



CHAPTER 4: SHORELINE

In the past decade, there has been increased concern about the nature and extent of lakefilling, measures used to control shoreline erosion, and other shoreline modifications in the Greater Toronto bioregion. Reports prepared for the Ministry of the Environment (MOE) during the 1980s revealed the existence of extensive heavy metal and organic contamination in some soils used for lakefill. The Royal Commission's first interim report (1989) described other concerns as well:

The [Ministry of the Environment] analyses clearly revealed that, while lakefilling operations have had little or no short-term impact on surface-water quality, they do contribute to general sediment contamination, with potentially damaging effects on the biological food chain.

... extensive modifications of the Lake Ontario shoreline have altered natural coastal processes, causing contaminants to accumulate in sediments; in the past, such pollutants would have been transported offshore.

There has been no comprehensive assessment of the cumulative

impact of lakefilling on Toronto's waterfront.

While understanding that lakefilling and other forms of shoreline modification can have beneficial effects, the Commission reiterated its concern about these practices in *Watershed*, its 1990 interim report. In that document, the Commission confirmed that it believed the situation was serious enough to require a moratorium on new lakefill projects, pending further study. The Commission recommended that the Province bring forward comprehensive lakefill policies for public review as soon as possible.

The provincial response was prompt: as a first step, in December 1990 the Minister of the Environment told the Legislature that she had asked the Royal Commission to address "... policies, practices, technology, and methods available to regenerate the shoreline areas".

The minister's choice of the phrase "regenerate the shoreline" was regarded as significant. Clearly, she wanted something much broader than a study of lakefill: the word "regeneration" suggested a desire to establish a shoreline that was healthier and more beneficial to the surrounding

community. Lakefill would be a significant consideration in the study, but would be placed in the context of the broader issues of a sustainable environment, economy, and society.

The Commission created the Shoreline Regeneration Work Group, nine people with diverse backgrounds and expertise, who were asked to investigate issues and options. The Work Group first met in February 1991, and its report, *Shoreline Regeneration for the Greater Toronto Bioregion*, was released the following September. The report, combined with submissions at earlier public hearings and with other presentations, gave the Commission broad information about the problems and opportunities posed by shoreline regeneration.

HISTORY OF SHORELINE MODIFICATION

It is important to recognize that the shoreline of Lake Ontario has evolved since the retreat of the glaciers about 15,000 years ago. We can neither return the lakeshore to "the way it used to be" nor hold it in its current state: forces beyond human control ensure that it constantly changes.

Until the 18th century and the arrival of European settlers, human inhabitants of areas around Lake Ontario adapted themselves rather than attempt to change the waterfront. The forces of wind, water, frost, and ice sculpted the shore: frost shifted the ground, cracked the rocks, and hastened erosion of river, stream, and lake banks. Wind gave the waves energy. The waves pounded relentlessly against the shores, dislodging rocks and soil. Sand eroded from the shore was augmented by sediment discharged from the mouths of rivers and

streams; this gritty material tumbled in the shallow nearshore waters and eroded the lake bottom and shore.

While sediment was the grindstone, ice propelled by waves was the battering ram: ice and wave-borne sediment attacked the shores and peninsulas, which retreated gradually. In sheltered areas, as waves and currents lost their ability to carry sediment, they deposited sand, which created and nourished beaches, bars, peninsulas, and islands. Erosion from what we now know as the Scarborough Bluffs, augmented by discharge from the Don River, created a peninsula and, later, the Toronto Islands.

Littoral sediments constantly replenished the bars that provided the essential barrier for many river and stream mouth marshes; these protected the marshes from invasion by icy water from Lake Ontario's depths. The warm waters of the marshes provided a rich nursery for all kinds of aquatic plants, fish, birds, and animals.

