Listen to Your River

A Report Card on the Health of the Humber River Watershed

2007

TORONTO AND REGION Conservation for The Living City

Canadian Heritage Rivers System

Le Réseau des rivières du patrimoine canadien

Humber River

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A Message from the Humber Watershed Alliance

The Humber Watershed Alliance was established in October 1997 by Toronto and Region Conservation (TRCA) to help implement the recommendations of *Legacy: A Strategy for a Healthy Humber* (1997).

The Report Card is a step towards fulfilling *The Living City®* vision. Our first *Report Card on the Health of the Humber River Watershed* was published in July 2000. Now, seven years later, this second report card reviews our previous results, analyzes data collected over the intervening seven years and evaluates the effect our efforts have had on improving watershed conditions.

We report on 26 indicators, illustrating a range of watershed conditions such as: how well landforms like the Oak Ridges Moraine are being conserved, the quantity and quality of natural vegetation cover, how swimmable the waters of the Humber are, how well the fish and wildlife are doing, how well are heritage resources being protected, and how involved people are in stewardship activities. We assigned grades to these indicators, from "A" (*very good*) to "F" (*fail*) and, when possible, assessed whether conditions are getting better or worse.

Overall, the Alliance gave the watershed a "C" or a *fair* health rating—the same as in 2000. This does not mean that nothing has changed. Several indicators have improved. Others have declined. However, improvement overall has been small. We recognize that it took many decades to create most of the degraded conditions we experience today and so it is not surprising that it will take more than a few decades to restore good or very good conditions to the watershed. We also need time to reap the rewards of our restoration activities and to see measurably-improved environmental indicators. We must continue working on a range of initiatives that protect the assets and qualities of the watershed that are in good health and restore those that need our help.

Who is responsible for protecting, restoring and celebrating this tremendous resource? We all are—every one of us. That is because, whether our home is an apartment, condominium, house, hotel, trailer or tent, we all live in a watershed. We work in watersheds and travel through them to carry out our daily activities. We drink our watersheds' water, breathe its air, enjoy its beauty, marvel at its heritage and stay healthy by enjoying the recreational opportunities that our watersheds offer. And so we must all be responsible for looking after them.

We know from our recent market research that only 20 per cent of Humber River Watershed residents surveyed knew what a watershed is. More encouraging was the fact that 33 per cent of the respondents could name the Humber when asked if they knew what river watershed system they resided in. We must build on this knowledge and continue our public education efforts so that all levels of government, businesses, community groups and individuals will be motivated to work together to improve the health of the Humber River Watershed.

I hope you find this report card informative, that it renews your commitment to the Humber and its watershed management, and that you will accept the challenge to take action. In 2012 we will report again, and I hope you will be there with us to celebrate the victories, set new targets and identify more actions for success.

In the meantime, listen to what your river is telling you, and then act!

On behalf of your friends, neighbours, community group representatives and colleagues of the Humber Watershed Alliance,

Lois Griffin
Chair, Humber Watershed Alliance

EXECUTIVE SUMMARY

This is the second report card on the health of the Humber River Watershed, prepared by the Humber Watershed Alliance. The Alliance is a community-based action group comprised of residents, representatives from interest groups, education institutions, and government agencies, municipal politicians from across the Humber River Watershed, and the chair of Toronto and Region Conservation (TRCA). It was established in 1997 by TRCA to help implement *Legacy: A Strategy for a Healthy Humber (1997)*, a plan for a vital and healthy Humber ecosystem.

One of the overarching roles of the Humber Watershed Alliance is to help achieve *The Living City*® vision, TRCA's vision for a "healthy, attractive, sustainable urban region extending into the 22nd century." This report card, includes an assessment of the heath of the Humber River Watershed and provides recommendations and short and long-terms targets for improving the health of the watershed.

The first report card on the health of the Humber River Watershed was published in July 2000. The 2007 report card follows a similar format and reports on most of the same indicators. The three main categories are: Environment, Society and Economy, and Getting it Done. Within these categories, we assessed 26 out of 28 indicators that were originally selected to provide an informative picture of current conditions in the watershed. The aesthetics and business outreach indicators were not evaluated this time due to a lack of information. Each indicator was assigned a letter grade and, where possible, we assessed and indicated whether the indicator is relatively stable, in decline or improving.

Overall, the watershed was given a "C" grade, indicating that, on average, conditions are only *fair*. However, there is a wide range of conditions, with some in better health and others in poor or failing health. Only six of the 26 indicators were graded as *very good* or *good*. Most notable are the two indicators with a very good, or "A" rating—the protection of significant landforms and progress in developing an inter-regional trail system. A "B" rating, indicating good conditions, was assigned to the sustainable use of groundwater, protection of groundwater quality, amount of public greenspace and municipal stewardship.

A "C" rating, indicating fair conditions, was given to nearly 50 per cent of the indicators. The fair environmental conditions are forest cover, quantity and quality of natural vegetation cover, wildlife protection, conventional pollutants, heavy metals and organic contaminants, river flow, benthic invertebrates, and riparian vegetation. From a social and economic perspective, a fair rating was given to heritage resources, outdoor recreation opportunities and sustainable use of resources. Among the indicators for getting it done, we gave a "C" rating to community stewardship and experiential and outdoor environmental education.

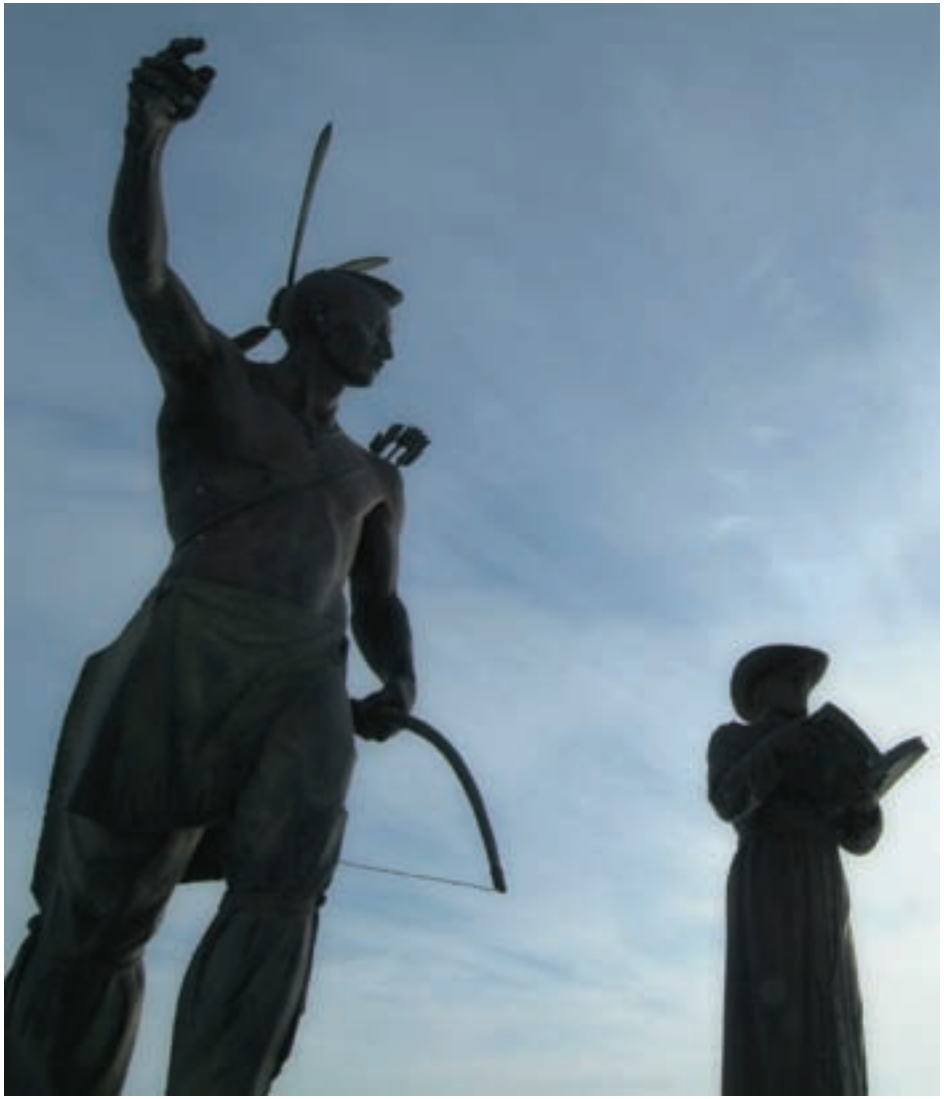
Seven of the indicators were rated "D" (*poor*) or "F" (*fail*). For example, wetland protection received an extremely poor or failing grade, because only 3.6 per cent of the watershed has wetlands, well below the 10 per cent target set by Enviroment Canada for the *Toronto and Region Remedial Action Plan* Areas of Concern[1]. Stormwater management also failed because only 25 per cent of urban land has stormwater quantity and/or quality controls. Unacceptably high levels of bacteria continue to affect swimming opportunities, resulting in another failing grade. Fish communities received a poor grade, since they continue to suffer from habitat degradation, barriers to movement in the river and competition from invasive species. Poor grades were also assigned to air quality, protection of agricultural land and the recognition and celebration of human heritage.

