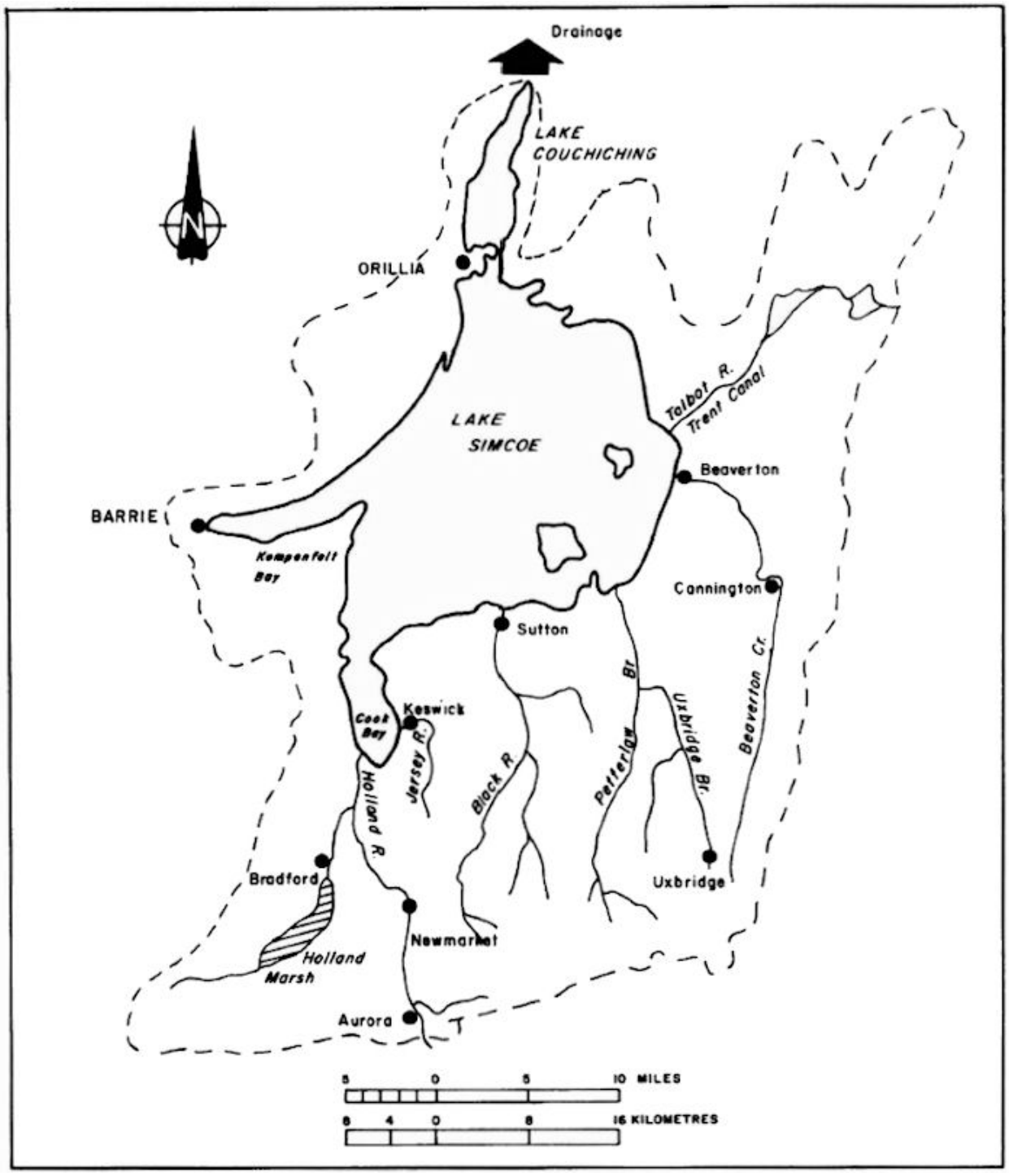
LAKE SIMCOE-COUCHICHING BASIN ENVIRONMENTAL STRATEGY

1979

LAKE-SIMCOE-COUCHICHING
REPORT COMMITTEE

LAKE SIMCOE-COUCHICHING BASIN
ENVIRONMENTAL STRATEGY

1979



MAP OF LAKE SIMCOE - COUCHICHING DRAINAGE BASIN

TABLE OF CONTENTS

FIGURES

SUMMARY

ENVIRONMENTAL STRATEGY FOR THE LAKE SIMCOE-COUCHICHING BASIN

SUMMARY

In the early 1970's, the Ontario Ministry of Environment undertook a water quality evaluation of Lake Simcoe. The results of the 4-year study were documented in a 1975 report entitled Lake Simcoe Basin - A Water Quality and Use Study. This report concluded that the general water quality of Lake Simcoe was good, but that there was evidence of water quality problems which could be related to man's activities in the watershed.

During the same period (early 1970's), the Ontario Ministry of Natural Resources, through its fisheries program, established the fact that significant changes in the Lake Simcoe fishery were becoming apparent. A decline in the cold-water fishery was of particular concern.

At the same time, local residents and cottagers on Lake Simcoe were expressing concern that the quality of the lake was in jeopardy. In light of local concerns and recent data from the Ministries of Environment and Natural Resources, the Township of Georgina sponsored a one-day conference at Keswick (September, 1975). Councillor Shillington, who arranged the conference, received considerable support for the need to deal with the environmental matters in a co-ordinated, influential manner. A number of meetings and discussions subsequent to the "Keswick Conference" resulted in the formation of two committees - the Lakes Simcoe-Couchiching Report Committee and the Lakes Simcoe-Couchiching Steering Committee. The memberships of these two Committees are detailed in APPENDIX B. The Report Committee was directed by the Cabinet Committee on Resources Development (CCRD) to: a) assess the types and magnitude of environmental problems in the Lake Simcoe-Couchiching area; b) identify the causes of these problems; and, c) propose a strategy for dealing with the problems. After consultation with the Steering Committee, the final report was to be forwarded to CCRD for review and direction.

The Report Committee met during 1977 and 1978. Also, there were meetings of the Steering Committee during this period, as well as joint discussions between the two Committees. The tasks of the Committees were divided into five phases, with a chapter of the final report relating to each phase.

Chapter 1 - BACKGROUND INFORMATION

Chapter 2 - PROBLEM IDENTIFICATION

Chapter 3 - ALTERNATIVE ENVIRONMENTAL DEVELOPMENT STRATEGIES

Chapter 4 - "COSTING" OF MANAGEMENT ALTERNATIVES

Chapter 5 - ENVIRONMENTAL STRATEGY AND IMPLEMENTATION

The following is a summary of the findings and recommendations of the Report Committee.

Chapter I - BACKGROUND INFORMATION

Lake Simcoe, along with Lake Couchiching, is the largest body of water in Southern Ontario excluding the Great Lakes. The lakes have a combined water area of 775 square kilometers (300 square miles), with a land area of 2425 square kilometers (940 square miles) draining into the lakes.

Lakes Simcoe and Couchiching have, for decades, served as a very important recreational resource. Reasons for the high recreational value of this area include clear water, good fishing (winter and summer), proximity to the Metropolitan Toronto urban complex, and the fact that the lakes are located on the Trent-Severn Waterway which can be travelled by boat from Georgian Bay to Lake Ontario. Looking at one aspect of the recreational importance of this area, namely the fishery, statistics reveal that Lake Simcoe supplies 15% of the angler recreation in the Province and that fishery generates about 13.6 million dollars in cash flow each year.

The lands which drain into Lakes Simcoe and Couchiching support a number of urban communities, as well as extensive and diverse agricultural activities including the well-known Holland Marsh market-gardening area. The permanent basin population is approximately 190,000 people. About 65% of the watershed population (120,000) lives in urban areas, and 45% (70,000) in rural areas. The four largest urban areas are Barrie, Orillia, Aurora and Newmarket. Ten of the urban areas are supplied with communal sewage systems which discharge treated sewage to Lake Simcoe or to one of the tributaries entering the lake. In addition to the permanent population, some 12,000 cottages surround Lakes Simcoe and Couchiching. Current population projection indicates a future population of 450,000 people.

Chapter 2 - PROBLEM IDENTIFICATION

The Report Committee found that while the general water quality of Lakes Simcoe and Couchiching adequately meets most recreational pursuits, there are several significant environmental problems. The major overall problem is that population growth in the Basin, with associated urbanization and land-use activities (e.g. agriculture), has resulted in excess nutrient material, in particular phosphorus, being released to the lakes. Periodic algae scums, shoreline growths of attached algae, localized weed problems, and localized turbidity problems are all a result of increased loadings of phosphorus to the lakes. As well as the aesthetic problems brought about by increased growths of aquatic plants, the increased level of plant decomposition in the bottom layers of Lake Simcoe results in depressed levels of dissolved oxygen. Every year, prior to fall mixing of the lake, the level of dissolved oxygen in the cold bottom waters falls to between 1 and 3 mg/L. This low level of dissolved oxygen is lower than the minimum level of 4 mg/L which is required to ensure a healthy, self-reproducing cold-water fishery. It should be pointed out that the existing unfavourably

low oxygen levels relate substantially to the natural shape of the lake basin (small ratio of "bottom water" to "surface water"); however, recent increased phosphorus loadings have aggravated the situation significantly. (By promoting a greater production of biomass that will ultimately die, sink to the lakebed and decay, consuming oxygen).

The Report Committee found that the recent changes in the Lake Simcoe fishery are large, and warrant considerable concern. The whitefish population is drastically reduced and could be on the verge of extinction, the lake-trout population requires heavy stocking to maintain its status, and less desirable species such as yellow perch and smelt have greatly increased in recent years. Changes in the fishery could not be attributed to a single factor. Water quality deterioration, fishing pressure, the introduction of smelt, and habitat deterioration are contributing factors. The alteration in water quality resulting from increased phosphorus loads is thought to be the most significant factor.

Because of the significance of phosphorus loadings in affecting water quality and thus influencing the fishery, the Committee determined the relative significance of each phosphorus source:

		Metric Tonnes Per Year
1)	tile field leakage - cottages	3
2)	precipitation	21
3)	rivers under natural watershed conditions	26
4)	urban storm waters	9
5)	agriculture and other land-use disturbances	22
6)	sewage treatment plant effluents (with P removal to 1 mg/L)	22
	Total	103

The existing total phosphorus load to Lake Simcoe is estimated at 103 metric tonnes per year. It is apparent that urbanization as well as agricultural activities and other land-use disturbances, result in substantial phosphorus loads to the lakes. The Report Committee also found that in addition to the defined phosphorus sources, there were other environmental problems and activities in the watershed which had either a direct or indirect impact on the water resources, and on the Basin environment in general. Important marsh and wildlife areas are being encroached upon; forested areas are being diminished, mining activities, if poorly managed, represent a threat to the ground water resource; and sensitive ecological areas (e.g. fish spawning grounds) are being threatened. All of these factors cumulatively affect the basin environment and the water resources and hence require careful management.

Chapter 3 - ALTERNATIVE ENVIRONMENTAL DEVELOPMENT STRATEGIES

The Report and Steering Committees initially considered three alternative strategies:

1) maintain existing environmental quality (i.e. maintain present water quality, fishery, and general basin environment)

2) improve environmental quality

3) allow environmental deterioration

Both Committees agreed that option #3 was unacceptable as it is contrary to existing provincial policy and local desires and hence only options 1 and 2 were assessed in detail.

Option 1 - Maintaining Existing Quality

A strategy to maintain existing quality would require the application of additional environmental controls and additional expenditures, as the environmental impact from existing plus new developments would have to be equal to the overall impact from existing developments. With respect to the phosphorus load to Lake Simcoe, this would have to be maintained at 103 metric tonnes per year as the population increases from 190,000 (existing) to 300,000, to 450,000 after the turn of this Century. To maintain the 103-tonne loading, the loading from each of the three major phosphorus sources, namely sewage plants, urban storm water, and agriculture, would have to remain constant as the Basin population more than doubles. With respect to sewage plants, this would mean additional chemical dosages for improved phosphorus removal, likely effluent filtration, and perhaps the installation of flow-equalization tanks. Keeping the phosphorus load from urban drainage constant would entail the application of comprehensive storm water management systems for new urban developments, (e.g. sedimentation basins with chemical treatment) as well as improved control over existing urban areas (e.g. street sweeping). Regarding the phosphorus impact of agricultural activities, the Committees had difficulty in deciding whether or not the agricultural impact would change in future. However, it was concluded that even with the uncertainties about future agricultural impact, certain definable problems exist such as excess nutrients from the Holland Marsh, improper manure management and excess fertilization.

The option of "maintaining" would result in an abundance of warm-water species in Lake Simcoe, and a precarious cold-water fishery. The whitefish population which appears to have collapsed will likely be extinct by the turn of the century. The lake trout population might be maintained through stocking. To protect fish habitat, activities in shallow water and inshore areas should be minimized, and greater control over wetland destruction, dredging and land filling should be exercised.

In order to maintain the general environmental quality of the watershed, there would have

to be additional attention given to pits and quarries, sensitive recharge areas, wildlife habitat, forested areas and recreational opportunities.

Option 2 - Improving Environmental Quality

An improvement in environmental quality would result in the elimination of algal scums on the lakes, decreased weed growth, improved water clarity in some areas, and a more stable fishery with healthy, self-reproducing populations of whitefish and lake trout. These conditions could progressively be achieved by reducing the total phosphorus load to Lake Simcoe from 103 metric tonnes. Only at a loading of 75 metric tonnes could we achieve a self-reproducing cold-water fishery. To achieve this reduction in phosphorus loading, immediate attention would have to be given to improved sewage treatment, as well as the treatment of existing urban drainage; these actions would have to be taken at the existing population level of the Basin. As the population advances from 190,000 to 300,000, some of the treated sewage now entering the Basin (e.g. from Barrie or Orillia) would have to be diverted to another Basin and new improved technology would have to be employed to minimize phosphorus loadings from agricultural sources and urban drainage. To maintain the loading of 75 tonnes as the population advances from 300,000 to 450,000 would be very difficult technically.

To improve the cold-water fishery, fish habitat areas would have to be improved, whitefish would have to be reared and temporarily stocked to restore the population, a program to increase harvest pressure on smelt and possibly yellow perch would have to be undertaken.

In order to improve other environmental aspects of the watershed, the following would be required:

- protection, improvement and purchase of important wildlife areas
- improved environmental control over pits and quarries
- improved legislative control of forested areas
- improved recreational facilities, etc.

Chapter 4 - COSTING OF ENVIRONMENTAL DEVELOPMENT STRATEGIES

The Report Committee experienced considerable difficulty in applying costing figures to some of the development - strategy options. However, "ball-park" figures were formulated in order to place the options into some type of economic perspective. The costing of the two strategy options, maintaining and improving, were assessed. It should be noted that all costs in the report are additional to normal existing expenditures.

a) Costs of Maintaining Existing Quality

To maintain existing environmental quality, the total annual cost would be roughly $3,000,000 (present value) when the Basin population reaches 300,000 people, and roughly $7-8,000,000 when the Basin population reaches 450,000 people. Relating this cost to a household basis, the costing would be as follows:

- $60 per year for each household (or residence) of the Basin as the population expands from 190,000 to 300,000.

- $100 per year for each Basin household as the population expands from 300,000 to 450,000.

One half of these expenditures would be used for urban drainage control, about one quarter for improved sewage treatment, and the remaining one quarter for other activities including fisheries management, agricultural controls, improved wildlife habitat, forestry management etc.

b) Costs of Improving Quality

To improve quality, additional monies would have to be spent immediately on sewage treatment, urban drainage, the fishery, agriculture, etc. These costs, at the existing population level of 190,000, would total $150 per basin residence per year. (Basin cost of $4-5,000,000 per year). The costing for population levels of 300,000 and 450,000 could not be determined. However, the costs would obviously be large as new, improved technology would have to be employed.

The following table summarizes the costs:

	MAINTAINING EXISTING CONDITIONS $/Basin Residence/Yr.		
	190,000 (existing)	300,000	450,000
sewage treatment	0	13	23
urban drainage	0	30	50
other programs	*	17	27
		60	100
	IMPROVING EXISTING CONDITIONS		
	190,000	300,000	450,000
sewage treatment	40	Could not be Costed	
urban drainage	70	Could not be Costed	
other programs	40	Could not be Costed	
	150		

* Although precise estimates are not available, some funds are necessary to initiate further studies and some strategy recommendations. For example, increased fisheries assessment and management would involve an expenditure of $150,000-$200,000.

It must be emphasized that the above costs by no means represent the total cost of development. There are other "spin-off" effects (e.g. lot levy increases, cost of revisions to local planning documents, etc.).

Chapter 5 - ENVIRONMENTAL STRATEGY AND IMPLEMENTATION

Environmental Strategy

There was considerable discussion, within the Report Committee, as to which of the two strategy options should be recommended to the Province. Most members of the Report Committee felt that the option of "improving" would not be advisable because of the socio-economic implications.

On June 27, 1978, the Report Committee formally presented its findings on Chapters I - IV to the Steering Committee. The Steering Committee expressed its opinion that maintaining existing quality be recommended to the Province. However, the Steering Committee stated that this option should not preclude efforts to correct localized problems, and requested a target loading of 95 rather than 103 metric tonnes.

The Report Committee selected the option of "maintaining" as the environmental strategy. However, the Ministry of Natural Resources stated that the "improving" option would be in agreement with their management goal for Lake Simcoe. The goal is to create a rehabilitated fish community which is stable, diverse, naturally reproducing and dominated by top predators. The "maintaining" option would not be in harmony with the aims of MNR as outlined in the "Federal-Provincial Strategic Planning for Ontario Fisheries - SPOF", and this option does not adequately meet the requirements for the most sensitive use of the water basin, the fisheries. Also, while the South Lake Simcoe Conservation Authority supported the "maintaining" option, the Authority emphasized the need to correct localized problems as per the recommendation of the Steering Committee. In summary, there was a general preference for Option 1 of maintaining existing environmental quality.

Implementation and Co-ordination

The Steering Committee recommended the formation of a special Implementation and Co-ordination Committee made up of local elected officials plus appropriate government agencies, with a permanent secretariat (with joint provincial-municipal funding) working under the guidance of the Committee.

The Implementation Committee would keep abreast of activities and environmental quality of the Basin, and would deal directly with the agencies involved in Basin activities and quality.

The Report Committee considered this recommendation and several other options. Considerable thought was given to the option of having a special Implementation Body

instead of utilizing the existing agencies and legislation to carry out the strategy. It was agreed that existing agencies had adequate jurisdiction and legislation to enforce the various parts of the strategy and therefore, were a logical mechanism for strategy implementation. There were mixed feelings, however, as to whether or not the strategy would, in fact, be adequately co-ordinated without a clearly defined or designated mechanism. The need for effective co-ordination of the strategy implementation was emphasized repeatedly. This concern stemmed from the fact that the fragmentation of environmental management between ministries and the local municipal level was precisely the concern of the local municipalities that led to the request for the development of this strategy. The Cabinet Committee On Resources Development (CCRD) emerged as a preferred best choice and is therefore recommended.

