust

The Waterfront Regeneration Trust Corporation is a not for profit charitable organization that brings people, ideas and resources together for the revitalization of waterfronts and watersheds. Working with communities around Lake Ontario, the Niagara River, the US and abroad, the Trust links environmental, social and economic actions to create solutions that have multiple and long term benefits.

Under a Memorandum of Understanding with Environment Canada, the Ontario Ministry of the Environment, and the Toronto and Region Conservation Authority, the Trust has been a coordinator for the Toronto and Region Remedial Action Plan since 1997.

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Waterfront Regeneration Trust

- Why were Toronto's waterfront and watersheds put on a "black list" of Areas of Concern around the Great Lakes in 1987?
- What causes the beaches to be posted?
- Why are fish too contaminated to eat?
- What progress has been made since 1987?
- What are the priority actions to fully restore health to our waterfront and watersheds?

Clean Waters, Healthy Habitats provides an in-depth evaluation of these issues and the progress made since 1987 to develop and implement the Toronto and Region Remedial Action Plan. Some conditions have improved but there is still a long way to go to complete the clean-up and remove Toronto from the list of Areas of Concern.

A practical workplan of priority actions is recommended to restore environmental health and improve quality of life. The result – a clean, green, healthy environment – will be an important contribution to thriving communities that attract economic investment and meet the needs of residents and tourists alike.

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Environment Canada Environnement Canada Conservation Ontario