Eighteenth-century European explorers and traders found native inhabitants, and a lush and vibrant natural community around the mouth of each river and stream. Protected by spits or gravel bars, a wide variety of fish fed and multiplied. Large quantities of wildfowl inhabited the marshes found at the mouths of tributaries, like Bronte and Sixteen Mile creeks, and rivers such as the Credit, Humber, and Don.

The beaches, woods, marshes, and islands provided rich and varied habitat for deer, lynx, beaver, black bear, and many other species of flora and fauna. More than 50 species of fish, 270 types of birds, and countless animals inhabited the region. Abundant shelter and food provided attractive incentives for European settlement. Then, as now, humans attempted to change



The stone hookers' last stand at Port Credit

the shore, and to bend it to their needs. The first modifications, primitive piers, were constructed to allow deep draft sailing vessels to load and discharge directly on the shore.

Sailing ships required ballast, and buildings needed stone for foundations and walls. Loose rock from beaches and shallow waters was easily gathered and delivered to shipping and construction companies; soon a thriving fleet of “stone hookers” was at work along the shore, their crews using devices like pitch forks with the tines bent at right angles. These tools were employed to loosen and lift stone from the bottom. In the 1830s, the stone hookers removed as much as 43,000 tonnes (47,000 tons) of stone annually.

Unfortunately, the full value of these nearshore stones to the lake was unrecognized at the time: they served as armour for

the lake bottom and shore and, once they were removed, erosion of the lakeshore banks accelerated. Farmers, alarmed by the loss of their shorefront property and pasture, successfully urged the Legislature to pass the so-called Three-Rod Law, in 1857. The law, which prohibited stone hookers from operating within three rods (15 metres) of the shore, came too late, after much of the damage had been done. Fish habitat was destroyed, shoreline facilities and farming land were damaged or lost.

It was a pattern often repeated to the present day: those involved in a worthy enterprise (such as gathering stone, an essential foundation for development) failed to consider the consequences for the natural environment. Nor did they fully consider the damage to the shoreline economy (farming and fishing). The activity was unregulated at first; only when the damage

Table 4.1 Major lakefill projects in the Greater Toronto bioregion

Project	Area	
	(hectares)	(acres)
J.C. Saddington Park	10	24
Lakefront Promenade Park	30	74
Colonel Samuel Smith Waterfront Area	28.5	70
Humber Bay Park — East and West	40	99
Ontario Place	38	94
Tommy Thompson Park (land and water)	470	1,161
Ashbridge's Bay	17	42
Bluffer's Park	42	104

Source: Reid, R., R. Lockhart, and B. Woodburn. 1990. *A green strategy for the Greater Toronto waterfront*. Publication no. 8. Toronto: Royal Commission on the Future of the Toronto Waterfront.

became serious were limits set, a reaction that effectively “closed the door after the horse had escaped”.

In the next 130 years, shoreline modifications of increasing magnitude dramatically changed the shape of the Greater Toronto bioregion's shore. The largest of these initiatives, filling the Ashbridge's Bay Marsh to create 428 hectares (1,057 acres) of land for industrial and recreational use, emerged from the 1912 Waterfront Plan of the Board of Toronto Harbour Commissioners (THC). Most of the fill material was sediment dredged from the Inner Harbour, but included construction debris, excavated soil, sewage sludge, incinerator refuse, and municipal garbage.

More recently, the 1967 Waterfront Plan for the Metropolitan Toronto Planning Area proposed massive lakefilling, chains of artificial islands, public open space, and marinas with a combined capacity of 5,000 boats (Metropolitan Toronto). The 1967 plan inspired a series of artificial

headlands configured to protect boat clubs and marinas. Since the 1950s, 676 hectares (1,668 acres) of land have been created through lakefill, and plans exist for many more. In *Pathways* and in *Shoreline Regeneration*, Royal Commission publications 11 (Barrett and Kidd 1991) and 13, lakefill projects and the associated decline in water quality are described in more detail.

Many projects and modifications have taken place on the shore of the Greater Toronto bioregion, and the nature of change varies. *Shoreline Regeneration* includes the following description of the Greater Toronto bioregion waterfront.