LAKE SIMCOE-COUCHICHING BASIN STRATEGY REPORT

INTRODUCTION

Lake Simcoe, along with Lake Couchiching, is the largest body of water in southern Ontario excluding the Great Lakes. The combined watershed area covers 3200 square kilometers (1240 square miles). Considering the two lakes' natural amenities and their prime geographical location, there has been a steadily increasing demand on their capacity for swimming, fishing, cottaging, boating, camping and other summer and winter recreational pursuits. The area is also subject to development pressures due to the proximity to the Metropolitan Toronto urban complex and decentralization policies of the provincial government. Many of the municipalities within the basin are experiencing, and will continue to experience substantial growth pressure.

In recent years, there has been visual evidence of water-quality deterioration. Recent changes in Lake Simcoe include algae scums, attached algae in inshore areas, and a deterioration of the fishery. Because of these changes in Lake Simcoe and the possibilities of further environment aggravation resulting from population growth, municipalities in the basin established a committee of municipal representatives to review and act on programs and policies pertaining to the protection of the resource. The committee chaired by Georgina Councillor Howard Shillington presented, through member municipalities, a resolution calling for a strong co-ordinated program of pollution control for the basin as a whole.

In response to the concerns indicated in the resolution, the provincial government, with agreement from area municipalities, established a Report Committee with technical staff representation from the Ministries of the Environment, Natural Resources, Agriculture and Food, Industry and Tourism, Housing, Treasury, Economics and Intergovernmental Affairs, and representatives from CORTS, the South Lake Simcoe Conservation Authority and some Regional, County and local governments to prepare an environmental development strategy using primarily existing studies and accepted standards and to co-ordinate the application of existing legislation in the Simcoe-Couchiching Basin as it applies to land use and environmental quality. A Steering Committee composed of representatives of area municipalities was established to work with the Report Committee on the formulation of the Environmental Strategy.

The format of this report follows the terms of reference (Appendix A) for the Lake Simcoe-Couchiching Report Committee with modification as suggested by the Steering Committee chaired by Councillor Howard Shillington and approved by the Cabinet Committee for Resources Development. The chapters in the report are Background Information, Problem Identification, Alternative Environmental Development Strategies, Costing of Environmental Development Strategies, and Environmental Strategy and Implementation.

CHAPTER 1

BACKGROUND INFORMATION

This review of background information is directed at three concerns: population, environmental policies and government legislation. This review has been limited to existing information.

1.1 POPULATION

The estimated population figures are listed on two tables. Table 1 shows the 1976 estimated population and long-term population targets in each municipality within the Lake Simcoe-Couchiching Basin. Table 2 shows the 1975 assessed population, interim targets or expansion capacity and long-term targets for communities in the Basin that are serviced or are likely to have some form of municipal piped services.

Table 1 indicates that the Basin had approximately 186,800 permanent residents at the end of 1976. The long-term potential population of the Basin is approximately 453,000. These figures are based on long-term population targets or possibilities in the Simcoe Georgian Task Force Report, current York Region Official Plan studies, and background papers for the Durham Official Plan.

These figures are entirely based on staff estimates of the proportion of current and future permanent population from any municipality in the Basin. As such, the accuracy of any individual figure on Table 1 could be questioned, but the aggregate figures should indicate the general magnitude of population. The population estimates were also reviewed by the Steering Committee. A certain degree of accuracy should be expected because the major urban areas having the majority of population (i.e. Barrie, Orillia, Bradford, Aurora, Newmarket, Uxbridge and Beaverton) are almost entirely located within the Basin.

Table 2 indicates that the majority of existing population in the Basin (65%) is located in community-serviced areas (water and/or sewage). In the future, this proportion could increase to approximately 62% based on current commitments.

Regarding seasonal dwelling units, it is estimated that the existing shoreline cottages total approximately 12,000. These dwelling units presently contribute to the pressures on the Lakes. The conversion of these units will undoubtedly account for a significant proportion of the permanent - population growth in these areas.

A 1972 Cottage Survey of Georgina Township indicated that cottages were being converted into permanent dwellings on a continuing basis and that the proportion of permanent dwellings compared to cottage units was growing each year. It can now be estimated that between 1966 and 1971, some 17% of all cottages in Georgina Township were converted

TABLE 1. Estimated Population Figures in Basin.

County Or Region	Municipality	1976 [1,2]	Long-term Targets [1,3]
Simcoe	Barrie	34,050	125,000
	Orillia	23,950	80,000
	Bradford	5,200	12,000
	Innisfil	10,500	29,450[4]
	Mara	3,350	9,500
	Orillia	4,950	8,000
	Oro	4,250	7,700
	Rama	450	850
	Vespra	250	500
	W. Gwillimbury	2,700	3,900
	Tecumseth	400	800
York	Aurora-Newmarket	13,150)	68,000
		24,700)	
	E. Gwillimbury	10,550)	
	Georgina	18,200)	65,000
	King	6,900)	
	Whitchurch- Stouffville	3,150)	
Durham	Brock	8,050	20,500
	Scugog	100	200
	Uxbridge	10,000	19,500
Victoria	Bexley	50	50
	Garden	50	50
	Eldon	1,050	1,150
	Laxton, Digby, Longford	50	50
	Mariposa	200	200
	Woodville	550	600
	TOTAL	186,800	453,000

1. Based on Staff Estimates of Proportion of Municipality Population in Basin

2. Based on Assessment Data

3. Based on Simcoe-Georgian Task Force (2011), York Official Plan Studies (2001), Durham Discussion Paper No. 4 (unofficial) (2001) and staff estimates.

4. Based on official plan of Innisfil Planning Area and on Simcoe-Georgian Task Force (2011).

TABLE 2. Community Serviced Areas.

Communities	1975 Population (Permanent)	Interim Targets Or Expansion Capacity	Long-term Targets	Source
Barrie	33,399	75,000	125,000	SGTF
Orillia	23,911	50,000	80,000	SGTF
Mara (Bayshore, Lagoon City, Brechin)	300	4,000	5,000	SGTF
Innisfil (Alcona & Waterfront)	4,000	9,000	(17,100)[1]	Innisfil O.P. and SGTF
Bradford	4,566	12,000	12,000	SGTF
Aurora-Newmarket (are scheduled to York Scheme)	32,500	55,000	68,000	York Official Plan Studies.
Sharon	660	2,600	n/a	Com. Pl.
Mt. Albert	860	3,600	n/a	York Reg. Staff
Holland Landing	2,700	3,700	n/a	"
Schomberg- Lloydtown	877	2,500	n/a	York R. Staff
Sutton	3,300	(8,000)[2]	n/a	"
Keswick	7,600	20,000	n/a	"
Uxbridge	3,350	(7,000)[3]	7,000	Durham O.P.
Beaverton	1,650	(7,000)[3]	7,000	"
Cannington	1,300	(3,000)[3]	3,000	"
Sunderland	900	(2,500)[3]	2,500	"
	121,873	264,900	367,000[4]	

NOTE: Figures in parentheses are assumptions due to lack of data.

1. Long-term population figure for Alcona Beach (Proposed Official Plan)
2. Existing servicing capacity and York Region Staff.
3. Long-term targets (Durham Official Plan).
4. Includes Interim Targets where Long-Term Targets not available.

to permanent year round use. This represents an average annual rate of 3.4% or about 140 dwelling units every year. Projecting the Georgina figures to the basin total of 12,000 cottages, the conversion rate approximates slightly more than 400 units per year or about 1500 people per year.

1.2 EXISTING ENVIRONMENTAL POLICIES (REGIONAL AND MUNICIPAL LEVEL)

The environmental policies are generally from official plan documents including background reports and the Simcoe-Georgian Task Force Report. The local Official Plans themselves are of varying age and status. The oldest plan was prepared before 1960 and some of the newer plans have not received provincial approval. The Durham Regional Plan was recently approved by the Province, although many sections including the Pits and Quarries Policies have been referred to the Ontario Municipal Board.

Most of the documents take the position that large scale urban development requires full municipal services. Furthermore, all development should be subject to the approval of the appropriate environmental agencies. Some residential development will however be permitted on individual septic tank systems.

Two other principles seemed to underlie most of the documents: (1) wherever possible the rural character of rural municipalities should be retained (especially by providing for rural development only at a low density so that piped services are not required) and (2) all municipalities should seek to achieve orderly development.

There is a variety of approaches to the conversion of seasonal residences to permanent dwellings in these documents. Some official plans prohibit permanent-residential use in waterfront areas; others recognize existing permanent-residential use and discourage any additional conversion; others appear to be inclined to recognize permanent-residential use in waterfront areas with servicing restrictions. The more recently prepared plans make reference to the preparation of a Waterfront Plan (Durham) and the protection of hazard lands, environmentally sensitive areas, etc.

1.3 GOVERNMENT POLICIES AND LEGISLATION (PROVINCIAL LEVEL)

There are numerous pieces of legislation and policy at the provincial level which regulate the environmental implications of development on the Lake Simcoe-Couchiching Basin.

a) South Lake Simcoe Conservation Authority -

The South Lake Simcoe Conservation Authority is a corporate body established and operating under the Conservation Authorities Act. The Conservation Authority regulates land-use and development activities primarily as they affect flood-plain areas and secondly, the total watershed. Hazard lands, flood-prone areas, ground-water recharge areas, source areas and

sensitive areas are identified by the Conservation Authority for management. Assistance is provided for erosion control projects, grassed waterways, tree planting and other Conservation measures.

b) Ministry of the Environment -

The Ministry operates basically under four acts - Ontario Water Resources Act, Environmental Protection Act, Pesticides Act, and Environmental Assessment Act. The O.W.R. Act provides penalties for impairing water resources, and also provides for the approval and development of municipal servicing works. The E.P.A. covers water-quality impairment, marina and boating operations, and waste management. The Pesticides Act regulates the use of pesticides, and the E.A. Act provides for a formal environmental review process for undertakings which have significant environmental impacts. In addition to these Acts, the Ministry has established stringent requirements on the Simcoe-Couchiching Basin for new and upgraded sewage treatment plant discharges (phosphorus concentration reduced to 0.3 mg/L) and urban storm waters (management required for larger developments).

c) Ministry of Natural Resources -

The Ministry operates under several acts. The Game and Fish Act deals with the management of the wildlife resource (open seasons, bag limits, etc.). Ontario fishing regulations are made under The Fisheries Act. The Lakes and Rivers Improvement Act deals with alterations to stream beds. The Parks Assistance Act provides for the establishment of public parks. The Forestry Act, Trees Act and Woodlands Improvement Act provides for the development, management and improvement of treed areas. The Public Lands Act covers numerous legal aspects of Crown lands ranging from the disposition of Crown land, to the administration and control of dams. The Beach Protection Act controls the removal of sand and other material from waterways. The Beds of Navigable Waters Act requires that authorization from the Ministry is required for any activity in crown-controlled water areas. The Provincial Parks Act provides for provincial parks and their management. Regarding mineral resources, the Mining Act and the Pits and Quarries Control Act regulates the licencing of the extractive industries.

d) Ministry of Agriculture and Food -

The Ministry's paper "A Strategy for Ontario Farmland" outlines a commitment to maintain the best-suited agricultural lands for agriculture. The Government Policy document, The Food Land Guidelines, assists municipalities in planning for ongoing agriculture. The Agricultural Code of Practice was adopted to manage the livestock industry on a proper environmental basis. The Drainage Act provides for the approval and funding of land-drainage projects.

e) Ministry of Industry and Tourism -

The Ministry has identified the Lake Simcoe area as an important region for tourism development in its "Framework for Opportunity", guide for tourism development in the Province.

f) Ministry of Housing -

This Ministry approves long range municipal planning documents official plans - and provides general planning advice to municipalities. The Ministry exercises its planning approval authority under the provisions of The Planning Act. Financial incentives to qualifying local municipalities are available from the Ministry to assist in the preparation of official plans and other planning documents and studies through the Ministry's community planning grant program.

g) Canada-Ontario Rideau-Trent-Severn (CORTS)

CORTS was established to plan and coordinate governmental action for the future development of the corridor of which Lakes Simcoe and Couchiching are a part. A report on Lakes Simcoe and Couchiching was prepared in 1973 containing 29 recommendations specific to that area. The recommendations are being considered on a priority-implementation basis. A key recommendation was that the publicly-owned shoreline land be increased from 5% to at least 15%.

CHAPTER 2

PROBLEM IDENTIFICATION

The existing population (1976) in the basin is 186,800 and is projected to increase in the long term to 453,000. If this increased development on the lands draining to the lake system is not carefully planned, the lakes, and tributary streams and the watershed will experience significant degradation. The prime concern is Lake Simcoe, as most of the major population and development occurs in or drains to that basin. The issue is environmental quality, including water quality, fish and aquatic life and wildlife, for it is the preservation or enhancement of those features which is critical to most uses of the lake.

2.1 BASIN-WIDE WATER QUALITY PROBLEMS

Introduction

In order to assess present water quality conditions in the basin and to determine those factors influencing the management of Lake Simcoe water resources, the Ontario Ministries of the Environment and Natural Resources carried out intensive field surveys over a five-year period (1970-1974). These studies included chemical and physical quality and aquatic biology field surveys, as well as a cottage questionnaire and personal interviews. A report of the investigations, entitled "Lake Simcoe Basin - A Water Quality and Use Study", was published in June 1975. This report provides an insight into the features and problems of the aquatic environment and is part of the technical basis for this current study.

Water Quality surveillance programs for the lake and tributary streams have continued following completion of the intensive studies and data from these ongoing long-term monitoring programs will identify trends in water quality.

The various water quality investigations and the Ministry of Natural Resources monitoring, indicate that Lake Simcoe can be rated as generally good for recreational use. For most purposes, including human consumption (with appropriate treatment), the basic water quality of Lake Simcoe is quite suitable. However, there are unmistakable signs of problems which require appropriate remedial and control measures. The following summarizes the types, extent and location of these problems.

2.1.1 Algae and Rooted Aquatic Plants

Since 1971, several blue-green algae scums (*Anabaena*) have occurred during periods of calm, sunny weather. Within the past decade, there has been an increase in the occurrence of filamentous plants or algae, primarily *Cladophora*, attached to rocky shorelines, docks, and other hard surfaces. The bright green *Cladophora* grow in filaments ranging from one inch to several feet.

Locally, weed beds have always been prevalent in calm, shallow bay areas such as Cook, Shingle, McPhee, Barnstable and Carthew Bays. However, increased weed growth has occurred recently in some areas, particularly Cook Bay, in late summer and early fall.

The occurrence of excessive plant growth represents aesthetic degradation, interferes with recreational and water supply uses and contributes to the dissolved oxygen problem, and problems with the coldwater fishery.

The factors contributing to the increasing plant growth include:

(a) Increased nutrient loading to the lake as result of increased urbanization, other land uses and inputs from the air.

(b) Bay areas in general and southern Cook Bay in particular offer ideal bottom for weed growth: they are shallow, sheltered and muddy. With respect to attached algae, the natural high alkalinity of the water (pH 8.3), as well as the many shallow inshore areas with hard stable substrate (rocky) are ideal conditions for the growth of these plants. Fixed structures such as piers and groynes also present ideal conditions.

2.1.2 Dissolved Oxygen Depression in Deeper Zones

The level of dissolved oxygen in the bottom (hypolimnetic) waters (i.e. waters deeper than 60') drops as low as 1 to 3 mg/L just prior to fall (September - October). (The M.O.E. dissolved oxygen criteria for cold-water fish is 6 mg/L). The area of oxygen depression underlies about ⅓ of the lake's surface and occupies about 1/5 of the lake volume (Figure 1). However, surface waters are rich in oxygen and exhibit no problems.

Comparative studies of the organisms on the lake bottom in the deep part of Lake Simcoe in the late 1920's and again in 1970 reveal considerable changes. In general, the population has changed from a dominance of midge-fly larvae which require more dissolved oxygen and are good fish food, to a dominance of worms which require less dissolved oxygen and are less desirable in terms of fish food.

Some of the causes leading to these low dissolved oxygen levels include:

(a) The utilization of oxygen from the hypolimnetic waters by unstable organic materials contributed by decaying aquatic weeds and algae, municipal wastes, septic tank wastes, and other organic debris carried to the lake by tributary streams and overland agricultural drainage.

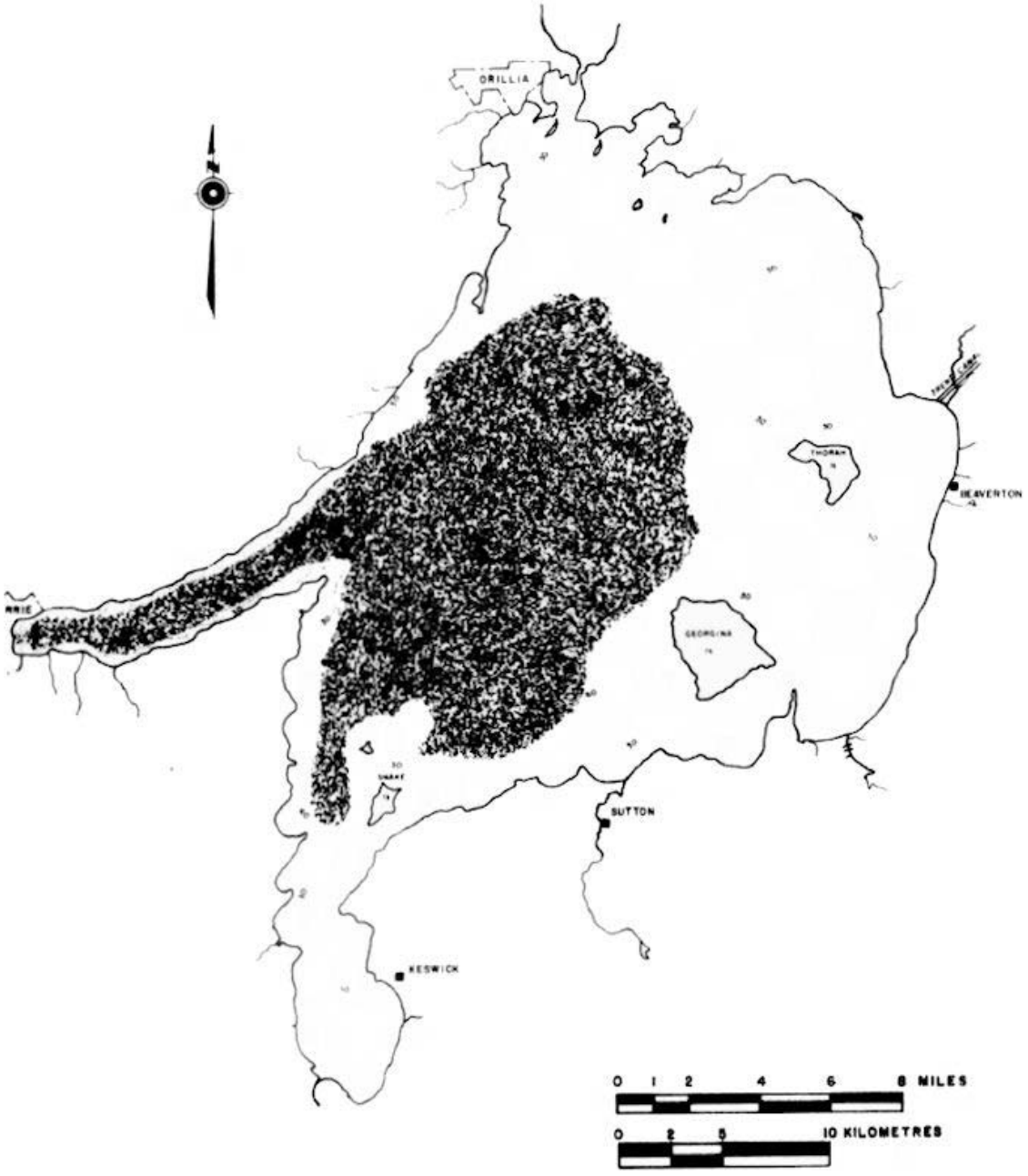


FIGURE 1. Illustrating The Area of Lake Simcoe (~ ⅓ of Lake) Bottom Water Zone With Low Oxygen Values (1-3 mg/L) During Late Summer.