A comparison of current conditions with those reported in 2000 showed that while six aspects of watershed health appear to be declining, 15 have not changed and five appear to be improving.

The six indicators that received worse ratings in 2006 conpared to 2000 are wetlands, bacteria levels, benthic invertebrates, fish communities, outdoor recreation and agricultural land.

The five indicators that have improved and are showing upward trends are the protection of significant landforms, groundwater quantity and quality, conventional pollutants and trails. Six other indicators also appear to show the hopeful signs of upward trends, but not yet enough to result in improved grades. They are the amount of natural vegetation cover, percentage of urban areas that discharge untreated stormwater to rivers (stormwater management), heavy metals and organic contaminants, riparian vegetation, heritage events and public greenspace.

1 Targets assigned to Toronto and Region Remedial Action Plan Areas of Concern are set out in Environment Canada's "How Much Habitat is Enough: A Framework for Guiding Habitat Rehabilitation in the Great Lakes Areas of Concern."



Monument on Toronto Carrying Place Trail—
Islington Avenue at Major Mackenzie Drive: City of Vaughan

This report card recognizes that there has been a tremendous investment of effort to protect and restore the health of the Humber River Watershed. These efforts are summarized for each indicator. From the current data we also highlight some of the good and bad news stories.

Looking ahead to future conditions, we expect that the watershed will continue to come under significant stress from the increasing human population, new urban development, more traffic and a growing demand for recreation opportunities. To avoid further degradation and achieve improvements in watershed conditions, this report card identifies specific targets for each indicator that we hope to accomplish by 2012, as well as a set of actions entitled, "How to improve."

We want to ensure that those indicators with very good and good ratings remain in a healthy state and continue to improve. We need to step up our efforts across the board to address the prevalent fair conditions. The greatest priority for immediate remedial action should go to those indicators that show poor, failing and declining conditions. This report card shows that there is not a single, simple solution to address the problems and reach the potential of the watershed. Instead, there are many small steps that cumulatively will make a real difference towards reaching our goals. Work is ongoing to update the watershed plan to provide more details, a stronger scientific basis and an integrated approach to achieving our vision of the Humber River Watershed as a vital and healthy ecosystem where we live, work and play in harmony with the natural environment.

In conclusion, we ask all our partners to adopt and act on the actions we have identified that need to be taken. With your help we can ensure that the Humber's rich legacy is passed on to future generations.

Let us listen to what the river is telling us. Then, working together, we can achieve a healthy Humber River Watershed—one that is livable, sustainable and prosperous.

Acknowledgements

The Humber Watershed Alliance would like to acknowledge the contributions of the members of the Report Card Subcommittee, who gave their time, expertise and experience to make this project a success. They are Brenda Fowler, Royce Fu, Krisann Graf, Lois Griffin, David Hutcheon, Luciano Martin and Bill Wilson.

The Alliance would like to thank Gary Wilkins, the Humber Watershed Specialist at Toronto and Region Conservation (TRCA) who led the staff team on this project. The efforts of Lisa Turnbull, Lia Lappano and Sonia Dhir were greatly appreciated, particularly toward the end of the project, when much had to be done in a short time.

We are grateful to all the "behind the scenes" technical experts, marketing staff, graphic artist and photographer who contributed their specialized knowledge and skills to tell the story of the health of the Humber in an understandable and informative manner. We also appreciate TRCA's cooperation to undertake another public opinion survey, titled *Humber River Watershed Awareness* (2006), with the assistance of Pollara Strategic Public Opinion and Market Research to re-evaluate residents' level of environmental awareness, attitudes and behaviours regarding issues in the Humber River Watershed since 1999.

No job can be done without a budget, so we thank TRCA and all the municipal councils who provide financial support to the work of TRCA and the Humber Watershed Alliance. Thank you as well to the staff of other agencies, representatives from special interest groups and the many citizens who have helped us along the way.

Humber Marsh: City of Toronto

Dedication

This report card on the Humber River Watershed is dedicated to all of the people who generously donate their time, energy and skills to the Humber River Watershed, so we all may enjoy its beauty, history and all of the opportunities it provides to make our everyday lives better.

Introduction

This is the second report card produced by the Humber River Watershed Alliance on the health of the Humber River Watershed. The first was published in July 2000. In this introduction, we briefly describe the general characteristics of the watershed and provide some background on the Alliance. We re-visit 26 of the original 28 health indicators from the first report card, describe how the health of the watershed was assessed, how the report card is organized and what information is included under each indicator.

Description of the Humber River Watershed

The Humber River Watershed covers approximately 903 square kilometres and is the largest watershed in the Toronto region (Figure 1[2] and Figure 2). The per cent of the watershed in each municipality is illustrated in Figure 3.

The Humber River was designated a Canadian Heritage River on September 25, 1999 by the federal, provincial and territorial governments. This designation formally recognizes the outstanding contribution the river has made to the development of the country. There are 10 other Canadian Heritage Rivers in Ontario including the French, Grand, Missinabi and Rideau rivers.

The Main branch of the Humber River flows approximately 126 kilometres from its source on the Niagara Escarpment and Oak Ridges Moraine to Lake Ontario. The East Humber (approximately 65 kilometres in length) originates in the kettle lakes region of Richmond Hill and King Township. The West Humber River (approximately 43 kilometres in length) begins in Caledon, on the rolling hills of the South Slope, and flows over the Peel Plain in Brampton before joining the Main Humber in Toronto.

Land use varies across the watershed. About 26 per cent of the watershed is developed, which is up from the 15 per cent reported in 2000. Existing rural land use is 40 per cent of the watershed. Natural cover makes up 32 per cent. The lower reaches in the City of Toronto are over 83 per cent urbanized. Brampton is expected to be completely developed by 2021, representing another 4,800 hectares of land. The town of Bolton is also considered part of the urbanizing zone and will be a focal point for growth in the Region of Peel. Thriving rural towns and villages exist in the watershed, such as Mono Mills, Caledon East and Palgrave.

In York Region, the majority of the urban growth has occurred since 1981. The existing urban boundary in Vaughan is defined generally as all land south of Teston Road. Two new communities in the Humber River Watershed are planned to accommodate anticipated future growth: Urban Village 1 (1,300 hectares), and the Woodbridge Expansion Area (330 hectares). Within the Humber River Watershed portion of the Town of Richmond Hill, the urban development area encompasses the lands bounded by Bathurst Street to Bayview Avenue, north of King Road to Bloomington Road. Development along Yonge Street in Richmond Hill was significantly altered with the passing of the *Oak Ridges Moraine Conservation Act*. A large contiguous natural area (428 hectares) called the Oak Ridges Corridor Park was protected from development. The main Rural Service Centres in York Region include Nobleton and King City.

Based on 2001 census data, the total population residing in the Humber River Watershed is estimated to be 670,000; an increase of 37 per cent (182,000) from 1995. The Humber is the second most populated watershed in the Toronto region next to the Don River Watershed, which has 1,550,000 residents. Much of this population growth, and associated urban growth, has occurred within the City of Vaughan, the Town of Richmond Hill and the City of Brampton. The City of Vaughan experienced a 60 per cent increase, from 132,120 in 1996 to 215,651 in 2006. The population of the City of Brampton increased over 38 per cent between 1991 and 2001, a level of growth that has continued to an even greater extent since 2001. The town of Bolton is the largest Rural Service Centre in the Town of Caledon and is the only Caledon community to be connected to the Peel Region (Lake Ontario) water supply and municipal servicing. Under the current population projections provided in Caledon's Official Plan, Bolton has a population allocation of 26,500 for 2021.

The rural areas of the Humber River Watershed have experienced much more moderate population growth. The population of King Township was 20,000 in 2001, which represents a five per cent increase from 1996. Projected populations for

2 The size of the watershed has been reduced by five square kilometres since we reported last as a result of using higher resolution mapping and updating drainage boundaries according to sewersheds in the City of Toronto.