A BIRD'S-EYE VIEW OF THE SHORE TODAY

Flying over the western shoreline of Lake Ontario, one is struck by the intensity of development: from the sand beach of the Burlington Bar to Oakville, much of the shoreline is protected with hard coverings (revetments) of concrete, rubble, and large quarried stone (armourstone), as well as with short groynes jutting into the lake. Occasional narrow cobblestone or gravel beaches remain, but the evidence of change is everywhere.

At the harbour entrance to Oakville Creek, the lack of beach at either side of the groynes suggests that littoral transport is not great. To the east, the St. Lawrence Cement Co. and Gulf Oil Co. concrete piers stretch offshore to navigable water. Residential development surrounds one of the few remaining wetlands, the Rattray Marsh, which is protected from the lake by the barrier formed by its tree-covered bar. Even further east, as the shale subsides below lake level, a different shore forms — one that is low and sandy, created from fine glacial material near Lorne Park, west of Port Credit.

At Port Credit, commercial and industrial development mixes with public open space built on reclaimed land behind steep stone revetments. A major lakefill structure east of the Credit River provides marina facilities next to the heavily armoured shoreline of the Lakeview Generating Station and Lakeview Sewage Treatment Plant.

The dominant features on the Metro Toronto waterfront are lakefill structures: the Colonel Samuel Smith project at Kipling Avenue projects 700 metres (770 yards) from a low-density residential area. Four kilometres (2.6 miles) to the east are two adjacent lakefill headlands at the mouth of Mimico Creek that provide shelter for boats as well as parkland. A breakwall, constructed as part of the 1912 Toronto Harbour Commissioners' plan, protects low parkland that stretches east from the Humber River

to the lakefill structure that supports Ontario Place.

The west shore of the Toronto Islands offers one of the longest sand beaches remaining on the waterfront. The south shore has been fortified with a rubble mound breakwater, groynes, and a concrete seawall. Cut off from its sand supply by the Leslie Street Spit, the shore is being eroded more quickly. The Ward's Island beach, anchored by the new Eastern Gap entrance structure, has reoriented itself to face southwest. Nearly all the Inner Harbour shore is vertical concrete and steel; the Outer Harbour has been created by the Leslie Street Spit, a lakefill structure extending five kilometres (three miles) into 16 metres (52 feet) of water, protected by a veneer of eroding concrete, brick, and asphalt rubble.





Mouth of the Rouge River

Immediately next to the spit is the Ashbridge's Bay lakefill, where the east-facing embayment has filled with littoral sand. Beyond the groynes and breakwalls along the Eastern Beaches rise the Scarborough Bluffs, where the Metropolitan Toronto and Region Conservation Authority (MTRCA) is installing shore protection structures of fill and rubble. The sharp incline of the bluffs is caused by erosion, the result of wave action on their underwater base. Unprotected, they retreat at a rate averaging a third of a metre (one foot) per year. Bluffer's Park lakefill at the foot of Brimley Road occupies nearly two kilometres (1.2 miles) of shoreline and extends 600 metres (660 yards) offshore, intercepting all littoral drift from the east.

Residential development at the top of the bluffs near East Point gives way to open

space and scattered industrial use. Much of the shoreline is in a natural state, although occasional storm-sewer outfalls intrude.

Further east, Frenchman's Bay is separated from Lake Ontario by a natural sand bar broken by an entrance structure that permits navigation. Part of the Pickering Generating Station is built on reclaimed land with heavy armourstone revetments and cooling water intake groynes.

From Pickering to Whitby the shoreline is characterized by low bluffs two to seven metres (14 to 23 feet) high, with low-density residential or agricultural uses predominating. Various creeks have small estuarine wetlands behind gravelly beaches and bars; the estuary at Whitby has long been a commercial harbour with entrance groynes interrupting the sand and gravel bar. From Whitby to Oshawa, the shoreline varies from