(b) Lake Simcoe has a small volume of cold bottom water (20%) and therefore oxygen resources are limited. Because of the funnel shape of the lake bottom it is believed that decaying organic material migrates to this area.

(c) The natural process of thermal stratification (in deeper lakes) during summer prevents vertical mixing of the warm, oxygen rich surface waters with the colder, denser bottom waters.

2.1.3 Turbidity (Suspended Algae and Sediment in Water Column)

Overall, Lake Simcoe is considered to be fairly free of material suspended in the water, with a mean surface turbidity reading of 3 J.T.U. (Jackson Turbidity Units) and a low average chlorophyll a reading of less than 3 µg/L. It falls into the general category of lakes considered mesotrophic, or moderately enriched with nutrients with an average secchi disc reading of 4 metres. In the shallow southeast near-shore areas and in southern Cook Bay, suspended particles and algae become sufficiently dense to noticeably reduce water clarity. Secchi disc readings in these areas are only 1 to 2 metres and the mean turbidity level at the mouth of the Holland River is 10 J.T.U. In addition, the chlorophyl a levels in South Cook Bay are high, ranging from 3.5 to 12.0 µg/L, and Southern Cook Bay is hence regarded as being eutrophic.

Elevated turbidity levels may cause problems with respect to swimming, aesthetics, private water supply and navigation in localized areas of the lake identified above.

The principal factors leading to the reduced clarity include the concentrations of the earlier mentioned free-floating algae in southern Cook Bay which are high enough to substantially reduce water clarity. Nutrient inputs from the Holland River are a major cause of this problem. Sediments introduced by the tributaries and shore erosion also contribute to this problem. In addition fine sediments (clay) are raised in suspension by wave action in the shallow, exposed eastern or southeast inshore areas.

2.2 WATER LEVELS

There have been complaints by boaters and marina operators, every year after Labour Day, about the lowering of lake levels and the consequential problems with respect to navigation in such shallow water areas as the central western shore of Cook Bay and possibly other shallow areas such as Duclos Point.

In the period of 1910-1920, lake-level control structures were installed near Washago. These control structures have been under similar operating procedures for the past 50-60 years. The operating objectives on maintaining the summer lake level 14 inches above the winter level are normally achieved, although extreme weather conditions can result in greater fluctuation.

The lake levels must be lowered in the September - November period to accommodate inflow

during the spring thaw and prevent flooding of low areas.

2.3 FISHERY CHANGES

Prior to 1960, a relatively stable cold-water fish community existed in Lake Simcoe. Since then the lake's cold-water fish populations (whitefish and lake trout) have undergone a dramatic decline, while the warm-water fish populations have thrived. Cultural eutrophication resulting from nutrient loading and subsequent habitat deterioration is considered to be the most significant factor affecting the stability of the lake's fish populations. The effect of smelt, exploitation and contaminants are not discounted, but they are considered to be less significant stresses than water quality degradation. Unless conditions in the lake are improved, we can expect to lose the lake's cold water fishery.

In 1975, the estimated adult whitefish population was 516,000 fish, a decline of 50% since 1972 and an 85% decline since 1962. Lake trout have undergone a similar decline but have been artificially augmented. Commencing in 1977, the Ministry of Natural Resources committed themselves to a ten year lake trout rehabilitation program with *an* annual stocking rate of 100,000 yearlings. Previous stockings (1960's to early 1970's) were contributing 68% to the trout populations by 1977. Trout, less than six years old were comprised of 86% hatchery fish. It is now quite evident that successful natural reproduction by both lake trout and whitefish has been severely curtailed since 1970.

The decline of the quality of angling for cold-water species in Lake Simcoe in recent years is illustrated as well by the fact that the winter angler harvest for whitefish has reduced from an estimated 169,380 fish in 1968 to 3,650 in 1977 (Figure 2). Between 1965 and 1977, the average number of man-hours required to catch a whitefish in winter increased about 50-fold from 2.6 man-hours to 133.3 man-hours. Between 1968 and 1974, the average number of man-hours required to catch a lake trout in summer increased 144% from 55.3 man-hours to 135.2 man-hours. However, there have been recent improvements in catch success for lake trout, largely resulting from the increased contributions of hatchery fish to the population.

For the warm-water fish, the trend has been exactly the opposite (Figure 2-yellow perch). The man hours required to catch a fish of any species between 1968 and 1974 held constant at 1.2 in summer and actually decreased 18% from 1.7 to 1.4, in winter. However, by 1976, yellow perch accounted for 60% of the fish caught in the winter fishery.

Lake Simcoe is one of the most important lakes for recreational fishing in the Province of Ontario. It provides 1.6 million angler days and generates 13.6 million dollars annually. In 1977, the fishery provided angling opportunities for 67,000 winter fishermen and 46,000 summer fishermen. In 1975 the lake provided about 15% of the angler recreation in the province. Changes in the fishing success, the quality of angling, and the instability of the fish community are very real biological concerns.

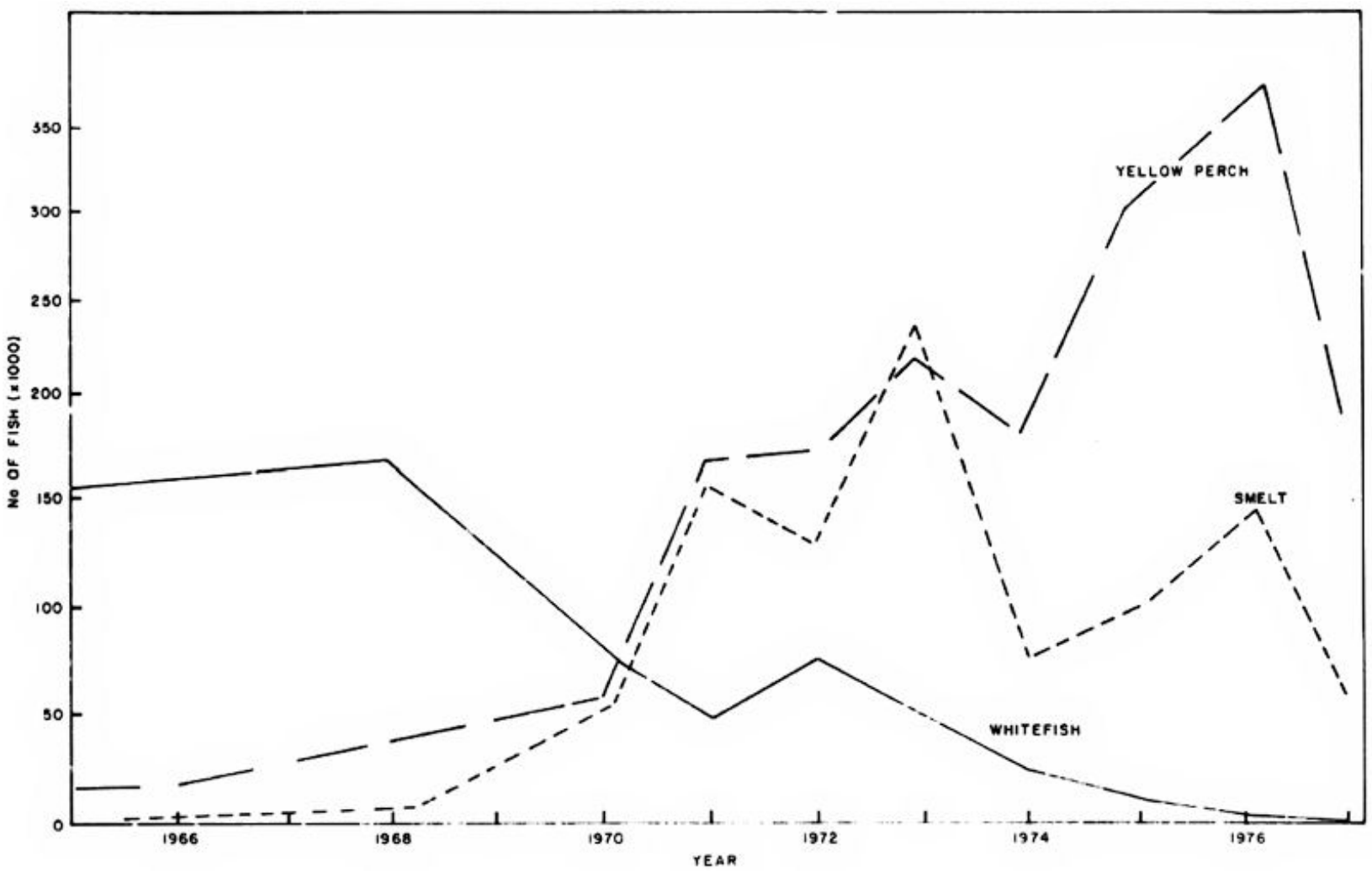


FIGURE 2: Winter Angler Catches Of Whitefish, Smelt And Yellow Perch , 1965 -1977.

The cold-water fishery changes are related to the earlier mentioned level of dissolved oxygen in the bottom hypolimnetic waters which declines throughout the summer and drops as low as 1 to 3 mg/L just prior to fall mixing. It is believed that this greatly stresses the cold-water fish populations (i.e. the M.O.E. criteria for cold-water fish is 6 mg/L dissolved oxygen). Smelt were accidentally introduced in the early 1960's and they now compete for space and food with indigenous fish species. Fishing pressure also stresses the already disturbed cold-water fish population. Shorter lake trout and whitefish angling seasons were introduced in 1977, as well as a possession limit for whitefish, in an attempt to conserve these stocks. The deterioration of spawning beds is another factor adversely affecting the fishery and believed to be due to some or all of the following - construction, development, and dredging activities in shallow water areas; sedimentation and silt loading; and fallout of dead algae from the surface water.

These detrimental stresses have affected cold-water populations by limiting natural reproduction. This is evidenced by the shift in age composition of the whitefish population from primarily young fish in the 1960's to a predominance of old fish in the 1970's. Significant year class failures were thought to have occurred since 1970 and under present conditions the virtual extinction of whitefish is predictable. Similarly, lake trout have failed to reproduce successfully, as evidenced by the increasing proportion of hatchery fish to the population, particularly in younger age groups.

The following areas are considered to be important habitats for speckled trout, largemouth bass, muskellunge, largemouth bass, northern pike, yellow perch and yellow pickerel: Lover's Creek Watershed, Bluff's Creek Watershed, Atherley Narrows, Shingle Bay, Smith's Bay, McPhee Bay, Barnstable Bay, Talbot River Watershed, Cunningham Bay, Chief's Island Marsh, Green Island Marsh, Sucker Creek, Canal Lake, Mitchell Lake and Raven Lake. Some of these areas, notably Lover's Creek, Shingle Bay, Smith's Bay, McPhee Bay and Barnstable Bay are under heavy development pressure. Other areas are deteriorating due to local turbidity problems and in-water construction and dredging activities.

2.4 TOXIC CONTAMINANTS

Recent analyses of fish from Lake Simcoe have shown that some species, notably yellow pickerel, large and smallmouth bass and lake trout contain levels of mercury that make some of the larger fish of these species suitable for consumption by people on only an occasional meal basis. (See Figure 3 - specific information has been made available to anglers and the lake is being posted.) Intensive studies were carried out during 1977, to identify the possible source of mercury in the Lake Simcoe Basin. Lake and river water and sediments, all potential sources (STPs, landfill sites, etc.), and additional fish were collected and analysed for mercury as well as PCB, DDT, and mirex (other trace contaminants found in some Ontario watercourses). A recently released report details the mercury findings (Mercury in the Lake Simcoe Aquatic Environment Sept. 1978).

CHECK BEFORE YOU EAT

Ontario

Fish in this water body may be contaminated by mercury or other pollutants. For safety's sake, you are urged to check your catch – here's how:

1. Identify species.
2. Measure length of fish from fork of tail to end of nose.
3. Check chart below.

If you eat your catch to the maximum recommended for or you should wait at least six months before doing so again.

If you fish on and off for more than three weeks during the year, and eat your catch, you should consider yourself a long-term consumer.

Children under 15 and women of child-bearing age should eat only

A meal is considered equivalent to 230 grams (8 oz.).

Anglers should *not* take fish home for freezing and eating later unless it is from category

Enjoy your fishing and make your own judgements based on information provided. Good fishing!

Category	One Week	Two Weeks	Three Weeks	Long-Term Consumption
	no restrictions	no restrictions	no restrictions	no restrictions
	10 meals or 2.3 kg (5 lbs.) per week	5 meals or 1.3 kg (2.8 lb.) per week	4 meals or 0.95 kg (2.1 lb.) per week	0.226 kg (.5 lb.) per week
	7 meals or 1.54 kg (3.4 lb.) per week	4 meals or 0.86 kg (1.9 lb.) per week	3 meals or 0.63 kg (1.4 lb.) per week	0.136 kg (.3 lb.) per week
	none	none	none	none
	occasional meals only – one or two per week	occasional meals only – one or two per week	occasional meals only – one or two per week	occasional meals only – one or two per month

Lake Simcoe
Lac Simcoe

4425/7920
(Simcoe, York & Durham Regions)
(Régions de Simcoe, York & Durham)

Fish Species / Espèces de poisson (Active contaminant is mercury in all species identified / Le polluant actif est le mercure dans toutes les espèces identifiées)	Safe to Eat / Bon à manger	Restricted / Consommation limitée	Restricted / Consommation limitée	Don't Eat At All / Ne pas manger	Occasional Meals Only / Repas occasionnels seulement	Data Not Available / Données non disponibles
Largemouth Bass / Achigan à grande bouche						
Smallmouth Bass / Achigan à petite bouche						
Yellow Perch[1] / Perchaude[1]						
Northern Pike / Brochet						
Walleye[1] / Doré[1]						
Lake Trout / Truite de lac						
White Sucker / Meunier noir						
Whitefish / Grande corégone						
Rock Bass / Crapet de roche						
Ling / Lotte						

Fish size in inches (centimetres) / Longueur du poisson en pouces (centimètres)

6 (15)	6-8 (15-20)	8-10 (20-25)	10-12 (25-30)	12-14 (30-36)	14-18 (36-46)	18-22 (46-50)	22-26 (56-66)	26-30 (66-76)	- 30 - (76)

[1] Species also sampled for PCB, Mirex and pesticides / Espèces aussi échantillonnées pour PCB, Mirex et pesticides

Lake Couchiching
Lac Couchiching

4440/7922
(Orillia Twp.) (Canton d'Orillia)
(Simcoe Co.) (Cte Simcoe)

Fish Species / Espèces de poisson	6 (15)	6-8 (15-20)	8-10 (20-25)	10-12 (25-30)	12-14 (30-36)	14-18 (36-46)	18-22 (46-50)	22-26 (56-66)	26-30 (66-76)	- 30 - (76)
Smallmouth Bass / Achigan à petite bouche										
Largemouth Bass / Achigan à grande bouche										
Walleye / Doré										
Northern Pike / Brochet										

FIGURE 3. Mercury Levels In Fish In Lake Simcoe.

With regard to pesticides, the most concentrated use has been in the Bradford Marsh where a variety of organochloride, organo-phosphorus and carbamate insecticides have been used over the years. With the banning of DDT, together with insects developing a tolerance to other organochlorides, organo-phosphorus insecticides have come into more common usage.

A survey of pesticide residues in the Bradford Marsh soils during 1972 to 1975 revealed that DDT residues were still the highest, and that a total of 24 insecticide residues could be identified. A similar study of pesticides in Marsh drainage water revealed that DDT was the most abundant insecticide in the water being pumped up into the Holland River. Insecticide residues in fish from the Marsh drainage ditch and from Cook Bay revealed that DDT again predominated. However, there was very little residue in Cook Bay fish compared with fish in the drainage ditch. This was supported by a Ministry of the Environment study of 1977 which found no significant concentrations of DDT, DDE, aldrin and dieldrin extending into Lake Simcoe (see section 2.10.1). However, DDT residues in large lake trout are at levels that could affect the production of viable offsprings.

2.5 WILDLIFE

Wildlife habitats are being threatened by the following:

(a) The physical destruction or alteration of existing wildlife habitat due to urban development, agricultural land reclamation, road and power line construction, dredging and filling of wetlands, cottage development and aggregate extraction operations. Specific developments are the proposed Ravenshoe Side Road extension of Highway 89 through the Holland Marsh and village expansion in the Durham Region in the Beaverton Creek Marsh area.

(b) Maintenance activities such as shrub clearing, grass mowing, aquatic weed removal and tree fellings.

(c) Mechanized recreation such as motor-boating, waterskiing, snowmobiling, all-terrain vehicles.

(d) Indirect development related impacts such as road kills, dogs, etc.

Another factor which underlines the sensitivity of wildlife to the destruction of habitat is the fact that only 15.5% of the shoreline of Lake Simcoe (woods and marsh) and 22% of Lake Couchiching's shoreline (woods) provide suitable wildlife habitat. Hunting, trapping and wildlife viewing are likely to be seriously threatened by further wildlife habitat destruction.