Figure 1: Humber River Watershed Context Map

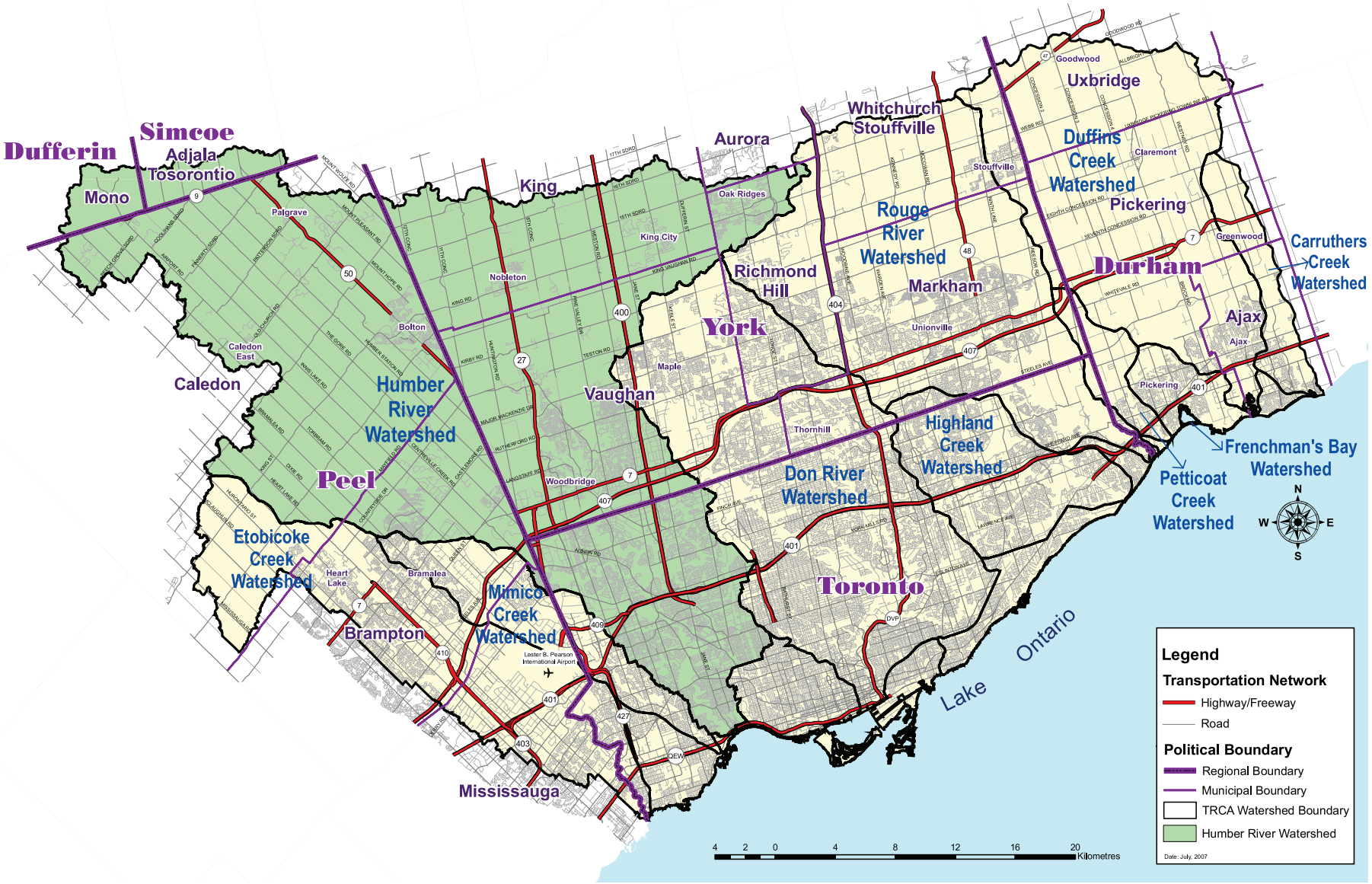
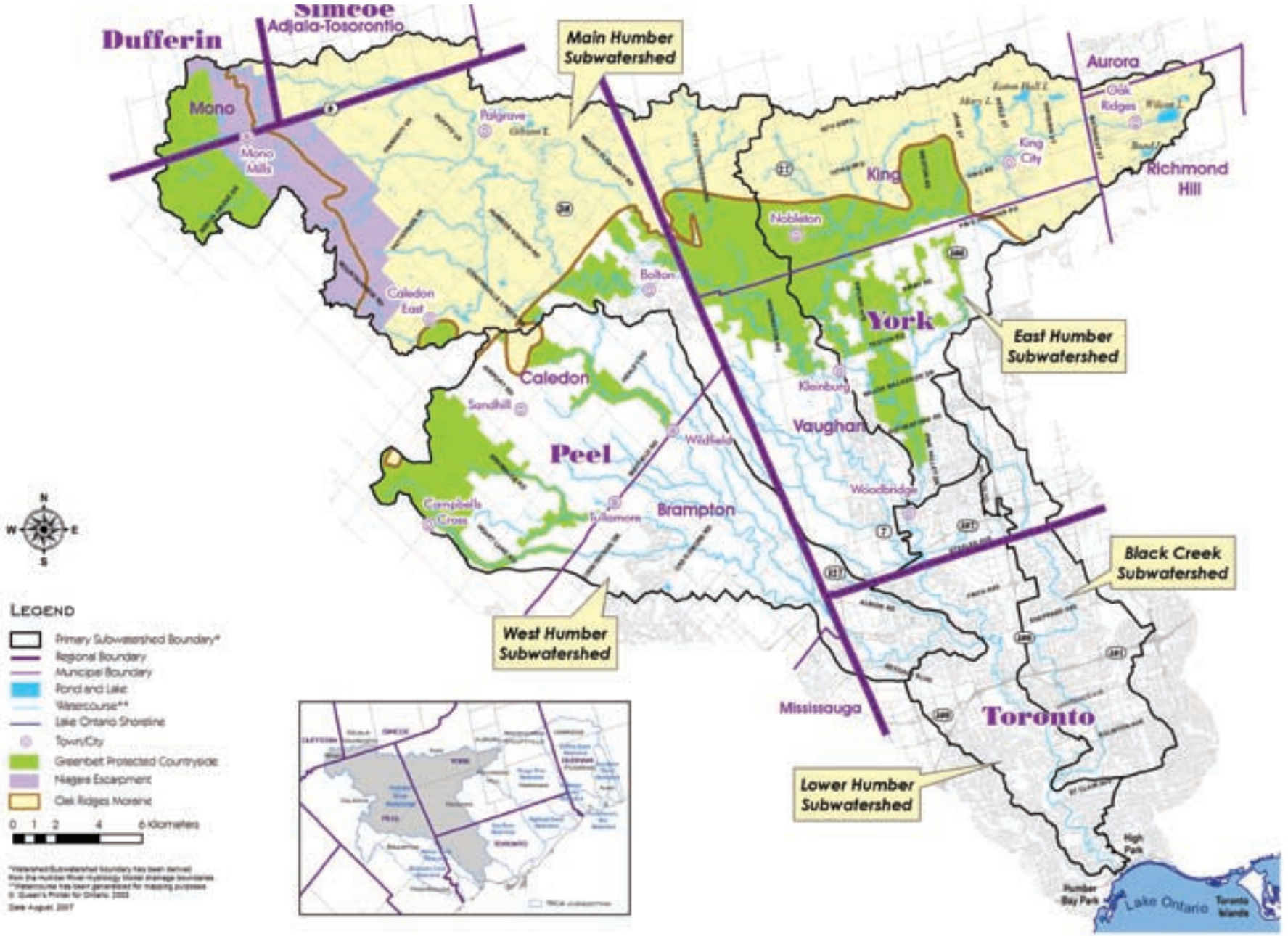


Figure 2: Humber River Watershed Base Map



King Township beyond 2001 estimate increases by approximately 10 per cent every five years. The majority of the population growth in King Township is anticipated to occur in the urban areas of King City and Nobleton. Growth has occurred in a similar fashion in the Town of Caledon, which grew from a population of 39,893 in 1996 to 50,595 in 2001.

The 2001 Canadian census showed that people who identify themsleves as being of Italian origin represent the largest group in the watershed, with nearly 20 per cent of the resident population, followed by Canadian (11 per cent), English (nine per cent), East Indian (seven per cent), Scottish (five per cent) and Irish (five per cent). The predominant origins of recent immigrants (those who came to Canada between 1996 and 2001) were India (17 per cent), Jamaica (six per cent), Pakistan (six per cent), and Guyana (five per cent), with the remaining new immigrants coming from over 35 different countries.

Background on the Humber Watershed Alliance

The Humber Watershed Alliance was created by Toronto and Region Conservation (TRCA) to facilitate the implementation of *Legacy: A Strategy for a Healthy Humber* (1997). One of the Alliance's primary objectives is to produce regular report cards to provide insights into the health of the Humber River Watershed. This report card tells us how well the objectives of *Legacy* are being met.

The Humber Watershed Alliance was first established in 1997. Since then there has been three terms, each of which has been three years in duration. The current Alliance began in May 2004. Our membership of 63 people includes unaffiliated residents, representatives from interest groups, school boards and business associations, politicians from the local and regional municipalities in the watershed, agency staff and the chair of TRCA.

One of the overarching roles of the Humber Watershed Alliance is to help fulfill *The Living City* vision, TRCA's vision for a "healthy, attractive, sustainable urban region extending into the 22nd century." This report card assists with this by collecting, analysing and communicating watershed conditions to the public to increase awareness and stimulate actions.