The following areas are considered to be important wildlife habitats: Brechin Swamp, Sibbald Point Provincial Park, Sucker Creek, Holland Marsh Provincial Wildlife Management Areas, Barnstable Bay, Georgina Swamp, Mud Lake, Morning Glory Swamp, Talbot River Lowlands,

Beaverton Creek Marsh, Duclos Point, Bluff's Creek, Vroomanton Pond, Pottageville Swamp, Mara Provincial Park, McRae Point Provincial Park, Lover's Creek and the Atherley Narrows. These areas support a variety of waterfowl, shore birds, raptors (hawks, owls etc.) and song birds, as well as a host of mammals, reptiles and amphibians.

The Beaverton Creek Marsh and the Holland Marsh Provincial Wildlife Management area are being threatened by proposed development projects. All of the wildlife habitats have been identified as being sensitive to development.

The most significant hunting in the watershed is for waterfowl in the Holland River - Cook Bay area. The birds most frequently sought are: mallard, bluewinged and greenwinged teal, scaup, bufflehead, and common goldeneye. The Holland Marsh Provincial Wildlife Management area provides good woodcock, varying hare and cottontail hunting. Sibbald Point Provincial Park provides a controlled pheasant hunt each year.

From 1969-1971, 60 trappers earned $19,000 capturing an average 6,413 animals per year, in the Holland River area and in Orillia Township. 82% of the animals trapped were muskrat. The rest were beaver, racoon, mink, fox, fisher and otter.

2.6 FORESTRY

In the Ministry of Natural Resources Maple District portion of the Lake Simcoe Drainage basin there was a decrease from 19.10% of total forestry acreage in 1957 to 16.28% total acreage in 1971. In 1977, 1725 acres, or 3.9% of total Maple District basin acreage was under Woodland Improvement Agreements.

The removal of forest cover in the study area in the past has resulted in loss of forest production, increase in soil erosion, increase in runoff, decrease in soil permeability, decline in available habitat, decline in general aesthetics, and deterioration of watercourses. Many of the surviving forests in the Basin are located in headwater areas and in major aquifer recharge areas, such as the Oak Ridges Moraine and therefore are vital in terms of groundwater quality and quantity. The Oak Ridges Moraine in particular is essential to ensure water for the northern part of the Durham and York regions.

The decline in forest cover throughout the study area has been due to pressures for urban expansion, estate and rural residential developments and road construction and widening. The decline has also been augmented by woodlot removal to produce agricultural land and cattle grazing in woodlots.

2.7 MINING

Two potential problems could arise as a result of extraction operations. Firstly, widespread uncontrolled washing operations which are designed to remove excess silt and clay portion from sand and gravel deposits could conceivably result in local siltation and turbidity problems within Lake Simcoe. Such a situation has not developed and is unlikely to develop since only 10 of the 123 licenced properties employ wash plants and all of these use settling ponds to remove the fine material from the wash.

The second problem is much more serious. The major sand and gravel operations are located on moraines and eskers. These glacial deposits are the most significant groundwater recharge areas in the watershed. Since large scale aggregate operations of necessity require the removal of forest cover, there is definite danger of increased stormwater runoff, erosion, and groundwater contamination and depletion. These problems can be avoided if operations are properly managed.

The main mineral resources of the Lake Simcoe watershed consist of sand, gravel, and crushed stone. Within the watershed, approximately 123 pits and quarries representing a total area of about 4,800 hectares are presently licenced for the extraction of granular materials. Total material extracted during 1976 amounted to approximately 7,000,000 tonnes. These materials fill the local needs for construction materials and also supply materials to the larger Metropolitan Toronto Market.

Sand and gravel deposits are distributed in moraines, eskers and beaches. The latter fulfil local needs. The most significant deposits are the Oak Ridges Moraine, the Bass Lake Moraine, the Sunderland Esker, the Cannington Esker, and the Ravenshoe Esker. The Oak Ridges Moraine, within the Town of Uxbridge provided 49% of the tonnage extracted within the watershed, in 1976.

Four limestone quarries are presently licenced within the watershed; one at Whiteoff, two near Brechin and one in Carden Township. Expansion of the quarry industry is possible in the Trenton-Black River Limestone formations south of Lake Couchiching.

2.8 RECREATION

There is no comparable alternative available to the population of Central Ontario of similar resource endowment for water-based and land-based recreation. Comprehensive planning of this area must exploit the implications stemming from this fact.

Although there is a surplus of capacity for all recreational activities excepting hiking, there is a problem of limited access which constrains recreational use. As an example, 25% of the total length of municipally provided beaches in the study area is road ends which do nut supply parking, beach supervision, or back-up facilities. This leads to congestion and

frustration. There is also a conflict involving kinds of recreation uses at wharfs (i.e. fishing, swimming, water skiing). Furthermore, Lake Couchiching suffers from a concentration of boat traffic at Atherley Narrows, which leads to docking and pollution problems, and a lack of public beaches.

Ad hoc, uncoordinated planning and intensive development pressures and population growth may lead to deterioration of recreational pursuits. In Lake Simcoe, about 83.3% of the shoreline land is intensively developed. Only 8.3% (woods and open field) is suitable for public recreation. Co-operation and co-ordination among all public agencies is required. Expansion and creation of facilities and space for day users and over-night visitors are key elements of the recreational development for the future.

2.9 SIGNIFICANT NATURAL FEATURES

Sensitive areas, such as fish spawning grounds, areas of rare vegetation, unique landscape features and significant wildlife habitats are declining in the Simcoe-Couchiching study area. These areas have been listed in the section dealing with the decline of habitats. At present, the shoreline of Lake Simcoe consists of only 6.8% marsh and 8.3% woods. Approximately 83.3% of the shoreline is developed for urban, rural residential and private and public recreational use.

Development is also occurring on hazard lands (i.e. lands which due to their physical characteristics and location sustain a risk for occupants to loss of life, property damage and social disruption, if developed). This results in shoreline and backshore erosion problems, at the very least.

The development pressure in environmentally unacceptable areas is illustrated by the fact that in 1977, for lands under the authority of the South Lake Simcoe Conservation Authority, 52% of development proposals were for hazard lands and/or sensitive areas like recharge areas, shorelines, key wildlife habitats, and floodplains on major river courses.

2.10 AGRICULTURE

2.10.1 Problems Associated with Agricultural Activity in the Holland Marsh

Studies have been done on the water quality impact of the Bradford Marsh on the Holland River and Lake Simcoe. In 1973 subsurface water from cultivated areas of the marsh was found to have a concentration of soluble reactive phosphorus 1.6 times higher than that from an uncultivated area of the marsh. In the same study run-off from the cultivated area had 4 to 5 times more phosphorus, and 40 to 50 times more nitrate-N than from the uncultivated area. The high nitrate-N concentration is due to fertilization and to the large quantities of nitrogen released from the naturally occurring decomposition of organic soil. Although the nitrogen and phosphorus concentration in run-off from the cultivated marsh is not particularly

high relative to other agricultural areas, other factors make the nutrient loading significant. In particular, the fact that the bulk of the nutrients are pumped from the drainage canal into the Holland River during a 5 to 6 week spring pumping period, increases the nutrient impact on the river and the lake.

There have been concerns raised in the past that the cultivated area of the Holland Marsh contributes toxic contaminants to the Holland River and thus Lake Simcoe. The presence of DDT, aldrin and dieldrin have been of particular concern. Prior to 1970 DDT was an insecticide used in the production of vegetables in the marsh, and in the control of biting flies in recreation areas around Lake Simcoe. In 1970 restrictions were placed on its use, and by 1972 its use was prohibited except by license. Similarly prior to 1968 aldrin and dieldrin were extensively used as insecticides. In 1969 their use was restricted and in 1970 sales stopped. Studies in Lake Simcoe from 1970 to 1976 showed a decline in the presence of DDT in shoreline sediments and fish tissue; no detection of dieldrin or aldrin in lake sediments; and a decline in aldrin and dieldrin in fish tissue. A more recent study by the Ministry of the Environment in 1977 found no significant concentrations of DDT, (except in large lake trout) DDE, aldrin and dieldrin extending into Lake Simcoe. Thus the ban of the use of these insecticides has significantly reduced the concentration of these contaminants to the point where they are of decreasing concern in Lake Simcoe.

2.10.2 Problems Associated With Mineral Soils

There is a potential for pollutant transfer from livestock and crop areas to both surface and ground water, primarily as a result of fertilizer use, and manure storage and application. Unfortunately there is little specific information on the water quality effects of agricultural practices within the Lake Simcoe basin. However, studies recently completed by PLUARG (Pollution from Land Use Activities Reference Group) of the International Joint Commission (IJC) provide information on non-point sources of pollution from Agricultural activities.

A 1974 study undertaken for the IJC mapped soils in categories related to the potential for pollutant transfer from agricultural land to surface and ground waters. This mapping indicated that in general, the area west of Lake Simcoe has a low potential for pollutant transfer, while the remainder of the basin has a highly variable potential for transfer. As nutrients from agricultural operations are generally transported to waterbodies in conjunction with soil particles, reductions in soil erosion would substantially decrease this pollutant transfer.

The environmental effect of the livestock industry on Lakes Simcoe and Couchiching is impossible to quantify. Although there may be some evidence of localized problems, this is not a serious basin wide problem, and it is evident that the industry is becoming more concerned about environmental management, and is taking steps to minimize water resource impacts (eg. contained manure storage).

Concern has been raised by members of the Steering Committee that sod production contributes to degradation of the soil and a reduction in the water quality of Lake Simcoe. There is no evidence that either situation occurs. Nursery sod has been produced on the same land in Ontario in excess of 20 years with no apparent effect upon soil structure or productivity. Continuous production is possible through minimal topsoil removal and continued additions of organic matter to the soil by the roots of the sod crop.

Grasses used for sod production have a fibrous root system which rapidly utilizes nitrogen from fertilizer application. Herbicides are occasionally used, however, insecticides are rarely needed.

The most likely period for soil erosion is following harvest. However, within a short period of time (approx. 10 days) the rhizomes remaining in the soil have developed shoots and are establishing a soil cover, inhibiting erosion. This large amount of organic matter left in the soil also helps to reduce erosion. This cover will later be plowed and the field reseeded, however the time between harvesting and reseeding is generally only 2 to 3 months. In addition, the fact that fields used for sod production tend to be flat, significantly reduces erosion potential*.

In summary then with respect to both the Holland Marsh area and mineral soils, the following factors would suggest that the overall impact of agricultural activities on the water quality of Lake Simcoe will not increase in the forseeable future:

- there are reductions of fertilizer used in some areas (e.g. Bradford Marsh) due to rising costs, better technical advice, and adverse effects of over-fertilization;
- more and more farmers are following the agricultural Code of Practice; and,
- it is unlikely that the number of hectares farmed will substantially increase in the future.

2.11 LOCALIZED ENVIRONMENTAL PROBLEMS

2.11.1 Rooted Aquatic Weeds

In general, Lakes Simcoe and Couchiching are relatively free of excessive rooted aquatic weed growth. However, some localized inshore areas which have deep, rich bottom sediments stimulate heavy weed growths. As shown on Figure 4, the most problematic area is the south end of Cook Bay where the enriched water and sediments have resulted in very dense growths which interfere with recreation during the summer period, and then cause aesthetic shoreline problems during late summer and fall as the weeds detach and accumulate on local beaches. The Shingle Bay area also shows significant nearshore weed growth.

---

* See Sod Production Guidelines, Ministry of Agriculture and Food.

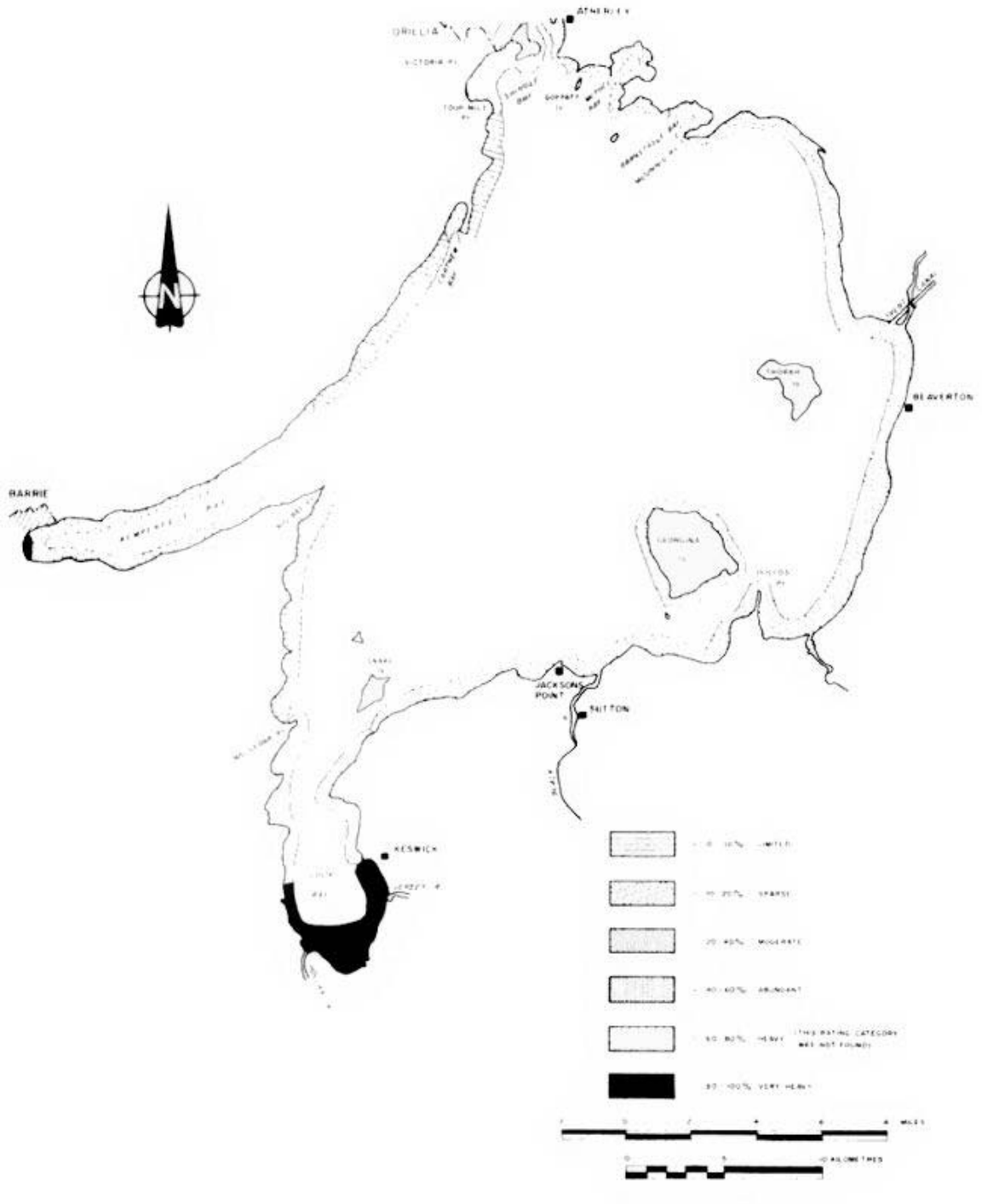


FIGURE 4. Showing Average Bottom Coverage Of Rooted Aquatic Weeds.

Due to the shallow nature of Lake Couchiching, aquatic weeds are generally evident throughout the Lake, although problems with localized excessive growth are minimal.

2.11.2 Surface Algae Scums

Surface algae scums have been a recurring lake-wide problem since 1971. At certain times algae scums are evident only in a few local bay areas.

2.11.3 Bacterial Problems

Although the general bacteriological quality of Lakes Simcoe and Couchiching is good, localized problems have been reported in the past. The Simcoe County District Health Unit reports that Kitchener Beach Park in Orillia had to be closed on numerous occasions in 1971, 1972 and 1973 due to high bacteria counts.

2.11.4 Marina and Boating Problems

Marina areas are periodically plagued with oil and gasoline slicks. The problem is difficult to solve under conditions of heavy boat traffic and heavy boat servicing. Regarding open-water boating, there are periodic reports of illegal dumping of sewage and refuse.

2.11.5 Hamlet Development on Private Sewage Systems

In several areas on the watershed, poor soil conditions have led to constraints on: infilling, development, conversion to permanent homes, and building enlargement. Problems in the Keswick area of the Township of Georgina, Mount Albert in the Town of East Gwillimbury, and the west shoreline areas of Innisfil Township, the shoreline area of Mara Township and the Ethel Park and Cedar Beach areas of the Township of Brock, have led to the planning of communal sewage systems for the collection and treatment of wastewaters. The Regional Municipality of York and the Township of King are reviewing the matter of development and sewage requirements in the Village of Schomberg.

2.11.6 Landfill Operations

Local landfill operations can create turbidity, and aesthetic problems and can alter lake current patterns.

2.11.7 Swimmers Itch

Swimmers itch is a temporary skin infection acquired by bathers when they accidentally become involved in the life cycle of a tiny trematode worm. While this problem is not common in Lakes Simcoe and Couchiching, however, cases have been confirmed in local areas of both lakes.

2.11.8 Destruction of Spawning Beds

Spawning beds can readily be depreciated as a result of wetland destruction, as well as changes in spawning shoals by sedimentation, biological growths or removal of shoal material by dredging operations.

2.12 URBANIZATION

The 1976 estimate of Lake Simcoe-Couchiching basin population is 186,800 people. The long-term potential population in the Basin is 453,000 people. 65% of the existing population in the Basin is located in community serviced areas. Ten communities - Barrie, Orillia, Cannington, Beaverton, Uxbridge, Holland Landing, Sutton, Bradford, Aurora and Newmarket-discharge treated wastes to the Lake Simcoe Basin. Increasing urbanization will increase stormwater runoff to the lake.

There are about 12,000 cottages on Lake Simcoe and seasonal dwellings are being converted into permanent homes. In Georgina Township, between 1966 and 1977, the annual rate of conversion of cottages to permanent residences was 3.4% or 140 units per year.

Results of the chemical and physical quality tests indicated that waste water discharges from municipal sewage treatment plants on the lake and the major tributaries along with urban, agricultural and natural land runoff are currently the major sources of polluting materials.

Key amongst the pollutants to the lakes is the nutrient phosphorus. Phosphorus removal of the sewage treatment plants has substantially reduced the input of this nutrient which in turn should reduce the rate of nutrient enrichment (eutrophication). In 1976, seven of the ten sewage treatment facilities within the study area were within the MOE objective of 1.0 mg/L phosphorus in S.T.P. effluent.

Figure 5 illustrates that prior to phosphorus removal from sewage (1972) the total phosphorus load to the lake was 138 metric tonnes per year. Following phosphorus removal the loading was reduced to 103 metric tons.