The first report card describing the condition of the watershed was published by the Alliance in July 2000. In 2003, a brief progress report was prepared to describe the many efforts that were being undertaken by everyone from citizens to government agencies to protect and restore the health of the watershed. In 2005, a

Figure 3: Humber River Watershed by Municipality

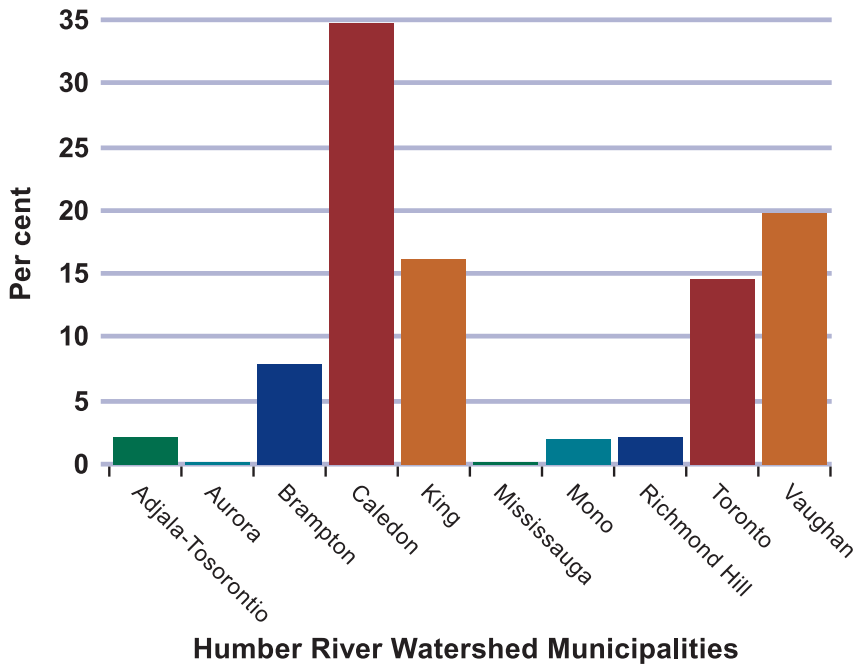
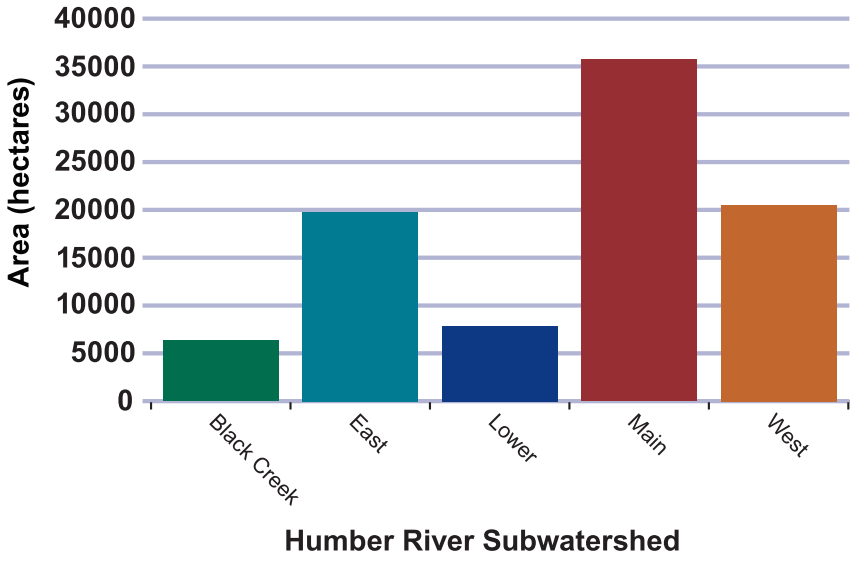


Figure 4: Humber River Watershed by Subwatershed



new subcommittee of the Humber Watershed Alliance was established to develop a second report card. The subcommittee's job was to help write, edit, advise, consult and recommend a report card that would describe the current health of the watershed and set appropriate targets and actions for maintaining or improving its condition.

An important role of the Alliance is to engage the public and provide a forum for individuals and groups to participate and make meaningful contributions to community-based watershed management. One way we did this was with the assistance of a public opinion survey. This survey was conducted for the Humber Watershed Alliance by Pollara Strategic Public Opinion and Market Research in June 2006. The purpose was to gather information on the attitudes, level of knowledge and environmental behaviour of watershed residents regarding the Humber. Seven hundred and fifty people were polled. Approximately half were urban and half were rural residents. The overall degree of accuracy was +/- four per cent 19 times out of 20. This information was compared to questions asked in a similar survey conducted in 1999 for the 2000 report card. Results of the survey are quoted throughout the report card.

Eighty per cent of Humber residents do not know what a watershed is. Despite this, in the same survey, 33 per cent could associate themselves to the Humber when asked if they knew what river watershed system they resided in (Pollara, 2006).

The Alliance continues to conduct its business using a variety of subcommittees. Some are organized around subwatersheds and include the West Humber, East Humber and Lower Humber Subcommittees. Our Planning and Policy Subcommittee commented on documents such as the *Greenbelt Plan,* and lobbied industry and municipalities for actions such as better disposal of pharmaceuticals by the public. We also continue to support efforts at community action sites where the focus is on building trails, improving water quality and enhancing terrestrial habitats. We hosted a number of special events to celebrate the Humber. In June 2004, TRCA, the Humber Watershed Alliance and all our partners who work hard to protect and restore the Humber were honoured at the fourth Canadian River Heritage Conference in Guelph, Ontario for outstanding contributions to river conservation in Canada.

The Alliance adopted this report card on the health of the Humber River Watershed in October 2006.

The Authority, at its meeting # 10/06 held on January 5, 2007, adopted resolution # A290/06 which directs staff to distribute the report card to federal government, provincial ministries, watershed municipalities, community groups, schools and the public throughout the Humber watershed. It also sets out targets and priority actions to guide the work of the Alliance and our partners in the years to come. We plan to issue another report card in 2012 to show what progress has been made towards our objectives.

How health is assessed

We used 26 of the original 28 indicators established in the report card published in July 2000 to assess the health of the watershed. An indicator is simply a piece of information or a clue that tells us something about the conditions around us. For example, to a physician, blood pressure and body temperature are indicators of the health of a patient. To an economist, gross domestic product and the unemployment rate are indicators of the health of a country's economy.

In choosing the watershed indicators, we asked ourselves a number of questions. Will the indicator give us meaningful information about the Humber? Is the information available, retrievable and cost-effective to collect? Will the indicator mean something to the public? Will it give us information about trends over time? Do the indicators collectively give us enough information to really assess the health of this complex watershed? Following this assessment we decided not to report on the aesthetics and business outreach indicators due to insufficient information.

When selecting indicators it is advantageous to choose ones that relate to more than one topic. For example, the health of fish communities is related to the amount of riparian (streambank) vegetation, condition of benthic invertebrates and amount of baseflow discharge (groundwater). Wildlife depend on the quantity, quality and distribution of natural vegetation communities. These relationships show how ecosystems work and how everything is connected to everything else.

How the report card is organized

The 26 indicators are presented in three major sections:

- Environment
- Society and Economy
- Getting it Done

Each section starts with a brief introduction. Within the sections, related indicators are grouped together. For example, surface water (in Environment) has

five indicators: stormwater management, bacteria, conventional pollutants, heavy metals and organic contaminants, and river flow.

Each indicator provides the following information:

- The question we asked about the indicator
- The data used to help measure the indicator
- The indicator grade
- The rating criteria
- Some current efforts that affect the indicator
- Highlights of good news and bad news
- Targets for the year 2012 (and beyond in some cases)
- Key next steps for how to improve

The grades for health were assigned by the members of the Humber Watershed Alliance based on the input of technical staff and a ranking criteria that was developed for each indicator.

Some grades (where it was possible to determine) have an arrow to show whether the trend is up, for improving, or down, for declining.

HEALTH RATINGS	
A	is very good health
B	is good health
C	is fair health
D	is poor health
F	is failing or extremely poor health

In some cases, we rated indicators on a municipal or subwatershed basis in order to show the varying conditions found in different regions of the Humber River Watershed.

Finally, the report card concludes with a summary of all the ratings in chart form and an assessment of the overall health of the watershed.

Red Trillium: Species of Conservation Concern

ASSESSING THE HEALTH OF THE WATERSHED:

Environment

Landforms

The Humber River Watershed contains landforms that are varied and unique, and help create a distinct sense of place. These landforms include the undulating and gravelly hills of the Oak Ridges Moraine, the ancient rock of the world-renowned Niagara Escarpment, the South Slope, the flat Peel Plain and the Iroquois Sand Plain, as well as the valley and stream corridors.

Besides possessing unique features, these significant landforms perform vital ecological functions. For example, the Oak Ridges Moraine plays a crucial role in helping to maintain the quantity and quality of groundwater in the region. The aquifers fed by it supply drinking water for a large population and form the headwaters for more than 65 watersheds including the Humber. The large woodland areas that remain on the Moraine support many native plants and animals, and act as refuge for species displaced from more developed areas. The Niagara Escarpment has been designated a World Biosphere Reserve by the United Nations Educational, Scientific and Cultural Organization, based on many outstanding features, including its geologic formations and biodiversity.

As the population of the Greater Toronto Area (GTA) continues to grow, so does the development pressure on the Humber's significant landforms. Poorly planned development can lead to loss of woodlands, wetlands and other habitats, alterations in stream flow, loss of groundwater recharge areas and extirpation (or local extinction) of plant and animal species. It can also spoil the natural beauty of these areas and reduce recreational opportunities for watershed residents, now and in the future.

A great deal has happened since 2000 to protect the integrity of the region's great landforms. At the provincial level, the *Oak Ridges Moraine Conservation Act*, *Greenbelt Act* and *Places to Grow Act* came into effect and updates to the *Provincial Policy Statement* were completed. The indicator we selected measures how much development has occurred on the Niagara Escarpment and Oak Ridges Moraine (Tables 1 and 2), and how much is now protected from development as a result of the new legislation. Another measure used is the extent of valley and stream corridors, and areas of interference with wetlands, shorelines and watercourses that are fill-regulated as a result of *Ontario Regulation 166/06*. The regulation was passed under the authority of the *Conservation Authorities Act* in 2006, to facilitate more effective protection of valley and stream corridors, headwaters, wetlands and other natural features and functions, Toronto and Region Conservation (TRCA) has updated its regulation mapping.

Above photo—Oak Ridges Moraine: Town of Caledon

INDICATOR 1:
Significant Landforms

How well are significant landforms being protected from urban development?

Rating:

A

Measures:

The amount of urban development that will be permitted on landforms such as the Oak Ridges Moraine and Niagara Escarpment and the extent of valley and stream corridors protected by conservation authority fill regulations.

Rating criteria:

Per cent of land within the Oak Ridges Moraine, Niagara Escarpment and Greenbelt planning areas protected from urban development.

A	Greater than 80%
B	70% –79%
C	60%–69%
D	50% –59%
F	Less than 50%

Current efforts:

- New provincial policies such as the *Oak Ridges Moraine Conservation Plan* (2002), the *Greenbelt Plan* (2005) and the new *Development, Interference to Wetlands and Alterations to Shorelines and Watercourses Regulation* for Toronto and Region Conservation *(Ontario Regulation 166/06)* regulate urban development on significant landforms.
- The *Oak Ridges Moraine Conservation Plan* requires municipalities to bring their Official Plans into conformity with it.
- The revised *Ontario Provincial Policy Statement* (2005) provides stronger language and direction for protecting natural heritage, water, cultural heritage and agricultural, mineral and archaeological resources.
- The *Ontario Places to Grow Act* (2005) allows the province to designate growth areas and protect environmental and agricultural resources from development.
- Toronto and Region Conservation and municipalities are together updating the *Humber Watershed Plan* to include new technical information such as recharge areas, which will support the protection of significant landforms.
- Toronto and Region Conservation, municipalities and the province are developing source water protection plans and water budgets that will help to protect water recharge and discharge.

Table 1: Area (per cent) of the Humber River Watershed that is Protected from Urban Development

Planning area	Area (per cent) of Humber River Watershed in planning area*	Area (per cent) of Humber River Watershed in planning area that is currently urbanized	Area (per cent) of Humber River Watershed in planning area that is committed for urbanization**	Area (per cent) of planning area that is protected from urban development
Niagara Escarpment Plan	4,400 ha (5%)	197 ha (4%)	60 ha (1%)	4,143 ha (95%)
Oak Ridges Moraine Conservation Plan	27,223 ha (30%)	2,840 ha (10%)	1,947 ha (7%)	22,436 ha (83%)
Greenbelt Plan (protected countryside)	15,173 ha (17%)	801 ha (5%)	483 ha (3%)	13,889 ha (92%)
Total	**46,797 ha (52%)**	**3,838 ha (8%)**	**2,490 ha (5%)**	**40,468 ha (87%)**

Notes: *Total area of the Humber River Watershed is 90,255 hectares.
There is no overlap in the areas quoted for the *Greenbelt Plan* and *Oak Ridges Moraine Conservation Plan.*
**According to Municipal Official Plans.

Good news:

- **Significant landform protection has been achieved since 2000.**
- **Eighty-seven per cent of the Humber River Watershed (40,468 hectares) governed by the *Niagara Escarpment Plan, Oak Ridges Moraine Conservation Plan,* and *Greenbelt Plan* is protected from urban development.**
- Only 4,787 hectares of the Oak Ridges Moraine and 257 hectares of the Niagara Escarpment within the Humber River Watershed is developed or committed to urban development (a total of 5,044 hectares or 13 per cent of the *Oak Ridges Moraine Conservation Plan* and *Niagara Escarpment Plan* areas in the watershed). This is less than the 2000 report card's upper limit target of no more than 6,200 hectares available for development by 2005.
- The provincial *Greenbelt Plan* protects 13,889 hectares of the South Slope, an important headwater area for the East

Above photo—Bond Lake: Town of Richmond Hill

and West branches of the Humber River.

- The new *Ontario Regulation 166/06*, and the updated mapping, will protect an additional 12,000 hectares of valleys, shorelines and wetlands in the watershed by regulating development, interference with wetlands and alterations to shorelines and watercourses. In total, 23,000 hectares of valleys, wetlands and shorelines in the watershed will now be protected.
- The option of extending Pine Valley Drive (Vaughan) through the Boyd Conservation Area was removed from the Pine Valley Environmental Assessment by the Provincial Minister of the Environment due to the significant environmental impacts it would have on the area.

Bad news:

- Lands not protected by provincial land conservation plans and regulations are being urbanized at a very rapid rate, especially throughout the mid-reaches of the watershed, including Brampton, Vaughan and Richmond Hill.
- The *Oak Ridges Moraine Conservation Plan* and the *Greenbelt Plan* combined will permit urban development in 58 per cent of the Town of Richmond Hill within the Humber River Watershed.
- Urban development on the Niagara Escarpment within the Humber River Watershed has increased from less than one per cent in 1994 to four per cent in 2005.
- The South Slope is not officially recognized as a significant landform in provincial legislation and hence is not specifically protected from development. This area will likely be the focus of future development pressure.

Target:

2012

- No additional land on the Niagara Escarpment and Oak Ridges Moraine is developed for urban uses beyond the 5,044 hectares that have been developed or committed in Official Plans for development as of 2005.

How to improve:

- Governments and agencies continue to uphold and enforce the requirements of the *Niagara Escarpment Plan, Oak Ridges Moraine Conservation Plan, Greenbelt Plan* and *Ontario Regulation 166/06*.
- Municipalities ensure landform conservation by including the recommendations from the *Humber Watershed Plan Technical Updates* in their Official Plans and enforcing them.
- Planners and developers protect the form and function of significant landforms by applying Best Management Practices (BMPs) and sustainable community design technologies in all developments.
- Private landowners conserve the landform features and functions on their properties through conservation easements, restrictive covenants and excellent private land stewardship activities.