Increased development will reverse this positive trend unless effective precautions are taken. These precautions could include better waste management practices with respect to urban storm water runoff, and agriculture drainage and further reductions of phosphorus at the sewage treatment plants (see Figure 5).

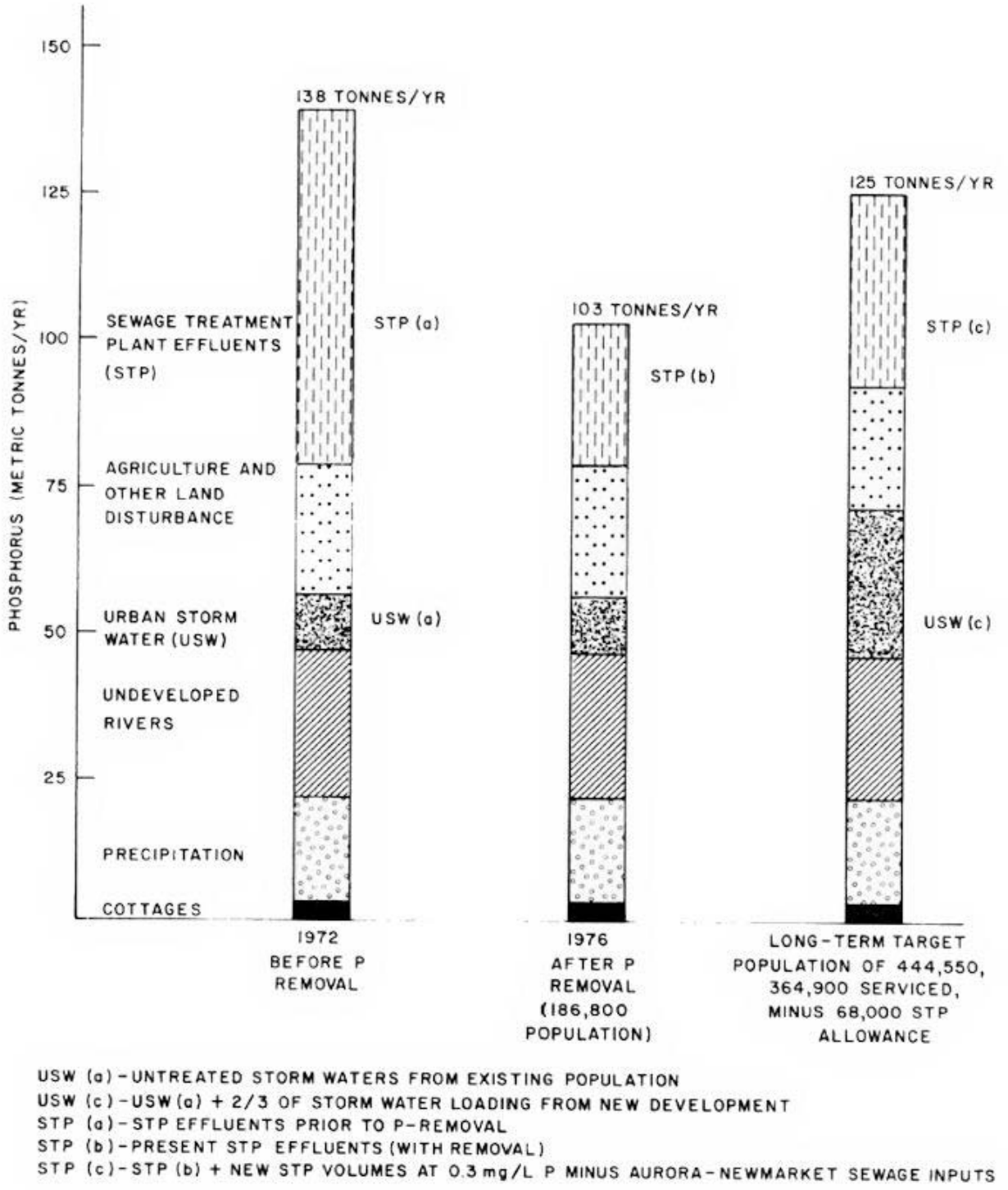


FIGURE 5. Phosphorus Loadings.

CHAPTER 3

ALTERNATIVE ENVIRONMENTAL DEVELOPMENT STRATEGIES

The cause and effect relationships leading to environmental problems as, for example, waste inputs - water quality deterioration declining fishery - declining recreational use play an important role in the formulation of environmental strategies. With this in mind, the listing of "problems" in Chapter 2 was reduced to the following major issues:-

(A) water quality
(B) fishery
(C) wildlife habitat
(D) mining
(E) forestry
(F) recreation

The first two issues, (A) water quality and (B) fishery, are the two main issues. As urbanization (which leads to sewage treatment plant discharges and storm wastes discharges) and agricultural activities are the watershed activities which primarily affect water quality and the fishery, these activities are integral parts of the water quality and fishery sections. Other watershed activities and aspects, such as (C) wildlife habitat, (D) mining and (E) forestry, which have a lesser and more indirect relationship to water quality and the fishery, are dealt with in separate sections. Recreation (F) is an important final section, as recreational activities can both affect sections (A) and (B), as well as be affected by the water quality and fishery.

With each of the six issues ((A)-(F)), two alternatives are considered:

MAINTAINING EXISTING CONDITIONS
IMPROVING EXISTING CONDITIONS

A third alternative of allowing further degradation of the six issues was discussed by the Report Committee. It was decided, however, that this alternative is not a viable option as it would lead to a worsening of the existing problems (e.g. algae scums, declining cold-water fishery). This would not only contradict government policy but also the preservation of a high quality environment and protection against further degradation are major concerns of the people living in the Lake Simcoe-Couchiching basin and were the main reasons which lead to this review of alternative environmental strategies.

3.1 WATER QUALITY

Lakes Simcoe and Couchiching presently have problems, including algae scums, an over-abundance of aquatic weeds and low dissolved oxygen in bottom waters. These problems are largely caused by past discharges of phosphorus from sewage treatment plants.

With phosphorus removal having been incorporated into the sewage treatment process in the early 1970's, the lakes appear to be now stabilized. It is expected that within a few years, the lakes will have reached the full extent of stabilization with the reduced phosphorus load to the lakes. However, it is doubtful that there will be any significant improvement in dissolved oxygen or the cold-water fishery.

3.1.1 MAINTAINING EXISTING WATER QUALITY (Alternative 1)

The two lakes support the varied recreational pursuits of the people living not only in the basin but also in other population centres south of Lake Simcoe. For example, the high quality, warm-water fishery and its unstable cold-water fishery are integral components of that recreational experience. Future population may have to change their dependence from diminishing or inadequate ground water supplies to the lakes for water supply. Most of these water uses can be readily supported by the present water quality.

Figure 5 in the Problem Identification chapter illustrated a present phosphorus loading of 103 metric tonnes per year after the provision of phosphorus removal. This loading is certainly expected to preserve the existing water quality if not lead to a slight improvement. However, in the face of increasing populations and urbanization limiting the phosphorus load to about 103 tonnes/year will be increasingly difficult and requires careful environmental management. Various management schemes are outlined in the following pages. Any combination of these schemes which have the effect of limiting the phosphorus loading to 103 tonnes/year or less is a potentially acceptable environmental strategy.

Phosphorus loadings from sewage treatment plants, urban storm waters, agriculture and other land disturbances have been identified as the major nutrient sources which are controllable. Control of nutrients from these major sources can be achieved as follows:

3.1.1.1 Sewage Treatment Plants

Presently, sewage treatment plants, in the Lake Simcoe-Couchiching Basin, provide an acceptable method of treatment including phosphorus removal and effluent disinfection. The Central Region of the Ministry of the Environment has established a policy whereby all new sewage treatment facilities and plant enlargements, must provide a stringent phosphorus effluent quality of 0.3 mg/L. With this policy, the wastes generated by the future population would receive a high degree of phosphorus removal and thus the increase from the present phosphorus loading would be minimized. For example, the total phosphorus loading from sewage plants would only increase from the present level of 23 tonnes/year to 30 tonnes/year with a doubling of the serviced urban population.

It is quite obvious that even with this stringent treatment of the wastes generated by future population, the goal of 103 tonnes/year would be exceeded sometime in the future. An expansion of the MOE policy making it not only applicable to new treatment plants but also

to the presently existing sewage treatment plants is therefore required. With phosphorus removal to 0.3 mg/L for all flows, the total P loading from sewage treatment plants would decrease to 14 tonnes per year. However, even with this high degree of waste treatment and only doubling the basin population the goal of 103 tonnes of phosphorus per year would still be exceeded. Clearly, therefore, other supplementary control measures will be required dealing with urban drainage, agriculture and other land disturbances.

Other waste components such as BOD_5, solids, ammonia and perhaps total nitrogen, can significantly affect the quality of the lakes. Although it is not clear at this time whether removal of these or other waste components would be required, a continued monitoring and assessment program would be required to signal the need for the timing and type of additional controls.

3.1.1.2 Urban Storm Drainage

Studies in many urban centres in North America reveal that, in general, urban storm drainage is of a highly variable quality and can be equivalent to raw sewage in terms of organic solids and nutrients. The result is that urban storm drainage can represent a significant source of pollution. Because soil percolation is minimal in urban areas, there is an increased rate and volume of storm water. The increased rate and volume of runoff can cause downstream erosion, siltation, and flooding in local streams and rivers.

Simple detention ponds can be conveniently used in new developments to improve quality by allowing settling, and reducing maximum runoff rates to near pre-development conditions (i.e. "zero runoff"). Presently, the Ministry of the Environment, some municipalities and the South Lake Simcoe Conservation Authority request storm-water management for developments with potentially serious impact. Storm detention ponds will result in reduction in the rate of runoff, substantial solids removal and up to 30% phosphorus removal. In general, the cost of storm-water management is small, if open space areas can be used for detention ponds and storm water controls are considered in the initial design of the development. With storm-water detention ponds, the rate of runoff is reduced and, therefore, smaller diameter storm sewers can offset costs of the ponds.

Chemical treatment of urban drainage could also be implemented with the detention ponds. This would increase the effectiveness of phosphorus removal from storm water for new development from 30% to 90% +.

In addition to detention ponds, significant improvements of the quality of the storm water can be made both for future and existing urban areas, by incorporating such techniques as:-

- regular sweeping of streets and cleaning of catch basins;

- running roof leaders onto lawns rather than into sewers;

- using temporary storage areas on roof tops, and other areas thereby providing short-term retention and reducing the rate of runoff;

- eliminating illegal waste discharges to storm sewers.

An appropriate overall strategy for the Lake Simcoe-Couchiching basin will be to ensure that storm water management is adequately addressed, and that general policies to minimize the impact from existing and future urban areas be implemented by local governments.

3.1.1.3 Agriculture

The control options relating to municipal sewage treatment and urban drainage outlined above allow an assessment of their effectiveness in quantitative terms to meet the goal of 103 tonnes of phosphorus per year. Also, cost estimates for these controls can be made. Such is not the case for those control measures related to agriculture and other land disturbances. Unfortunately, it is impossible to predict, in quantitative terms, the reductions in phosphorus inputs with the implementation of the control schemes outlined below. However, there is no question that with their implementation these phosphorus sources would be reduced, a fact which can be confirmed through continued water quality monitoring.

Although, as indicated previously in this report, the quantitative input from agricultural activities in the Lake Simcoe basin may not increase in the foreseeable future, efforts can be made to reduce the negative effects of agricultural activities on water quality. Strategies to reduce the nutrients escaping due to agricultural activities could be introduced in two main areas: the cultivated portion of the Bradford Marsh (Holland Marsh); and the agricultural areas in the remainder of the basin where beef and dairy operations predominate. Alternate strategies of reducing the nutrient escape from the Holland Marsh are:

- fertilization only to soil-test needs.
- minimizing pumpage from the marsh during and shortly after ice cover when the drainage water is stagnant and without oxygen. It is during these conditions that nutrients dissolve into the water. Additional fall pumpage could reduce the need for pumping the enriched water in the spring.
- aeration of drainage water to precipitate phosphorus, thus reducing the escape of this nutrient to Lake Simcoe.

Other alternatives could be employed, such as:

- establishing an aeration lagoon or a treatment tank (perhaps with chemical coagulation) at the foot of the Marsh.

With respect to agricultural activities in the remainder of the drainage basin, there are a number of methods by which nutrient contributions could be reduced, including:

1. Fertilization control - fertilize at rates recommended on the basis of soil tests. Testing needs to be done once every 3 years.

2. Manure management - greater implementation of the Agricultural Code of Practice with respect to livestock operations. This would include manure storage, runoff from barnyards, manure spreading, etc.

3. Reduction in soil erosion - a variety of techniques are available, including the following:

    - crop rotation - (note: cash crops are not very common in the drainage basin) - corn or cash crop would not be grown continuously year after year;
    - corn production would be rotated with grain, grass or legume production;
    - strip cropping - various crops planted on the contour in alternative strips - strips of grass or legume crops will reduce erosion;
    - contour cultivation and cropping - ridges made by tillage or rows of crops, when they follow the contour of the land, retard the flow of water down the slope;
    - sod buffer strips bordering watercourses;
    - thicker crop stand adjacent to watercourses would slow down the movement of water and would provide more root residue to bind the soil together;
    - grassed waterways - broad, shallow channels in the soil, planted with grass or legumes, to carry water away from farmland with a minimum of erosion or soil loss.
    - reforestation of shoreline areas of Lakes Simcoe-Couchiching, as well as streams draining in to these lakes, should be encouraged.

4. Restrict access of livestock to watercourses.

5. Education and communication - greater liaison between farmers and those familiar with water quality problems. Ensure farmers are aware of water quality implications of farm practices.

Although there is little legislation regulating agricultural practices, there are programs and guidelines, such as the Agricultural Code of Practice, which provide a framework for action to rectify problem areas. Increased education and information programs stressing implementation of existing guidelines in order to reduce nutrient contributions to watercourses would be very beneficial.

3.1.1.4 Other Land Disturbances

(a) Unserviced Residences (Septic Tank - Tile Field Systems) The 1975 water quality report of the Ministry of the Environment estimates a low phosphorus loading from residences (both seasonal and permanent) with septic tank-tile fields. However, efforts could be considered to minimize this input even further. Possibilities include a survey in selected suspect areas to define faulty systems, and the use of chemical additives to septic tanks to inactivate phosphorus within the treatment system thus eliminating the risk of phosphorus escaping from such systems to the lakes.

(b) Dredging and Landfilling - The most readily visible physical disturbances of the lakes and associated watercourses are dredging and landfilling. These activities are common over areas of the basin and impair water quality, destroy fish spawning facilities, create erosion problems on adjacent land and may also contribute to flooding problems. Although government approval is required, these activities have occurred without seeking approval. A method of dealing with this resource misuse is the enforcement of regulations made under the Conservation Authorities Act, the Federal Fisheries Act, Public Lands Act, Navigable Waters Act and Beach Protection Act. More stringent enforcement is recommended.

(c) Wetlands Destruction - The destruction of wetlands is being caused by channelization of marshes; draining and filling wetlands; and peat mining. Wetlands play a role in the ecology of the Lake Systems by acting as natural filters for the removal of nutrients, maintaining surface-water flow and by providing emergency storage during periods of rapid run-off and high water. Regulations made under the Conservation Authorities Act are a method of protecting wetlands, as are Official Plan (policies and designations) and implementing by-laws.

3.1.1.5 SUMMARY

In summary, with the formal adoption and implementation of the MOE policies dealing with the new sewage treatment plants and storm waters, the lakes will remain at or near their present quality for several years. However, the population targets would suggest that despite these policies the goal of 103 tonnes of phosphorus per year would be exceeded in ten years. Environmental planning will therefore have to include measures for the aforementioned, less quantifiable aspects (agriculture, other land use practices, dredging, etc.). Some of these precautions should be planned and implemented now if the long term water quality of the Lake Simcoe-Couchiching system is to be preserved at its present level. Water quality monitoring of these lakes must be an integral part of this planning process in order to assess continually the effectiveness of all control measures.

3.1.2 IMPROVING WATER QUALITY (Alternative 2)

It is felt that a healthy, natural, self-sustaining cold-water fishery can only be preserved with certainty if water quality is improved. A paramount aim for the long-term preservation of the cold-water fishery would be the elevation of the minimum dissolved oxygen value in Lake Simcoe to 4 mg/L or higher. In order to achieve this, the total phosphorus loading would have to be reduced to considerably less than 100 metric tonnes/year. It must be realized that it would be increasingly difficult with present technology to control future phosphorus inputs to less than 100 tonnes. Therefore, it is highly unlikely with the projected population that the dissolved oxygen objective of 4 mg/L can be obtained over the long term. However, in order to approach this dissolved oxygen objective at least in the short term, major, immediate steps to reduce phosphorus inputs would have to include the following:

1) updating existing sewage treatment plants to best practical treatment;
2) a program of reducing as much as possible the pollution from urban drainage from existing urban areas;
3) a program of reducing the impact of agricultural activities;
4) treatment of drainage from the Bradford Marsh.

Also, the possibilities and implications of diverting wastes to other watersheds (similar to the Aurora-Newmarket diversion to Lake Ontario), could be addressed as could the alternative of restraining population growth.

The above discussion of strategies for "improving water quality" should make it very clear that present technology makes it very difficult to meet the goal of reducing the phosphorus discharges to considerably less than 100 tonnes per year. The main difference between the improvement strategy as opposed to maintaining existing water quality strategy is the timing for pollution control measures. The four steps outlined above would be required now rather than sometime in the future. Also, with the projected development of the Simcoe-Couchiching basin, the improvement in water quality would be only short lived unless new technology is developed for the control of waste inputs from municipalities and general land drainage.

3.2 FISHERY

As with the Water Quality section, two alternatives will be addressed in regards to fisheries;

1) maintaining existing conditions and

2) improving existing conditions. The third alternative of permitting deterioration is again not addressed in view of the value of fisheries (valued at 13.6 million dollars in 1977) as a recreational resource.

3.2.1 MAINTAINING EXISTING FISHERIES (Alternative 1)

Maintaining the existing level of fishery would result in an abundance of warm-water species in the lake, and a precarious cold-water fishery (see previous chapter section 2.3). The following controls in addition to the water quality controls outlined previously are suggested to try to maintain this level of fishery in the face of continued development in the basin.

3.2.1.1 Protection of Fish Habitat and Spawning Areas

The controls on dredging and landfilling, and wetland destruction outlined in the Water Quality section, should be adopted to protect fish habitat and spawning areas from siltation and destruction.

Where possible a buffer zone should be protected and provided along the shore, where development would be restricted and removal of healthy trees not allowed.

Controls and programs as outlined in the Maintain Existing Forestry and Mining sections should be adopted to prevent siltation of spawning and habitat areas.

3.2.1.2 Assessment and Management Programs

Fisheries assessment and management programs should be continued and expanded as necessary in efforts to maintain the existing fishery. A fish stocking program should be maintained to promote the continuance of the trout fisheries. Lake trout should be continued to be stocked at a rate of 100,000 yearlings each year.

3.2.2 IMPROVING FISHERIES (Alternative 2)

While stocking programs could perhaps maintain at least part of the cold-water fishery, this section addresses itself to the maintenance of a stable, naturally reproducing fish community dominated by indigenous predators as existed two decades ago.

3.2.2.1 Water Quality

The controls listed in the Improving Water Quality section would have to be implemented to reduce the phosphorus input to considerably less than 100 tonnes per year, thus leading to an improved oxygen conditions in the bottom waters of Lake Simcoe. However, as also pointed out in that section, it is unlikely that phosphorus loading can be reduced to the required level over the long term. Therefore, pollution controls will not permit the maintenance of the required 4.0 mg/L or greater minimum dissolved oxygen in the lake if the populations projected in this report are approached.

3.2.2.2 Fish Habitat, Spawning Area, and Assessment and Management Program

The programs previously outlined in the water quality section and subsequently in the mining and forestry sections which relate to siltation control, should be continued and expanded where possible. Specifically, dredging, dredge spoil dumping and shallow water construction adversely affecting spawning shoals and weed beds should be prohibited. Construction in the shallow water zone should be controlled and monitored to protect fish habitat and spawning areas.

3.2.2.3 Stocking

The rehabilitation of the white fish population through stocking is required as a temporary measure to develop a self-sustaining population. Also, the trout rehabilitation program should be maintained at the present level of 100,000 yearlings for at least a 10 year period and its effectiveness then carefully assessed.

3.2.2.4 Stabilize Yellow Perch and Smelt Population

To help stabilize the fishery, increased harvest pressure on smelt and possibly on yellow perch should be implemented. Consideration could be given to contracting for the removal of these fish species. However, the popularity of at least perch to the fishing public would have to be considered.

3.3 WILDLIFE HABITAT

Important wildlife areas on the Simcoe-Couchiching Basin are frequently associated with significant ecological areas such as forests and wetlands. These natural wildlife habitats assist in preserving the quality of the lakes through mechanisms such as 1) stabilizing soils, 2) maintaining recharge areas, and 3) filtering out and absorbing nutrient materials. Hence, it is important that the significant wildlife areas be given careful consideration.

3.3.1 MAINTAINING EXISTING WILDLIFE AREAS (Alternative 1)

Important wildlife areas should be identified, maintained and protected. Buffer zones should be established around wetlands and other significant habitats to protect them from the influence of humans and to preserve their integrity. Dredging and filling of wetlands should be discouraged. A public education program could be developed to advocate such aspects as the need to minimize the disturbance of near-shore aquatic vegetation.

3.3.2 IMPROVE WILDLIFE HABITAT (Alternative *2)*

Some important habitats have already been defined, for example the Beaverton River Marshes, the Pefferlaw-Mud Lake area, the Pottageville Swamp and part of the Holland Marsh. These areas could be purchased by the public to ensure future preservation and management. There are many other areas which are suspected to be significant habitat areas, and detailed

studies would be required to define and subsequently preserve these areas. In addition, reforestation programs could be further encouraged (see Forestry Section). Similar to alternative 1 buffer zones should be established around wetlands and other significant areas for added protection and dredging and filling of wetland areas should also be discouraged. Future construction of roads, highways, transmission lines, railways and pipelines should be kept well back from wildlife habitat areas.

Public educational programs could be undertaken advocating the maintenance of natural vegetation cover and minimizing the disturbance of near-shore aquatic vegetation.

3.4 MINING

Mining of sand and gravel (aggregate) does have potential impacts on the lakes through such aspects as siltation, vegetation destruction, and groundwater depletion through dewatering of pits or quarries. These problems may be avoided through proper management, operation and inspection of sites. In 1976 there were 123 licensed pits on the Basin which supplied some 7,000,000 tonnes of aggregate.

3.4.1 MAINTAIN EXISTING ENVIRONMENTAL CONTROL OVER AGGREGATE OPERATIONS (Alternative l)

The environmental effects of existing industrial mineral operations should be carefully monitored, especially with regard to groundwater depletion or contamination. The sites of abandoned and existing industrial mineral operations should be carefully rehabilitated into an appropriate productive use such as recreation or agriculture.

3.4.2 IMPROVED ENVIRONMENTAL CONTROL OVER AGGREGATE OPERATIONS (Alternative 2)

As part of a provincial strategy a detailed geological appraisal of the Lake Simcoe watershed should be undertaken in order to identify areas of high quality industrial and metallic mineral resources. Such areas should be planned for compatible sequential or multiple land use, (e.g., Forestry, Mining, Agriculture). Proposed development adjacent to existing industrial mineral extraction operations and other significant mineral resource areas should be carefully evaluated to avoid creation of incompatible adjacent land uses and to preserve access to future mineral supply.

Large scale extraction operations proposed on or immediately adjacent to significant groundwater recharge areas should be subject to environmental controls. The environmental effects of such operations, whether existing or future, should be carefully monitored, especially with regards to groundwater depletion or contamination. The sites of abandoned and existing aggregate operations should be carefully rehabilitated into an appropriate productive use.

3.5 FORESTRY

Forests are important in maintaining the stability of the landscape, the local hydrologic budget, and serve as important wildlife as well as recreational areas.

The Trees Act is the only Ontario statute with some applicability for protecting conditions in Environmentally-Sensitive Policy Areas that passes responsibility for instituting legal protection and enforcement to the county or regional level of government.

Councils are permitted to pass by-laws, subject to provincial approval, regarding tree conservation to:

a) restrict and regulate the destruction of trees, and
b) provide for officers to enforce such by-laws. Contravention of such a by-law leaves one liable to a maximum fine of only $500 or up to three months imprisonment -- a small trade-off for many developers. However, the Trees Act has now been revised and the new Act includes higher penalties for violations of the Act.

3.5.1 MAINTAIN FORESTED AREAS (Alternative 1)

Local municipalities should be encouraged to pass tree cutting by-laws. Government Ministries (particularly MNR) could provide stronger comments on the need for individual developers to refrain from destroying woodlots, and maintain as many trees as possible. Legislation could also be enacted and aimed at preventing subdivisions on prime woodlots, especially those on tributaries and on major aquifer recharge areas of the Oak Ridges moraine.

3.5.2 IMPROVING FORESTED AREAS (Alternative 2)

An initial step in improving the forestry cover would be the development of a comprehensive forest cover inventory. The development in forests located on tributaries and major aquifer recharge areas should be controlled, and at the same time reforestation in these areas should be undertaken. Private and public reforestation should be encouraged to increase the percentage of watershed coverage by forests.

The strategies suggested for the maintenance of forested areas (Alternative 1) are also applicable to this alternative.

3.6 RECREATION

Lakes Simcoe and Couchiching are presently used for a wide variety of recreational activities, and in general the water quality of the lakes is adequate to support these activities. The only significant exceptions to this generalization are:

1) periodic bacterial pollution in localized areas (i.e. at Orillia) has restricted swimming;
2) the decline in the cold-water fishery has reduced the quality of the fishing experience as well as the amount of fishing activity directed to catching whitefish;

3) algal scums have reduced the aesthetic appeal for swimmers, boaters and other recreational users.

The recreational importance of the Lake Simcoe-Couchiching study area is illustrated by the following rough yearly estimates:

- $6 million to regional income resulting from expenditures of day-use participants in swimming;
- $1.3 million from expenditures of day-use recreational boaters.
- $13.6 million associated with recreational fishing activities.

A major problem in the Basin is the lack of clearly-defined roles and policies for agencies involved in public recreational facilities. The Report Committee recommends the establishment by the provincial government in conjunction with local and regional municipalities and the conservation authority of a clear mandate policy for the provision of public recreation facilities. This recommendation applies to the two following alternatives.

3.6.1 MAINTAINING EXISTING RECREATIONAL ENJOYMENT (Alternative 1)

In order to maintain the present recreational enjoyment of Lakes Simcoe and Couchiching, the main requirement would be adherence to the recommendations in the previous part of this report dealing with maintaining existing conditions (e.g. with respect to water quality and fishery).

The one problem which could be addressed at the present time is that road allowances constitute 25% of the total length of beach provided by municipal jurisdiction, and these road allowance areas do not supply adequate parking facilities and beach supervision. There is strong local resistance, however, to the utilization of road allowances for access.

Additional recreational facilities will be necessary to accompany population growth. The following are rough estimates for some of these facilities, based on available data. However, additional studies will be required.

1986	2001
1) 655-731 m. of beach with appropriate support facilities	1) 1883-3862 m. of beach
2) 47-58 boat ramps, or 591-729 mooring slips, or combination of two	2) 160-193 boat ramps, or 2510-3020 mooring slips, or combination of the two
3) 205-214 kilometers of hiking trails	3) 261-276 kilometers of hiking trails
	4) 133-171 kilometers of snowmobile trails

The above figures are a rough outline of some recreational facilities needed to maintain existing recreational enjoyment. It is not known if the basin would have sufficient capacity to absorb the increase in recreational use without some loss of the quality of the recreational experience or of the basin environment. Further study is required to assess this problem.

3.6.2 IMPROVING RECREATIONAL ENJOYMENT (Alternative 2)

Along with improving the water quality and fishery, the following measures would be required:

1) retention and acquisition of public open space from existing level to fifteen per cent of total shoreline;

2) recreational development of all present public holdings;

3) establishment of a policy for non-disposition of road allowances and development of suitable sites for recreational use;

CHAPTER 4

COSTING OF ENVIRONMENTAL DEVELOPMENT STRATEGIES

Chapter 3 outlines alternative programs of: maintaining existing conditions; and, improving; considering six major issues: water quality, fishery; wildlife habitat; mining; forestry; and recreation. A third alternative of allowing further degradation by not initiating advanced methods of control was considered by both the Report and Steering Committees to be unacceptable.

Some rough costing figures are available for the water quality and fishery sections. Unfortunately, practically no costing information is available for wildlife habitat, mining, forestry, and recreation.

The costing is based on population figures of 300,000 and 450,000 persons in order to illustrate the escalation in cost as the population in the Lake Simcoe-Couchiching Basin increases.

4.1 MAINTAINING EXISTING ENVIRONMENTAL QUALITY

4.1.1 MAINTAINING EXISTING WATER QUALITY

In order to maintain existing quality, the phosphorus loadings from sewage plants, urban drainage and agriculture plus other land disturbances would have to be maintained at the existing level of 103 tonnes P/year.

4.1.1.1 Existing Population of 186,800

It is estimated that approximately 100,000 (i.e. 55%) of the existing 186,800 basin population is serviced with communal sewage treatment facilities. As stated previously, this population, with existing environmental management practices, results in an annual phosphorus load to Lake Simcoe of 103 metric tonnes when the man-made input is combined with the "natural" input. The serviced urban population of 100,000 people generates 61 million liters per day of sewage, equating to 610 liters *per* capita per day. It is assumed that the per capita generation of wastewaters will remain constant in the future.

4.1.1.2 Future Population of 300,000

As the population in the Basin grows, the percentage of people in the serviced urban communities will likely increase. With a total Basin population of 300,000, it is assumed that 70% (210,000) will live in serviced urban areas.

4.1.1.2.1 Sewage Treatment Facilities

The assumed serviced urban population of 210,000 (70% of 300,000) would theoretically generate 2.1 times the existing volume of wastewater, and hence 2.1 times the amount of

phosphorus (i.e. 46 metric tonnes/year assuming no change in present treatment). However, with the completion of the York-Durham Servicing System, the municipal sewage from Aurora and Newmarket will be taken away from the Simcoe-Couchiching Basin. As these two communities constitute *32% of the present phosphorus load to Lake Simcoe, 31 metric tonnes (68% of 46) of phosphorus would be the S.T.P. loading to Lake Simcoe with an urban basin population of 210,000, and with the existing degree of phosphorus removal (i.e. to 1 mg/L). In order to reduce the phosphorus loading from 31 to 22 metric tonnes, the phosphorus concentration in all the final effluents would have to average 0.7 mg/L.

Under recently-established requirements of the Ministry of Environment, all new plants on the Basin, as well as additions to existing plants, must provide an effluent quality of 0.3 mg/L phosphorus. With the existing plants (excluding Aurora and Newmarket) providing a loading of 14 metric tonnes per year, and new plants plus additions (at 0.3 mg/L P) adding 8.8 tonnes when the population expands by a factor of 2.1, the total loading would be 23 tonnes/year. This 23 tonnes/year compares favourably with the existing S.T.P. load of 22 tonnes per year. Converting the 23 tonnes/year into an overall average phosphorus concentration in the effluents, one finds that the "objective" of 0.7 mg/L, stated above, would be roughly achieved.

Previous chapters have suggested that improved treatment, which would result in an effluent phosphorus concentration of 0.3 mg/L at new plants and enlargements, could consist of good aeration, as well as carefully-controlled phosphorus removal and effluent filtration. The additional cost of this type of treatment, over and above conventional treatment with phosphorus removal to 1 mg/L, would be perhaps **$25 annually per household in the basin.

Excluding Aurora-Newmarket, the increase in serviced population from 65,000 (existing) to 135,000 (2.1 x existing) would mean an increase of housing units from approximately ***20,000 to approximately 40,000. Hence, the additional cost for the specialized treatment required would be $25 x 20,000, or $500,000 per year. If this cost were spread over the existing plus new urban serviced community, the annual cost per household would, of course, be $12-13 per household rather than $25 per household.

In summary, the assumptions and calculations above lead to the conclusion that an annual investment of $500,000 ($12-13 per urban household) would be required to meet the policy of the M.O.E., and to keep the phosphorus loading from S.T.P.'s at about 22 tonnes/year as the total basin population grows from 186,800 to 300,000.

———————————————

* assuming all Basin plants have same (P)

** capitalized cost. Small additional operating cost would be added to this. This $25 figure was assumed as a result of M.O.E. information and discussions. Through the report, it is assumed that all capital costs would be capitalized at 10% per year.

*** Throughout report, calculations of numbers of households derived assuming 3.5 people per household.

4.1.1.2.2 Urban Drainage

The assumed serviced urban population of 210,000 would theoretically generate 2.1 times the phosphorus loading from urban storm waters assuming continued minimal storm-water management. Hence, the urban drainage phosphorus loading would be increased from 9 metric tonnes per year, to 19 metric tonnes per year.

Storm-water treatment has not been extensively implemented in Ontario, although considerable research and policy development is underway. For crude calculation purposes, however, it can be assumed that future management systems will likely involve the combination of "on-site" control measures with "end-of-pipe" control measures. The "on-site" controls could include techniques such as frequent catchment-basin cleaning, frequent street sweeping, and minimizing run-off rates by using roof-top detention, etc. The costs of these "on-site" control measures would be small. The "end-of-pipe" controls would likely include sedimentation ponds, which could result in a cost of *$500/ha/year for newly urbanized areas. Assuming an urban population density of 37 people per hectare, the 110,000 additional urban population would occupy about 3000 hectares. Hence the basin cost, for incorporating sedimentation ponds for new urban areas, could be 500 x 3000 = $1,500,000 annually.

If sedimentation ponds could reduce the phosphorus load from new urban areas from **10 to 7 tonnes, the total urban loading would be 7 + 9 = 16 metric tonnes rather than 19 metric tonnes. It is expected that carefully planned but very economical "on-site" controls (e.g. frequent street sweeping) could probably reduce to total loading by another ***7 tonnes, thereby keeping the urban drainage loading down to the existing 9 tonnes per year.

In summary, it could be concluded, from the above discussion and calculations, that an annual investment of 1.5 to 2 million dollars ($25 to 35 per total urban household) would be required to keep the phosphorus loading from storm water at about 9 tonnes/year as the total basin population grows from 186,800 to 300,000.

---

* The figure of $500/ha/year was assumed as a result of the review of the report of Canadian-British Engineering Consultants Limited entitled "Storm Water Management Study of the Midland Park Lake Watershed - 1977". In particular, Table P of that report.

** The assumption of 10 tonnes decreasing to 7 tonnes is based on an internal M.O.E. memorandum (June 13, 1977).

*** The assumption of 7 tonnes from street sweeping, etc. was made after a review of the paper entitled "Street Cleaning - Its Effect on the Environment", published in CIVIC - The Public Works Magazine - December, 1977.

4.1.1.2.3 Agriculture and Other Land-Use Activities

Minimizing the environmental impact of agriculture and other land-use activities may best be achieved through various programs. It is impossible to quantitatively cost these types of programs. However, the cost would no doubt be small compared with the predicted costs of improved treatment of sewage and urban storm waters.

The only well-defined phosphorus source from agricultural activities is the drainage water from the intensively farmed Bradford Marsh. This source likely contributes 5 to 6 metric tonnes per year, which is a substantial proportion of the 22 tonnes from agriculture and other land-use activities. Various controls or combinations of controls are possible to reduce the loading from the Marsh (e.g. lower fertilizing rates, different pumping procedures, aeration lagoon at Bradford).

4.1.1.3 Future Population of 450,000

With a total Basin population of 450,000, it is assumed that 85% (380,000) will live in serviced urban areas.

4.1.1.3.1 Sewage Treatment Facilities

Assuming the per capita production of sewage remains constant at 610 liters per capita per day, the phosphorus load to Lake Simcoe would be 30 metric tonnes per year under existing policy (i.e. existing plants at 1 mg/L; new plants and additions at 0.3 mg/L). In order to reduce this loading from 30 to the existing loading of 22, the overall average effluent phosphorus concentration would have to be 0.4 mg/L.

The following two possibilities would appear to exist to keep the S.T.P. load to 22 tonnes:

a) divert the sewage from Barrie and/or Orillia to another area;

b) bring the old S.T.P.'s to treatment calibre of the new plants (i.e. P - 0.3 mg/L).

a) With the removal of Aurora and Newmarket, the treated sewage from Barrie plus Orillia will constitute about 85% of the phosphorus load to Lake Simcoe coming from S.T.P.'s. With existing treatment policy, the removal of either of these effluents to another area would probably reduce the S.T.P. loading from the 30 tonnes mentioned above, to below the "target" of 22 tonnes. In fact, if both effluents were removed from Lake Simcoe, the total loading from S.T.P.'s would be reduced to less than 5 metric tonnes per year. It is evident that effluent diversion could constitute a major force toward the long-term preservation of Lake Simcoe.