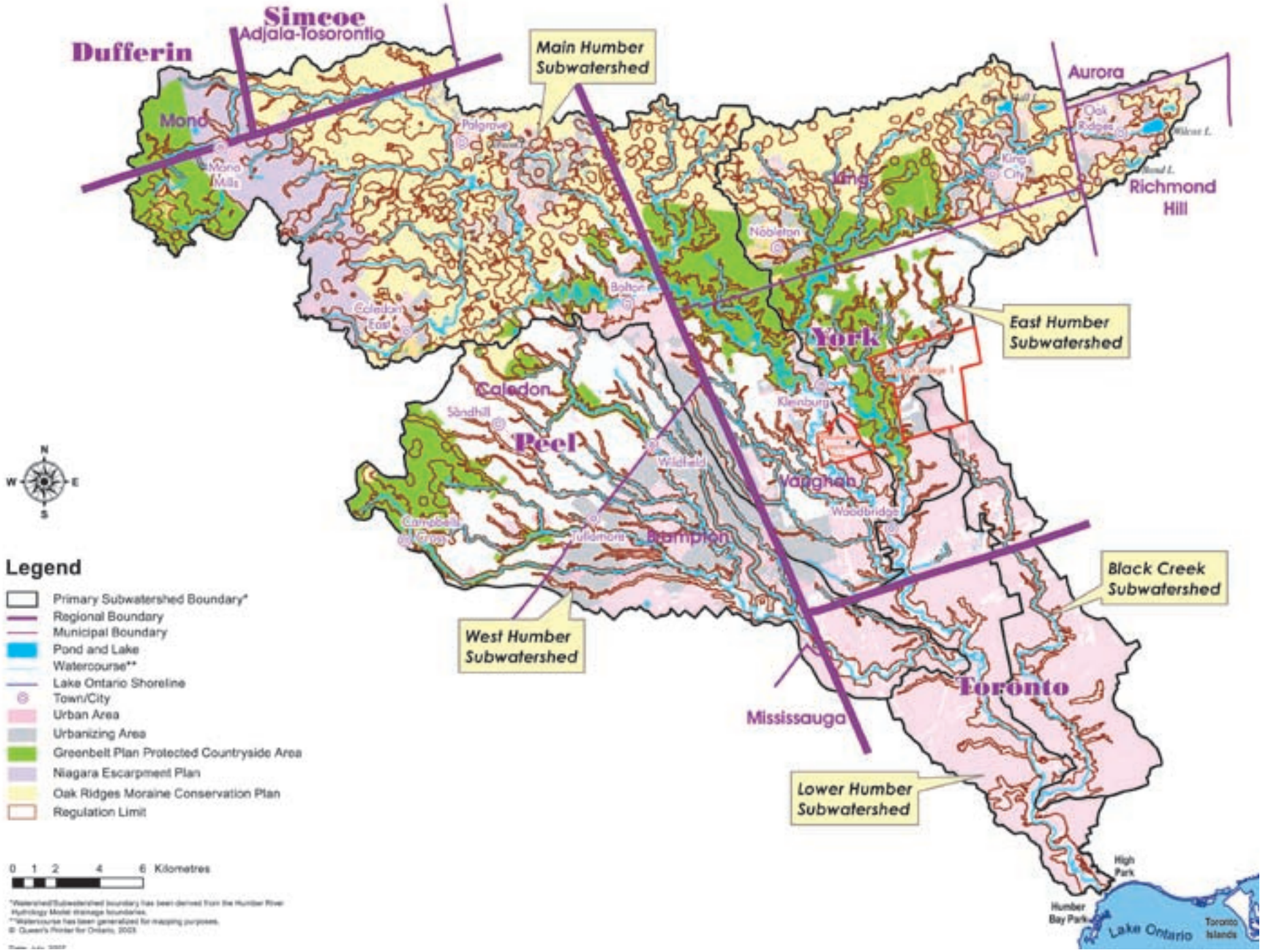
Table 2: Area (per cent) of the Humber River Watershed by Municipality that Falls within a Provincial Land Conservation Plan or Ontario Regulation*

	Area of Humber River Watershed in each municipality	Area (per cent) of the total within a Provincial Land Conservation Plan or Ontario Regulation*	Area (per cent) within a Provincial Land Conservation Plan or Ontario Regulation* that can be developed **
Adjala-Tosorontio	2,015 ha	2,015 ha (100%)	46 ha (2%)
Aurora	148 ha	148 ha (100%)	89 ha (60%)
Brampton	7,169 ha	1,789 ha (25%)	0 ha (0%)
Caledon	31,406 ha	22,912 ha (73%)	2,797 ha (12%)
King	14,583 ha	14,498 ha (99%)	2,080 ha (14%)
Mississauga	162 ha	0 ha (0%)	162 ha (100%)
Mono	1,768 ha	1,768 ha (100%)	48 ha (3%)
Richmond Hill	1,920 ha	1,920 ha (100%)	1,111 ha (58%)
Toronto	13,196 ha	2,092 ha (16%)	0 ha (0%)
Vaughan	17,888 ha	7,704 ha (43%)	157 ha (2%)
Humber River Watershed	**90,255 ha**	**54,846 ha (61%)**	**6,490 ha (7%)**

Notes: *Area of the Humber River Watershed that falls within the *Greennbelt Plan, Oak Ridges Moraine Conservation Plan, Niagara Escarpment Plan* or *Ontario Regulation 166/06* governing the development, interference with wetlands and alterations to shorelines and watercourses.
** Areas that can be developed include settlement areas; rural settlement areas (including the Palgrave Estates) in the *Oak Ridges Moraine Conservation Plan*; major and minor urban areas in the *Niagara Escarpment Plan*, and settlement areas in the *Greenbelt Plan*.

Above photo—Eaton Hall Lake: King Township

Figure 5: Urban Development on Significant Landforms in the Humber River Watershed



Seneca College: King Township

Terrestrial Habitat

A healthy terrestrial system is important not only because it provides habitats for plants and animals but also because it sustains us all. For example, the terrestrial system, including forest cover and wetlands, provides for clean water and air, climate regulation, benefits the aquatic system, promotes a natural water cycle, supports healthy human settlements and provides areas for recreation and enjoyment.

A century ago, natural vegetation cover blanketed the entire watershed. However, widespread settlement destroyed and fragmented the once contiguous terrestrial cover into remnant and often isolated habitat patches. Vast forests were clear-cut and many hectares of wetland were filled in or drained. Lost were the many species that required extensive natural habitats to survive and reproduce such as the Eastern cougar, black bear and elk. Much of the quantity, quality and distribution of natural cover necessary for plants and animals to complete their life cycle and thrive were lost.

To report on the health of the Humber's terrestrial habitats, we used five indicators:

1. Quantity of vegetation cover
2. Quality of the natural vegetation cover distribution
3. Amount of forest cover
4. Amount of wetland cover
5. Presence of specific wildlife species

The status of terrestrial biodiversity in the watershed serves as an excellent indicator of the health and integrity of the rest of the natural system. The quantity and quality of natural vegetation cover, and its distribution across the watershed, along with the suite of species supported by these habitats, tell us a mixed story about the health and ecological integrity of the Humber River Watershed.

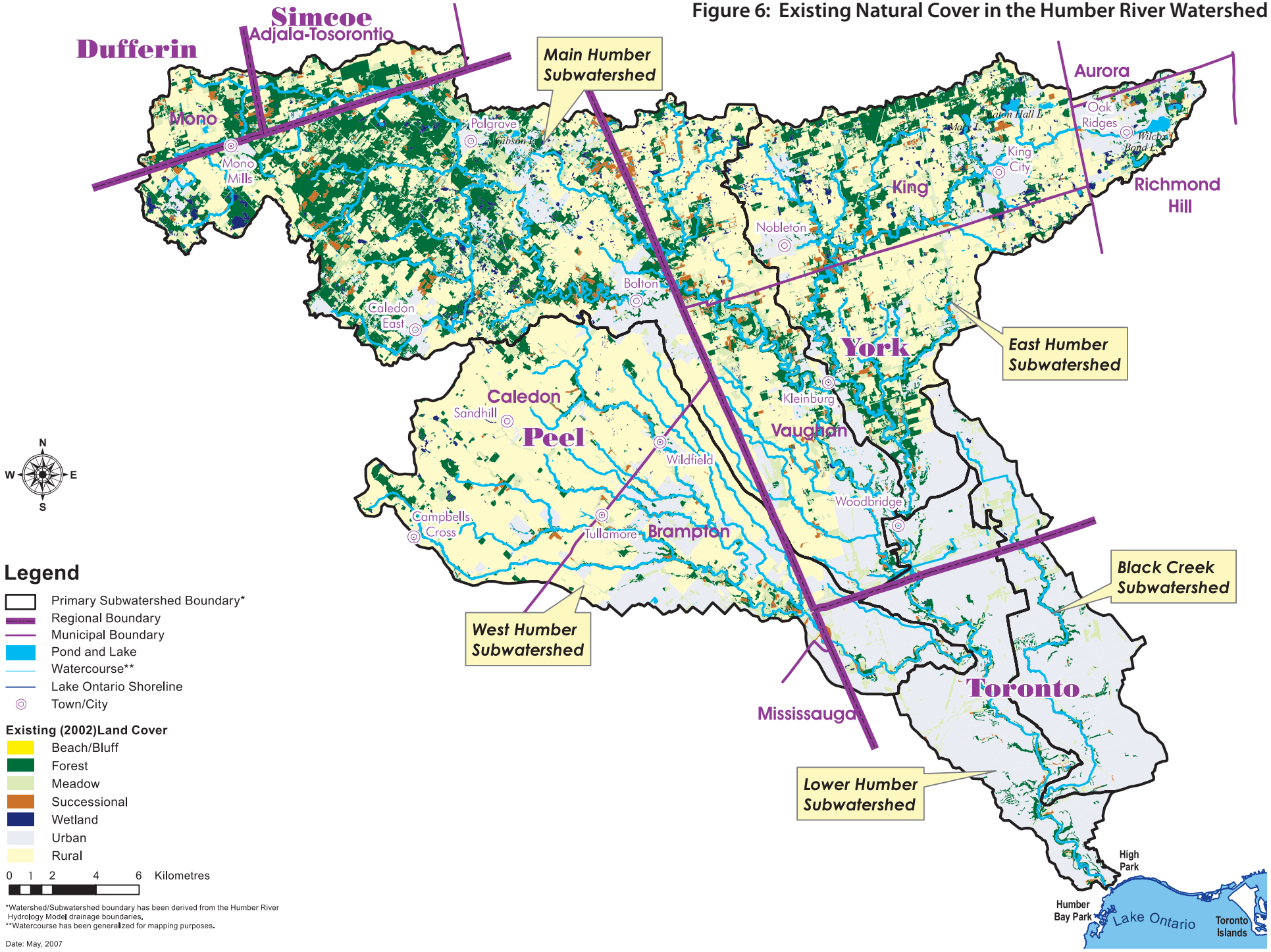
To evaluate terrestrial habitats across the watershed at a landscape scale, natural vegetation cover was classified into a number of categories including forests, successional forests, wetlands, meadows and beach/bluff habitat. Data was derived from interpretation of 2002 aerial photographs. Detailed information on vegetation communities and species continues to be collected in the field to complement and confirm the remotely sensed data. The vegetation community information is mapped according to the Ecological Land Classification System (produced by the Ministry of Natural Resources in 1998). Species are mapped as point occurrences.