The cost of such diversions is not detailed in this report, and would, of course, depend on the selected area of relocation.

b) As mentioned previously, reducing the loading from 30 tonnes to 22 tonnes would require an overall average effluent concentration of 0.4 mg/L. Hence, to accommodate a serviced urban population of 380,000, the old sewage treatment plants would have to be upgraded to provide treatment comparable to the new ones (i.e. effluent (P) of about 0.3 mg/L). As previously stated, the additional annual cost (over and above conventional treatment) for new plants achieving 0.3 mg/L would be roughly $25 per new urban residence. As the cost of renovation typically exceeds the cost of new construction, it would be reasonable to assume that the $25 figure would perhaps be increased to $40.

   As the existing urban population is about 20,000 units (excluding Aurora-Newmarket), the annual cost of renovations would be in the order of $800,000. However, with a serviced urban population of 380,000, this cost would theoretically be spread over the 72,000 housing units (excluding Aurora-Newmarket) at that time, resulting in a housing unit cost of about $10 per unit per year. Combining this $10 figure with the $12-13 figure required to meet existing M.O.E. policy for new plants, the total cost becomes $22-23 per household per year.

In summary, one can conclude that an annual investment of $800,000 would be required to keep the phosphorus loading from S.T.P.'s at about 22 tonnes/year as the basin population grows from 300,000 to 450,000.

4.1.1.3.2 Urban Drainage

With the Basin population expanding from 300,000 to 450,000, it is evident that a high degree of attention would have to be paid to storm-water management. The management system required could include extensive "on-site" control measures, as well as perhaps collecting and treating the urban drainage from new as well as old (existing) urban areas. As mentioned above, basic settling ponds for new urban areas, together with basic on-site control measures (e.g. frequent street sweeping) could cost $25-35 per urban residence. The addition of chemical treatment (e.g. alum dosage units and clarifiers) to the settling ponds would likely add *30-50% to the cost of a basic settling pond. Hence, while an accurate costing for a "high degree" of storm-water management cannot be determined, it is quite possible that $50 per urban residence would be required rather than the $25-35 figure quoted for the basin population of 300,000. Hence, with an urban population of 100,000 housing units, the total basin cost could be $50 x 100,000 = $5,000,000 per year.

———————————

* The figure of 30-50% was assumed as a result of the Canadian British report detailed above.

In summary, one can conclude that in order to keep the phosphorus loading from urban drainage constant, the cost could be in the order of $50 annually per household, or roughly $5,000,000 annually when the serviced urban population on the basin reaches 380,000 people.

4.1.1.3.3 Agriculture and Other Land-Use Activities

Unlike the estimation of trends with respect to urbanization on the Basin, it is impossible to predict the agricultural trends; agricultural trends are regulated by numerous factors (e.g. changing markets, changing technology) so that the long-term changes in overall environmental impact on the Lakes is impossible to predict.

Additional studies and future monitoring are required to establish what environmental programs will be required to maintain the agricultural impact at a constant level.

4.1.1.4 Figure 6 illustrates the costs involved in maintaining the existing water quality of Lakes Simcoe and Couchiching.

4.1.2 MAINTAIN EXISTING FISHERY

Presently, the Ministry of Natural Resources spends 83,000 dollars annually on fisheries assessment programs for Lake Simcoe. It spends an additional 12,500 dollars annually in its stocking program of 100,000 hatchery reared yearling trout. Other fisheries management practices include the encouragement of smelt harvesting in the spring and a possession limit on whitefish. Despite this, the overall fishery continues to depreciate. To try and maintain, as much as possible, the existing fishery, additional financial commitment will be necessary to improve on technical and scientific knowledge and therefore, management capabilities. Also, somewhat tighter environmental controls would be needed to minimize the impact of watershed activities. There would have to be more consideration for the protection of the environment in Official Plans, and tighter supervision and control over such aspects as industrial and housing development, dredging activities, etc. It is not possible to place a cost figure on these various additional controls and investigations which would be required. Upgrading MNR's assessment capabilities might involve an additional expenditure of 150,000 to 200,000 dollars yearly.

4.1.3 MAINTAIN EXISTING WILDLIFE

With increasing development on the basin, considerable attention would have to be directed to wildlife resource management. The identification, preservation and perhaps management of important wildlife areas will become more and more essential. Similarly, the adverse impact of "development" (e.g. impact of roads, houses, industry) would have to be minimized. Again, it is difficult to provide costing on these programs, although the cost of managing privately owned wildlife habitats is estimated to range from $0.60 to $5.00/ha/year.

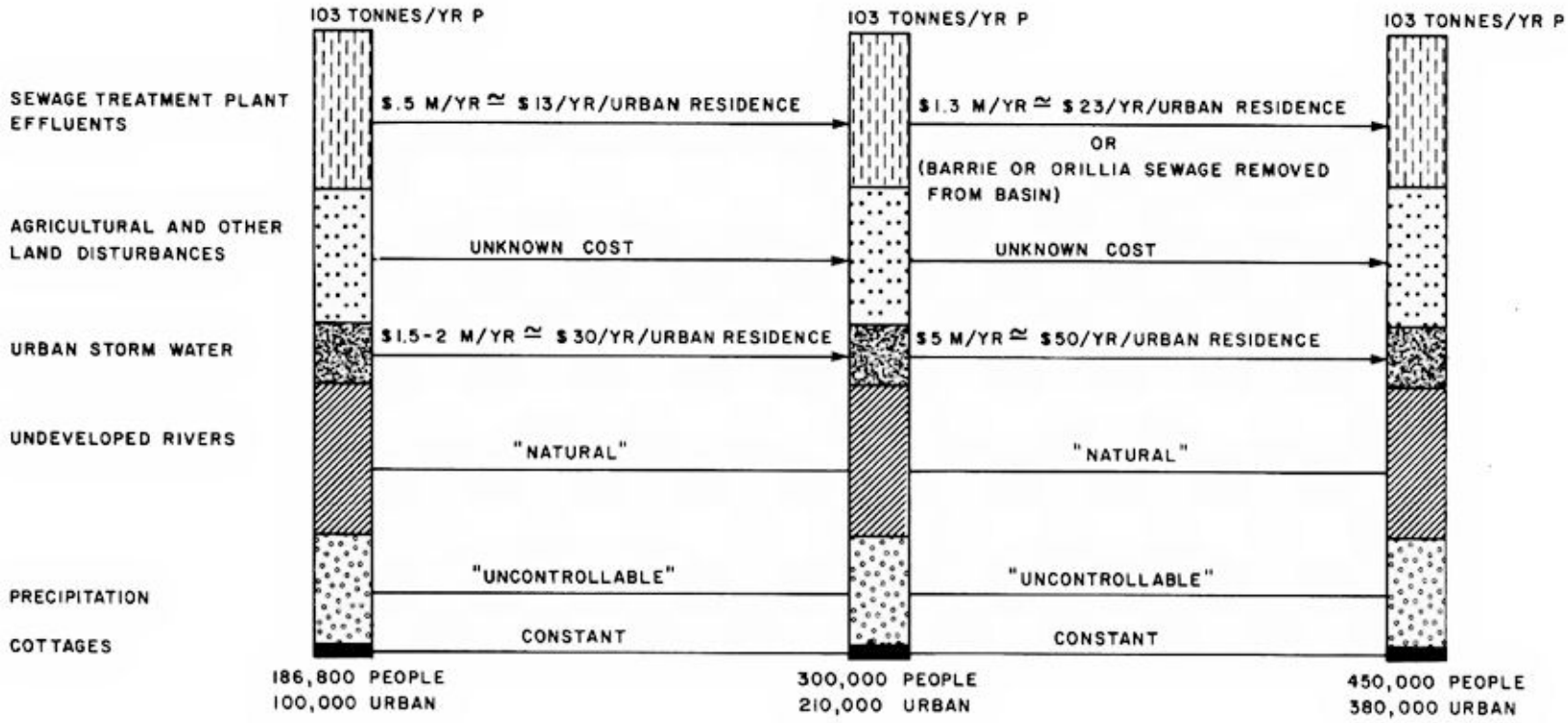


FIGURE 6. Cost Of Maintaining Existing Quality.

4.1.4 MAINTAIN EXISTING ENVIRONMENTAL CONTROL OVER MINERAL RESOURCES

In 1976, 123 licenced pits and quarries on the basin supplied about 7 million tonnes of aggregate. A total of 86 of these sites are now abandoned. The figures quoted in this section do not reflect the actual cost of rehabilitation. Costs vary according to the size and nature of the operation, as well as the proposed plans for the site, but might be substantial. These rehabilitation costs would have to be borne by the Ministry of Natural Resources.

A levy of 2¢ per tonne is collected which will be returned on completion of rehabilitation. However, since this levy does not cover the cost of rehabilitation, the Ontario Mineral Aggregate Working Party has suggested a raise to 8¢/tonne, which hopefully would cover rehabilitation costs.

4.1.5 MAINTAIN EXISTING FORESTRY

In order to protect existing forested areas, it would be necessary to:

- provide educational programs to the municipalities
- provide more potent policy comments, from Ministry of Natural Resources on development proposals for woodlots It is not possible to cost out these required actions.

4.1.6 MAINTAIN EXISTING RECREATION

Data from various MNR studies (Ontario Recreation Survey, Ontario Recreation Supply Inventory, TORPS Model), when applied to the Simcoe-Couchiching Basin, reveal that in general, the existing recreational demands on the Lakes are being adequately met by the existing resources. One exception to this generalization is hiking, where the demand exceeds the existing resource. Most of the recreational demand comes from people who live outside the Basin. However, further studies are required on this subject.

In order to maintain the existing level of recreational service on the Basin, facilities will have to be expanded. Information is not readily available to apply a costing on maintaining the existing level of recreational service.

4.2.1 IMPROVING WATER QUALITY

The present phosphorus load to Lake Simcoe is approximately 103 metric tonnes per year. In order to significantly improve lake quality, this loading would have to be substantially reduced, say to a loading level of approximately 75 tonnes per year.

4.2.1.1 Existing Population of 186,800

As almost half of the existing phosphorus load is from very-difficult-to-control sources (e.g. precipitation, rivers in their natural state), the "controllable" sources (S.T.P.'s, agriculture, urban storm waters) would have to be reduced by approximately one-half in order to bring the 103 tonnes down to 75 tonnes. Also, with the understanding that the agricultural fraction of the "controllable" sources is difficult to reduce, greater than 50% reduction would have to be achieved on the urban sources (S.T.P.'s and urban drainage) to compensate for the difficulty in reducing the agricultural impact.

4.2.1.1.1 Sewage Treatment Facilities

As outlined previously, the present loading from sewage treatment plants is 22 metric tonnes per year assuming an effluent quality of 1 mg/L. The removal of Newmarket and Aurora to the York-Durham system would subtract 5 tonnes, leaving a balance of 17 tonnes. With facilities incorporated into existing plants which would achieve an effluent phosphorus of 0.3 mg/L, the total S.T.P. load to the Lake could be 5 metric tonnes (0.3 x 17), or 20-25% of the existing load.

As discussed previously, renovating existing plants to achieve 0.3 mg/L could cost $40 annually per household, equating to $800,000 annually for the basin (excluding Aurora-Newmarket).

4.2.1.1.2 Urban Drainage

As outlined previously, a costing of $50 annually per urban residence would likely result in a large percentage of the phosphorus being removed from new urban drainage. The costs of urban drainage improvements for existing urban areas would exceed the $50 figure. With an assumed cost of $70 per residence per year and 29,000 residential units on the basin, the total annual cost would be about $2 million.

4.2.1.1.3 Agriculture and Other Land Use Disturbance

Major efforts to minimize the existing phosphorus input from agriculture and other land disturbances would be costly. For example, manure storage for a dairy operation, using a slatted floor and liquid manure storage, could cost $70,000 for 100 cows. With some 300 fluid milk shippers and 25,000 head of dairy cattle on the basin, it is evident that considerable money could be spent through the incorporation of sophisticated manure practices at dairy farms. Similarly, manure controls at beef farms and swine farms, runoff controls from barnyards and watercourse fencing could all be very costly.

4.2.1.1.4 Conclusion

It is quite possible that 1) by introducing the "best practical technology" at existing sewage treatment plants; 2) by applying innovative urban-drainage management; and

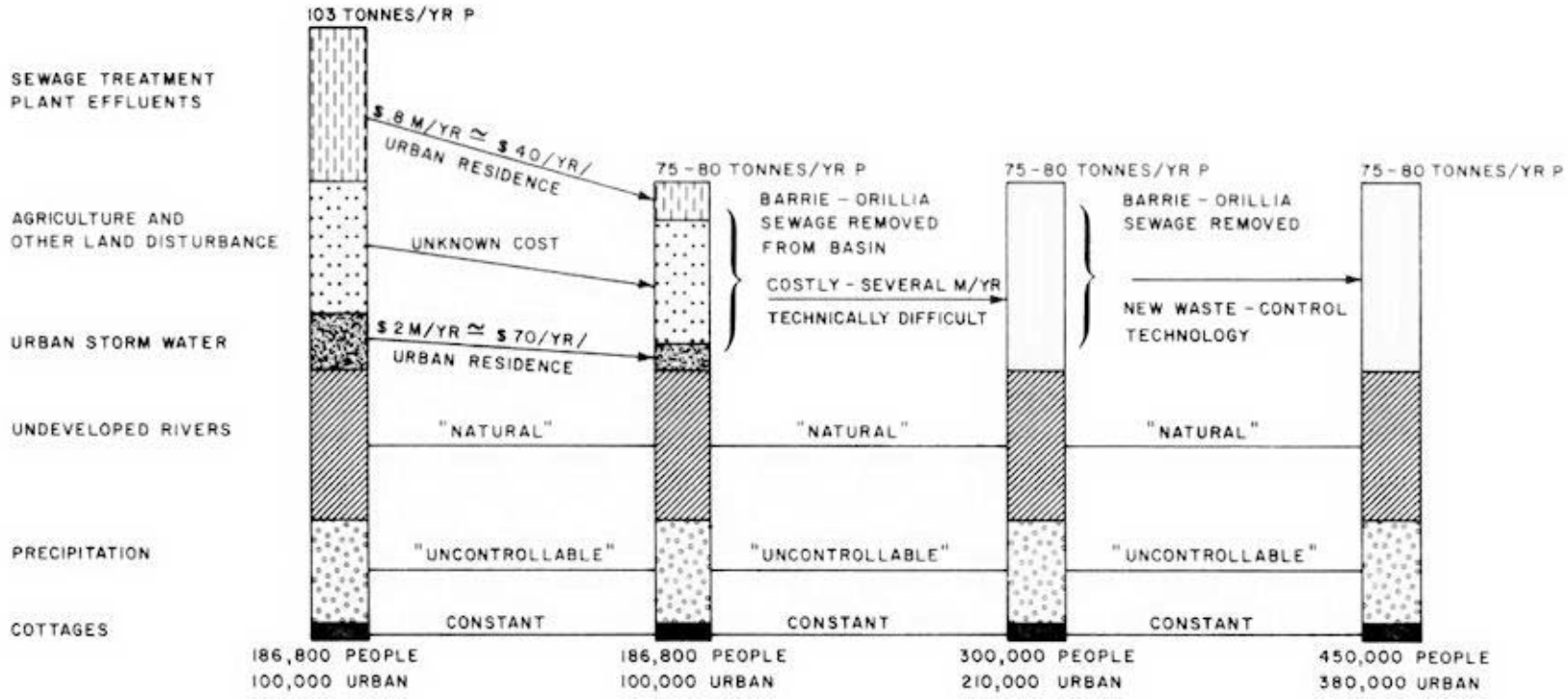


FIGURE 7. Cost Of Improving Water Quality.

3) by introducing economical but effective agricultural controls (e.g. educational-informational campaigns), the existing phosphorus loading could be reduced from 103 tonnes per year to 75-80 tonnes per year. The cost of these environmental controls would perhaps be in the order of $150 per basin household per year, for a total basin cost of about 4.8 million dollars annually.

4.2.1.2 Future Population of 300,000

As outlined above, it would be costly and difficult to improve water quality even with the present population of 186,800 remaining constant. With a theoretical future basin population of 300,000, it would appear that to achieve improved water quality, the sewage wastes from Orillia and Barrie would have to be diverted into another area.

4.2.1.3 Future Population of 450,000

It is likely that improved water quality with a basin population of 450,000 could be achieved only 1) with the sewage from Barrie and Orillia directed elsewhere; and 2) with the development of waste-control techniques which are presently not available.

4.2.1.4 Figure 7 illustrates the costs involved in improving the existing water quality of Lakes Simcoe and Couchiching.

4.2.2. IMPROVE FISHERY

The Ministry of Natural Resources has identified a specific goal statement for Lake Simcoe: to create a rehabilitated fish community which is stable, diverse, naturally reproducing and dominated by indigenous predators. To achieve this, the quality of Lakes Simcoe and Couchiching would have to be restored to a state existing two decades ago.

Upgrading the existing assessment unit to improve their monitoring capability would require the expenditure of additional funds as indicated in section 4.1.2. Whether or not a "maintain" or "improve" environmental strategy is adopted the monies spent to acquire this new knowledge base would be similar. The lake trout rehabilitation program would have to be continued on interim basis at a cost of $12,500 per year. An interim whitefishing stocking program, if considered practical, would be costly. Additional new program initiatives, including rehabilitation of spawning shoals and increased exploitation of smelt and yellow perch might be undertaken.

In summary, it is evident that the cost to improve the assessment and management of the fishery, whether a "maintain" or "improve" option is adopted is similar. Only the emphasis of the program would change. The adoption of several new program initiatives, particularly whitefish rehabilitation, even on an interim basis would be quite costly.

4.2.3 IMPROVE WILDLIFE

Improved wildlife management would be initiated after an extensive survey of the watershed to identify areas which are the most suitable and most feasible for enhancing and protecting as wildlife areas. The following lands which are currently under development pressures could be acquired as Wildlife Management Areas:

Name	Area (Ha)	Estimated Acquisition Costs (Millions of Dollars) -1977	Estimated Management Costs (Thousands of Dollars)-1977
Beaverton River Marshes	1600	1.6-2.0	20.0-32.0
Pefferlaw Lake	290	0.29 -0.36	3.6-5.8
Pottageville Swamp	300	0.90	4.5 -7.2
Holland Marsh	1050	3.9-5.2	13.0- 20.8
TOTAL	3300	6.69 -8.46	41.1-65.8

The costs of managing privately owned wildlife habitats are estimated to range from $0.60 to $5.00 per hectare per year.

The above costings are, of course, only a part of the monies which would be required for overall studies and management projects.

4.2.4 IMPROVE ENVIRONMENTAL MANAGEMENT OF AGGREGATE OPERATIONS

As an initial step, a geological inventory would be required to provide the framework for improving production. Based on this inventory, the environmental aspects of exploitation of the resource would have to be assessed. The MNR suggests that the inventory would cost about $100,000.

4.2.5 IMPROVE FORESTRY

In addition to the activities required to maintain existing forestry (Section 4.1.5), a mapping of the lands suitable for forestry would have to be carried out. Also, reforestation projects should be encouraged to increase the percentage of watershed coverage by forests, development in forests located on headwater areas and major aquifer recharge areas should be controlled, and areas of high aggregate potential should be established for forestry on an interim basis.

The cost of reforestation within the watershed as part of the year 2020 Production Forest requirements is broken down, by Ministry of Natural Resources District, as follows:

District	Ha Planted/Year	Per year (dollars)
Maple	67	$13,000 -16,000
Lindsay	10	$2,000
TOTAL	77	$15,000 +

4.2.6 IMPROVE RECREATION

Although Lake Simcoe-Couchiching supplies in general adequate recreational opportunities, there is one recreational facility which requires improvement. These are the road ends which are presently being used for activities such as boat launching, without appropriate accompanying facilities (e.g. parking, ramps). A second item requiring improvement relates to some prime recreational facilities on the Basin which are presently used to capacity (e.g. Sibbald Point Provincial Park).

The costing needed to improve certain recreational activities, up and beyond keeping up with the existing supply-demand situation, is not available from existing information.

4.3 COSTING SUMMARY

In summary, the additional costs of maintaining existing conditions are estimated as follows: Although precise estimates are not available, some funds are necessary to initiate further studies and some strategy recommendations. For example, the fishery work would involve an expenditure of $150,000 - $200,000.

Existing Conditions 300,000 Population		Cost per Residence/Year
Sewage Treatment	(urban only)	$ 13.00
Urban Drainage	(urban only)	$ 30.00
Other Programs*	(approx.)	$ 17.00
		$ 60.00

(Total Cost $3.0 million/year)

* See next page

Existing Conditions 450,000 Population		Cost per Residence
Sewage Treatment	(urban only)	$ 23.00
Urban Drainage	(urban only)	$ 50.00
Other Programs*	(approx.)	$ 27.00
		$100.00

(Total Cost $7.5 million/year)

See Figure 6 for a graphical presentation of costs.

A review of Figure 7 reveals that complete costing detail for the improved status is not provided beyond that of restoring quality conditions for the present population on the watershed of 186,000 persons. Beyond the present population level, it would be increasingly difficult to achieve the suggested 75-80 tonnes per year of phosphorus input level to the lakes. Activities such as diverting sewage effluents from the basin and the use of new technology would have to be initiated. However, considering the indicated constraints Figure 7 graphically outlines the following details.

Improving 186,000 Population		Cost per Residence/Year
Sewage Treatment	(urban only)	$ 40.00
Urban Drainage		$ 70.00
Fishery		$ 10.00
Other Programs*	(approx.)	$ 30.00
		$150.00

(Total Cost $4.8 million/year)

---

* While the costing of several important activities including additional fish studies and stocking programs, Holland Marsh remedial programs, wetlands and woodlot development, provision of recreational facilities and agricultural education programs was not possible, an approximation of required funding is presented to round out the cost picture. Further, not all costs for all these programs will or can be levied against all households.

CHAPTER 5

ENVIRONMENTAL STRATEGY AND IMPLEMENTATION

5.1 ENVIRONMENTAL STRATEGY

It has been concluded from discussions with local municipal representatives and provincial ministries that two major environmental alternatives should be considered.

- Maintain Existing Conditions
- Improve Existing Conditions

These alternatives had been selected to satisfy the major concern at the local and provincial levels for the deterioration of the traditional role of the Lake Simcoe-Couchiching area as a strongly water oriented multiple-use area. The aim of the Lake Simcoe-Couchiching Committees was to develop a strategy which would upgrade or at least retain the environmental character and related socio-economic status of the Basin.

The principal environmental factors affecting the quality of the recreational experience are water quality and fishery. The pollutant which affects water quality both locally and lakewide is phosphorus. The fishery is affected by water quality, marine construction and recreation. Marine construction relates to the destruction of fish habitat and recreation creates fishing pressure which can affect maintenance of a viable fishery.

As one important factor in preserving existing water quality conditions, the phosphorus loading cannot be allowed to increase above its present rate of 103 metric tonnes per year; while the alternative of improving the existing conditions would require the reduction of the annual load to about 75 metric tonnes of phosphorus.

Figure 5 establishes land drainage and municipal input (from sewage treatment plants) as the major sources of this pollutant, and Chapter 3 outlines the various options available which would prevent the phosphorus loading to increase above 103 metric tonnes per year or reduce and maintain the annual loading at about 75 metric tonnes per year. Chapter 3 in essence, thus, represents a detailed outline of how to implement the two major alternatives.

Chapter 3 also deals with the fishery and other environmental issues such as wildlife habitat, mining and forestry and establishes (together with its support documents) the management option designed to maintain or improve existing conditions.

The task, therefore, remaining is the selection of the strategy to maintain or improve the existing conditions and then to select from Chapter 3 the option needed for implementation. A number of factors have to be considered for this task.

Technological
Economic and
Social Development

5.1.1 TECHNOLOGICAL

Waste treatment technology is fairly well understood, but insufficient with the population projections to ensure the long-term preservation of the cold-water fishery. The urban drainage treatment is difficult to implement and the technology for measures required to reduce phosphorus loadings from agricultural land drainage is just now being developed and can only be expected to be applicable and effective sometime in future. However, it is felt that technologically, the existing water quality conditions can be maintained. Only new, presently untried technology would allow improved conditions over the long term if current population projections prove accurate.

5.1.2 ECONOMIC AND SOCIAL

Detailed economic and social appraisal of the various options outlined in Chapter 3 was not possible because a number of the options require detailed investigation or research and development before their costs and social desirabilities can be determined. A number of points can be made.

1) The tourism industry has significant local and provincial economic and social implications. Tourism relies on the quality of the recreational experience which relates to good water quality and fisheries.

2) The cost figures summarized in Chapter 4 and specifically on Figure 6 and 7 are generally very rough estimates. The waste treatment costs are more reliable than the estimated costs for land drainage controls. However, notwithstanding these qualifications, it is felt that these cost estimates are useful in guiding future development in the Lake Simcoe-Couchiching basin. It should be appreciated that many of these measures will in turn affect development costs and could have numerous "spin-off" costs and effects not measured in this paper (e.g. lot levy increases, house prices, costs of revisions to local planning documents).

5.1.3 DEVELOPMENT

The rate of future development will largely influence where and when the measures outlined in Chapter 3 will be implemented. Given the present technological limitations, the alternative of improving existing conditions which equates to reducing the phosphorus loading to about 75 metric tonnes per year, is unachievable if the basin population increases as summarized in Chapter 2. Recent trends in the basin indicate a decrease in the general rate of population growth which may delay considerably increase to a population of 450,000 people.

5.1.4 DISCUSSION

Municipal representatives, in light of these facts, have opted for adoption of the alternative of maintaining existing conditions. In terms of increased population, it is technically possible to maintain existing quality up to a population of 450,000 people. However, as estimated in Section 4.3, costs more than double between the 300,000 and 450,000 population level to maintain the existing conditions. Generally, this alternative of maintaining existing conditions is also supported by the provincial ministries. However, the Ministry of Natural Resources objected, because the rehabilitation of a naturally reproducing cold-water fishery (lake trout, whitefish) would be unachievable with adoption of this alternative and at best the lake trout fishery might be sustained by extensive stocking. The South Lake Simcoe Conservation Authority was concerned that local pollution problems still required improvement.

Two other points have emerged from discussions with the local municipal representatives. In view of the fact that some uncertainties exist with regard to the effectiveness of the removal of phosphorus by some of the control measures outlined in Chapter 3, it was recommended and adopted through formal resolution by the Steering Committee that the phosphorus loading goal of 103 metric tonnes per year be reduced to a more conservative 95 metric tonnes per year. In addition, municipal representatives stressed that population constraints may have to be exercised in the long term, in order to achieve the preservation of existing conditions. With respect to reducing the phosphorus loading goal, the conservative approach is not deemed required as sufficient monitoring of the inputs is ongoing which would provide early warning if indeed some of the control measures instituted were not as effective in controlling the phosphorus load. Furthermore, the goal of 103 metric tonnes of phosphorus is considered to provide adequate protection of the existing water quality.

Given the above, the detailed strategy is outlined in section 5.3.

5.2 IMPLEMENTATION AND CO-ORDINATION

The Province should ensure implementation through its review and approval of local planning and development control action, through its technical expertise and in some cases through financial assistance. In this regard, the following strategy recommendations which are dealt with in more detail in Chapter 3 and designed to protect at least existing conditions should, where appropriate, be incorporated in, or taken into account when preparing or revising the official plans of the local municipalities.

Various options of implementing the selected strategy have been considered by the Steering and Report Committees as follows.

A. Provincial Secretariat for Resources Development:

- conducts an annual review of implementation done to date;

- reports progress to Cabinet Committee on Resource Development.

B. Designated agency:

- reports to Cabinet Committee on Resource Development; -conducts an annual review of implementation done to date by themselves and all other agencies.

C. Line agencies:

- each individual agency is responsible for its own co-ordination of the implementation of the recommended strategy and co-ordination between agencies will be left to existing channels.

D. South Lake Simcoe Conservation Authority and/or Canada-Ontario Rideau, Trent-Severn Secretariat:

- co-ordinate implementation with local involvement and report to Cabinet Committee on Resource Development.

E. Provincial-Municipal Implementation Committee:

- -as suggested by Steering Committee.

The Steering Committee have recommended a special Implementation Committee made up of local elected official plus appropriate government agencies with a permanent secretariat (with joint provincial-municipal funding) working under the guidance of the Committee. The Implementation Committee would keep abreast of activities and environmental quality on the Basin, and would deal directly with the agencies involved in the Basin activities and quality.

The Report Committee considered this recommendation and the above options. Considerable thought was given to the option of having a special "Implementation and Co-ordination Agency or Body" instead of utilizing existing agencies and legislation to carry out and co-ordinate the strategy. It was unanimously agreed that in theory, existing government structure and mechanisms should be adequate to implement and possibly co-ordinate the strategy, but considerable doubt was expressed that in practice, effective co-ordination of the strategy would take place. This doubt was based on the concern that on the one hand, there is the split in jurisdiction and management over the environment at the provincial and local level and on the other hand, the fact is that the concern over the lack of co-ordination between existing agencies was the very reason that initiated the development of this strategy. Having this strategy is of no value unless co-ordinated implementation can be assured. On the other hand, a new special purpose body could add to bureaucratic red tape

and is contrary to the provincial government's commitment to deregulation. After considerable discussion, a resolution was passed recommending that the strategy in the first instance be made provincial and municipal policy and further that the policy be implemented through existing agencies and mechanisms.

The question of how best to co-ordinate implementation was discussed at length by the Report Committee. The Committee decided to recommend that CCRD act as co-ordinator. It is most important to gain a clear commitment from all the agencies which have a prime responsibility in the strategy implementation. The stronger the commitment, the less the need for co-ordination.

5.3 DETAILED STRATEGY

Additional development can be accommodated providing it meets the phosphorus loading target of 103 metric tonnes per year. The exact amount and location of further development must, however, be initiated primarily at the local level. Policies and guidelines concerning environmentally sensitive issues such as water quality, agriculture, hazard lands, forestry, fish and wildlife, mineral resources, etc. all have to be taken into consideration by local and provincial agencies when considering additional development.

There is a clear commitment at the local and provincial levels of government to:

- maintaining and whenever possible improving water quality;
- maintaining and whenever possible improving the fishing quality;
- ensuring continued recreational enjoyment of the lakes.

The following listing outlines the activities necessary to meet this commitment.

		Responsibility*
(1)	The phosphorus loading to the lake should be limited to 103 metric tonnes per year. Consistent with this loading goal, the following measures will have to be taken.	MOE, OMAF, Municipalities
	a) Reduction of phosphorus concentrations at <u>existing</u> sewage treatment facilities as much as possible below the present 1.0 mg P/L in order to reduce the total loading to the lakes to 103 metric tonnes per year.	
	b) All new sewage treatment facilities or plant enlargements must provide a phosphorus effluent quality of 0.3 mg/L.	

c) Storm water control techniques for new and existing urban areas will have to be implemented to reduce as much as possible the phosphorus input from that source.

d) Strategies to reduce the input of phosphorus from agricultural activities should be implemented as soon as practicable. In this regard, reference should be made to the PLUARG findings which provide guidance on the type of remedial measures required to reduce nutrient escape from land drainage in general and agricultural specifically.

e) For unserviced areas with identified septic tank problems, surveys should be carried out to detect faulty systems and to implement corrective measures in compliance with MOE criteria.

(2) Dredging, filling and development of wetlands and marshy areas must be prevented, since these areas are generally unsuitable for private waste disposal system. These activities also may impair water quality in general, destroy fish spawning areas, or create erosion and flooding problems. — MOE, MNR, SLSCA, Municipalities

(3) Present levels of fishing quality in lakes Simcoe and Couchiching should be maintained as much as possible. This will have to be achieved through the protection of fish habitat and spawning areas and the continuation at least at present levels of the fisheries assessment and management programs. The lake trout stocking program should be continued. — MNR

(4) Significant wildlife habitat areas should be identified, protected and managed. — MNR, Municipalities, SLSCA

(5) New development adjacent to or on existing mineral extraction operations should be discouraged. Also, the environmental effects of these operations should be carefully monitored, especially with regard to ground water depletion or contamination. — MNR, MOE, Municipalities, SLSCA, MOH

(6)	The existing forest cover should be preserved. Local enforcement, through tree cutting by-laws, is strongly encouraged and developers are encouraged to maintain as many quality trees as possible.	MNR, Municipalities, SLSCA
(7)	In order to maintain existing recreational enjoyment, additional facilities for the public will have to be provided.	MNR, SLSCA, Municipalities, MIT
(8)	Major permanent residential development should be encouraged to locate in or adjacent to serviced urban areas. In this regard, municipalities should be encouraged to identify areas they are prepared to service year-round.	Municipalities, MOH, MOE
(9)	All municipalities in the Lake Simcoe-Couchiching basin should review their official plans and zoning by-laws and where necessary make revisions to reflect the environmental strategy. Proposals for residential development will then be reviewed in the context of these approved official plans.	Municipalities, MOH
(10)	It is recommended that the above strategy be adopted as provincial policy and implemented through existing agencies and mechanism. The requirement that an effective co-ordination mechanism be developed to ensure implementation of the strategy is emphasized.	CCRD
(11)	A public education - information program should be established to enhance environmental conscience and cultivate public support for the implementation of the strategy.	Ministries

In addition to the above, the following additional studies are required.

1. The adequacy of existing chemical and biological surveys should be reviewed, upgraded if required, and continued to establish trends in water quality (MOE)

2. Additional studies should be carried out to identify environmentally sensitive areas as for example, wildlife habitat. In this context, MNR should develop guidelines for defining sensitive areas (MNR).

---

* Includes legislative and/or primary roles in the implementation of the measures.

3. Assessment of the Lake Simcoe-Couchiching fisheries should continue at a more intensive level to allow better management (MNR).

4. The feasibility and effectiveness for reducing the phosphorus escaping from the Holland Marsh (3.1.1.3) should be investigated (OMAF).

5. Identify faulty private sewage disposal systems (MOE).

6. Assess the recreational carrying capacity of the Basin and the impact of increased recreational use (MNR, CORTS).

APPENDIX A

LAKE SIMCOE - COUCHICHING BASIN

TERMS OF REFERENCE FOR STRATEGY REPORT

1. BACKGROUND INFORMATION

   Review background information contained in existing official plans of municipalities in the drainage basin; studies; standards; and, legislation.

   Determine past and current development trends, and estimate future development requirements.

2. PROBLEM IDENTIFICATION

   Identify types, locations and extent of existing problems and conflicts, and estimate the degree of growth of the problems with anticipated levels of development.

3. NEED FOR DEVELOPMENT STRATEGY

   Detail the need, or non-need, for an environmental development strategy.

4. ALTERNATIVE ENVIRONMENTAL DEVELOPMENT STRATEGIES

   Prepare alternative environmental development strategies, within a six month period, using environmental constraints, amongst others, as a guide. The strategies should also include consideration of; advanced waste and storm water treatment, and alternative quality or water use goals. Evaluate the alternatives and select a preference.

5. IMPLEMENTATION PLAN

   Develop implementation plan for the preferred environmental development strategy.

6. REVIEW BY ELECTED MUNICIPAL REPRESENTATIVES

   The draft report to be forwarded to the Lake Simcoe Steering Committee and municipalities for review and comment.

7. CCRD REVIEW
   Final report to be prepared and forwarded to CCRD for review and direction.

APPENDIX B

COMMITTEE MEMBERS

REPORT COMMITTEE

1) Ministry of Housing
   - Elaine Hitchman/Marcia Smith
   - Jennifer Darrell

2) Ministry of Natural Resources
   - Sabu George
   - Ron DesJardine

3) Ministry of Agriculture and Food
   - Donald W. Gallagher

4) Ministry of the Environment
   - Steve E. Salbach
   - George R. Trewin - Chairman
   - Denis Veal - Secretary

5) Ministry of Industry and Tourism
   - Ted Spearin

6) Ministry of Treasury
   - Milton Phillips/Paula Frisch

7) Simcoe County
   - Gordon R. Knox

8) Canada-Ontario-Rideau-Trent-Severn, Secretariat (CORTS)
   - Peter J.T. White

9) South Lake Simcoe Conservation Authority
   - Robert McClure

10) Region of York
   - William S. Addison

11) Region of Durham
   - James W. Blair

12) City of Barrie
   - Gerry A. Tamblyn

13) City of Orillia
   - Earl W. Newhall

14) Township of Innisfil.
   - Charles E. Tatham

STEERING COMMITTEE

1) City of Orillia
   - Frank Kehoe

2) Township of Innisfil
   - Blake Constable

3) Township of Mara
   - Archie Newman

4) Township of East Gwillimbury
   - Jean LaChappelle

5) City of Barrie
   - Ross Archer

6) Township of West Gwillimbury
   - John Fennell

7) Town of Newmarket
   - Robert Forhan

8) Township of Brock
   - Keith Rynard
   - Stan Richard

9) Township of Oro
   - Howard Campbell
   - Allan McLean

10) Simcoe County
   - Roy Gardhouse/Morris Darby

11) Town of Bradford
   - Roy Gordon

12) Township of Georgina
   - Howard Shillington - Chairman

13) Canada-Ontario-Rideau-Trent-Severn, Secretariat (CORTS)
   - Paul Wyatt

14) South Lake Simcoe Conservation Authority
   - George R. Richardson