Of the 32 per cent natural vegetation cover in the Humber River Watershed today, 18.3 per cent is forest, including mixed forest, deciduous forest, coniferous forest, successional (regenerating) lands and treed swamps. While the per cent of forest cover is higher than in more urbanized watersheds such as the Don (seven per cent) and the Highland (six per cent), it is still low considering that historically it was probably closer to 90 per cent. On a positive note, forest cover has slowly increased over the last 75 years due to a reduction in the intensity of agricultural use and extensive reforestation on the Oak Ridges Moraine. However, with urban expansion, the pressure is again threatening the amount of natural vegetation cover in the Humber River Watershed. Compared to rural surroundings, an urban context is considerably more harmful due to increased pollution, invasive alien species, disturbance and predation by domestic pets.

Maintaining and improving ecological conditions in the watershed will need a robust terrestrial natural heritage system. To address this need, Toronto and Region Conservation (TRCA) prepared a *Terrestrial Natural Heritage System Strategy* (2007). It establishes a target system that would provide the greatest overall benefits to the quality and function of the terrestrial natural heritage system. The 39 per cent target for natural cover in the Humber River Watershed represents the minimum land base that needs to be protected and restored to a natural state to have a healthy terrestrial natural heritage system.

Key wildlife species were chosen as indicators for the Humber River Watershed. Different animals have particular needs for breeding, feeding, shelter, space, resting and migration. They also have differing sensitivities to development. Knowing whether indicator species are present in a watershed provides us with important information about the conditions of the habitats they need for survival and helps us to monitor environmental changes.

Figure 6: Existing Natural Cover in the Humber River Watershed



Legend

- Primary Subwatershed Boundary*
- Regional Boundary
- Municipal Boundary
- Pond and Lake
- Watercourse**
- Lake Ontario Shoreline
- Town/City

Existing (2002)Land Cover

- Beach/Bluff
- Forest
- Meadow
- Successional
- Wetland
- Urban
- Rural

0 1 2 4 6 Kilometres

*Watershed/Subwatershed boundary has been derived from the Humber River Hydrology Model drainage boundaries.
**Watercourse has been generalized for mapping purposes.

Date: May, 2007

INDICATOR 2A:
Quantity of Natural Vegetation Cover

How well is the quantity of natural vegetation cover, including forests, successional forests, meadows, wetlands and beaches/bluffs being protected and restored?

Rating: C

Measure:

Quantity of natural vegetation cover.

Rating criteria:

Per cent of total watershed area that has natural vegetation cover.

A	Greater than 61%
B	41%–60%
C	21%–40%
D	11%–20%
F	Less than 10%

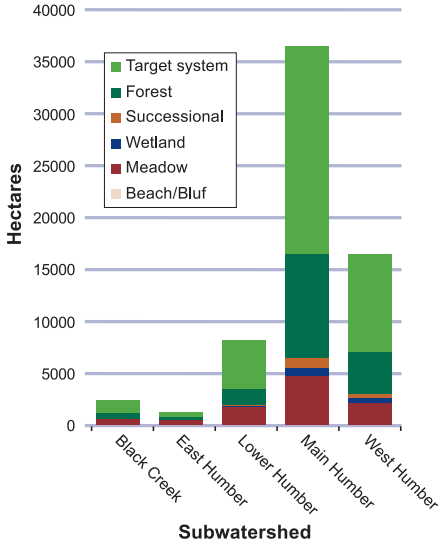
Current efforts:

- Toronto and Region Conservation (TRCA) has completed the *Terrestrial Natural Heritage System Strategy*, a plan for protecting, restoring and enhancing the diversity and function of natural vegetation cover.
- Toronto and Region Conservation is implementing the *Humber Habitat Implementation Plan* that includes strategies for expanding and connecting patches of natural vegetation cover.
- Toronto and Region Conservation is updating the *Humber Watershed Plan* to incorporate the most recent approaches to terrestrial management science, and provide priorities and direction for management of natural vegetation cover.
- Toronto continues to protect and enhance rare black oak savannah habitat in High Park and Lambton Park.
- Toronto and Region Conservation, municipalities, schools and homeowners are improving natural vegetation cover through schoolyard naturalization and Healthy Yards initiatives.

Good news:

- **The Humber River Watershed has 32 per cent natural vegetation cover.**
- Toronto and Region Conservation has planted over 360 hectares of new forest in six years, exceeding the 60-hectares target set in 2000.

Figure 7: Quantity of Natural Vegetation Cover in the Humber River Subwatersheds



Bad news:

- **Over 460 hectares of natural vegetation in the Black Creek and Lower Humber subwatersheds are scheduled to be destroyed, according to proposed urban development plans. As a result of this, long-term targets for these watersheds are less than existing cover.**
- Urban development has severed all upland forest connectivity within the cities of Toronto, Brampton and the southern portions of both Vaughan and Caledon.

Targets:

2012

- Increase the quantity of natural cover across the watershed by five per cent or 500 hectares.

Long-range target:

- Increase the total quantity of natural vegetation cover from 32 per cent to 39 per cent.

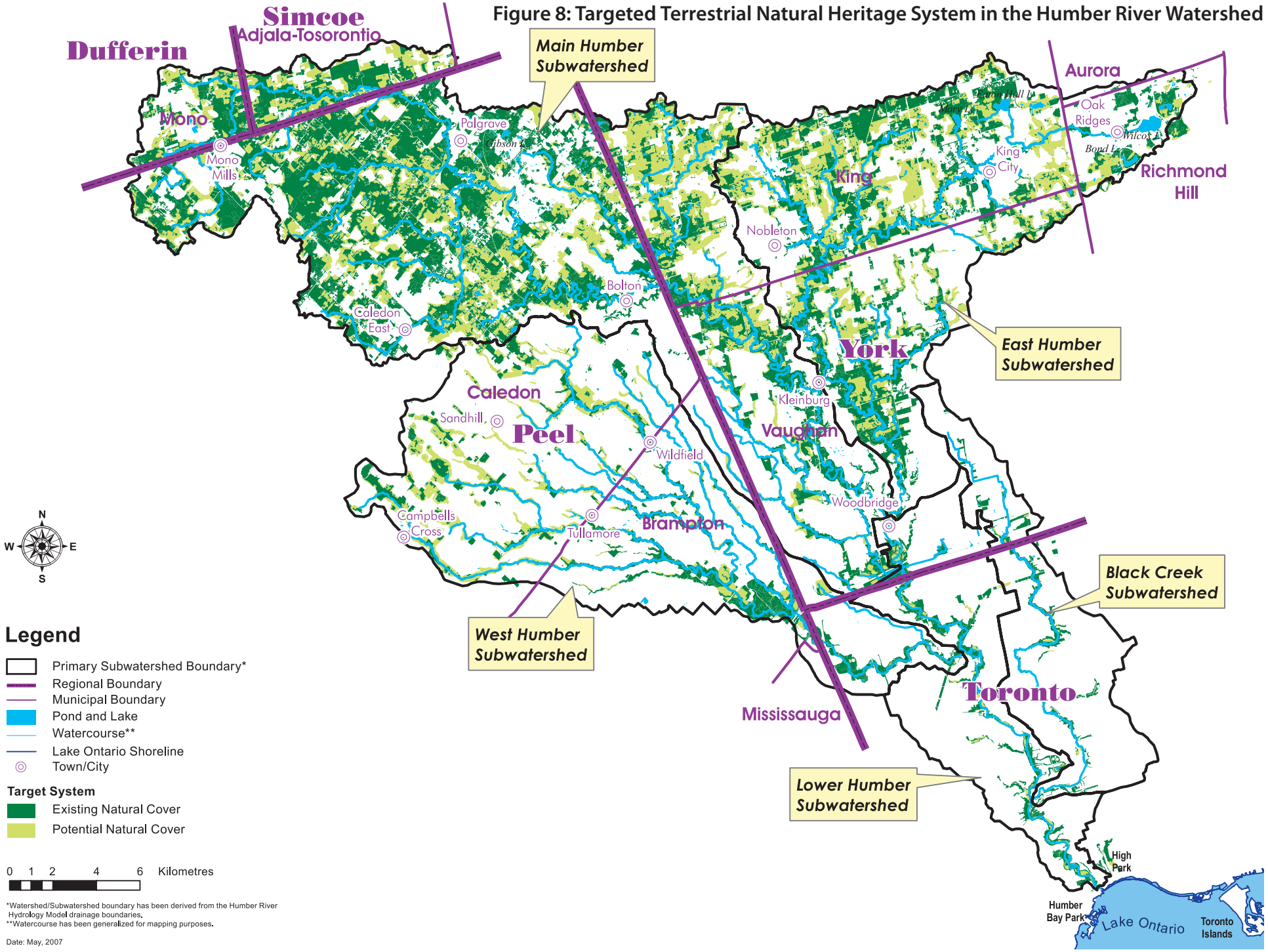
How to improve:

- Include the *Terrestrial Natural Heritage System Strategy* in municipal planning documents.
- Create more biodiversity by naturalizing large areas of greenspace, passive use parks and private backyards to create core habitats and corridors that connect isolated habitat patches.
- Target the West Humber subwatershed for habitat restoration work—as opportunities still exist.

Above photo—Marsh Marigold, Species of Conservation Concern

Subwatershed	Existing natural vegetation cover (2002)	Rack	Target natural vegetation cover	Rack
Black Creek	802 ha (12%)	D	491 ha (8%)	F
East Humber	7,060 ha (36%)	C	9,320 ha (47%)	B
Lower Humber	1,211 ha (15%)	D	1,055 ha (13%)	D
Main Humber	16,526 ha (46%)	B	19,979 ha (56%)	B
West Humber	3,493 ha (17%)	D	4,641 ha (23%)	C
Humber River Watershed	**29,092 ha (32%)**	**C**	**35,486 ha (39%)**	**B**

Figure 8: Targeted Terrestrial Natural Heritage System in the Humber River Watershed



Legend

- Primary Subwatershed Boundary*
- Regional Boundary
- Municipal Boundary
- Pond and Lake
- Watercourse**
- Lake Ontario Shoreline
- Town/City

Target System

- Existing Natural Cover
- Potential Natural Cover

0 1 2 4 6 Kilometres

*Watershed/Subwatershed boundary has been derived from the Humber River Hydrology Model drainage boundaries.
**Watercourse has been generalized for mapping purposes.

Date: May, 2007

INDICATOR 2B:

Quality of Natural Vegetation Cover Distribution

How well is the quality of natural vegetation cover distribution being protected and restored?

Rating: C

Measure:

Quality of natural vegetation cover distribution.

Rating criteria:

Based on the average of habitat patch quality total scores which are made up of the combined individual scores for shape, size and surrounding (matrix) influence.

A Total score of 13+	Excellent	Local Rank 1 (L1) Habitat	Habitat that is of the highest quality and supports both regional species and vegetation communities of conservation concern that are the most sensitive and the most threatened.
B Total score of 11–12.99	Good	Local Rank 2 (L2) Habitat	Habitat of good quality that supports both regional species and vegetation communities of conservation concern.
C Total score of 9–10.99	Fair	Local Rank 3 (L3) Habitat	Habitat of fair quality that supports or is close to supporting both regional species and vegetation communities of conservation concern.
D Total score of 6–8.99	Poor	Local Rank 4 (L4) Habitat	Habitat of poor quality that generally will not support regional species or vegetation communities of concern, but will support species that are adapted to urban conditions .
F Total score of 0–5.99	Very poor	Local Rank 5 (L5) Habitat	A patch of very poor quality which will generally only support those species and vegetation communities that are the most common, and not regional or urban species and vegetation communities of conservation concern.

Current efforts:

- The *Humber Watershed Plan* is being updated to incorporate the most recent approaches to terrestrial management science, which will assist in developing strategies for improving habitat quality.
- The recently adopted *Greenbelt Plan* (2005) and *Places to Grow Plan* (2006) will manage growth and hopefully help benefit habitat quality by moderating the influences of urban development.

Good news:

- **Overall, the quality of natural vegetation cover in the Humber River Watershed merits a "C" or *fair* grade.**
- The best quality habitat is in the upper Main and East Humber subwatersheds and therefore is largely protected by the *Greenbelt Plan* and *Oak Ridges Moraine Conservation Plan*. In general, land uses surrounding these natural vegetation patches do not currently threaten their biological integrity and diversity.
- The range of habitat patch sizes in the watershed is *good* to *excellent*, with a predominance of forest habitats over 50 hectares and wetlands over 10 hectares in area (Figure 11).
- The West Humber subwatershed is generally in the fair quality range.

Bad news:

- **The watershed will be at least 45 per cent urbanized by 2021 according to plans for new urban and settlement areas, suggesting a future loss to habitat quality and biodiversity.**
- The majority of habitat patches in the Humber are linear and follow the valley corridor, placing them in the *very poor* category for shape.
- Most of large forest patches have an irregular shape, thus increasing the exposure of the trees to negative edge effects such as urban uses and domestic pets.
- Most of the remnant natural vegetation cover in the Lower Humber and Black Creek subwatersheds is limited to the riparian corridors.
- High-quality natural vegetation cover is poorly distributed over the watershed.
- In the southern to mid-reaches, the highly fragmented distribution of natural vegetation cover affects the movement of less mobile flora and fauna, and results in poor plant dispersal, delayed colonization and poorer genetic stock.

Targets:

2012

- Increase the quality of natural vegetation cover from a Local Rank C grade to a Local Rank B grade by increasing patch size, enhancing patch shape and mitigating negative external influences.

Figure 9: Quality of Natural Vegetation Distribution within the Humber River Watershed (existing)

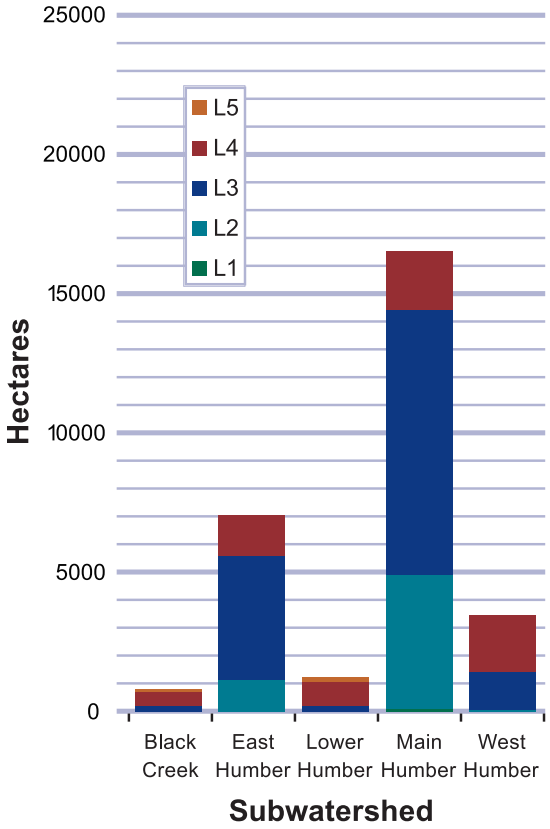
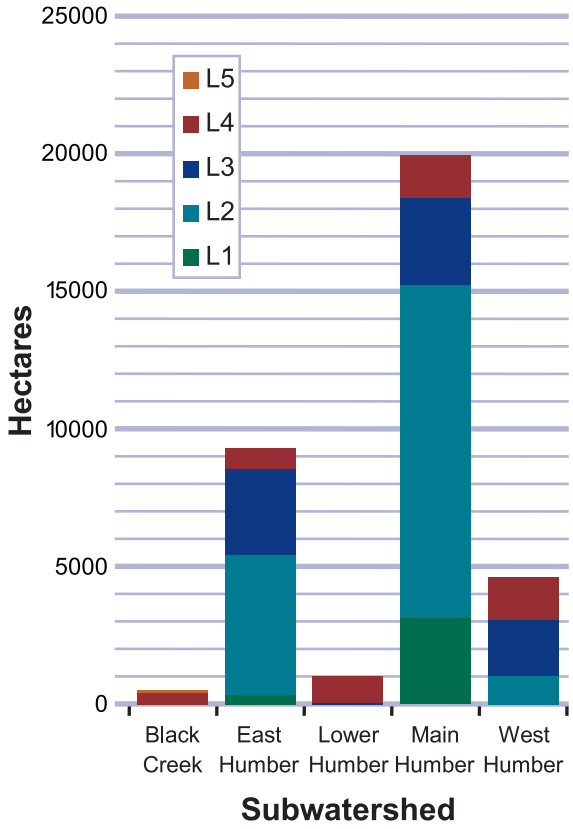


Figure 10: Quality of Natural Vegetation Distribution within the Humber River Watershed (target)



Long-range target:

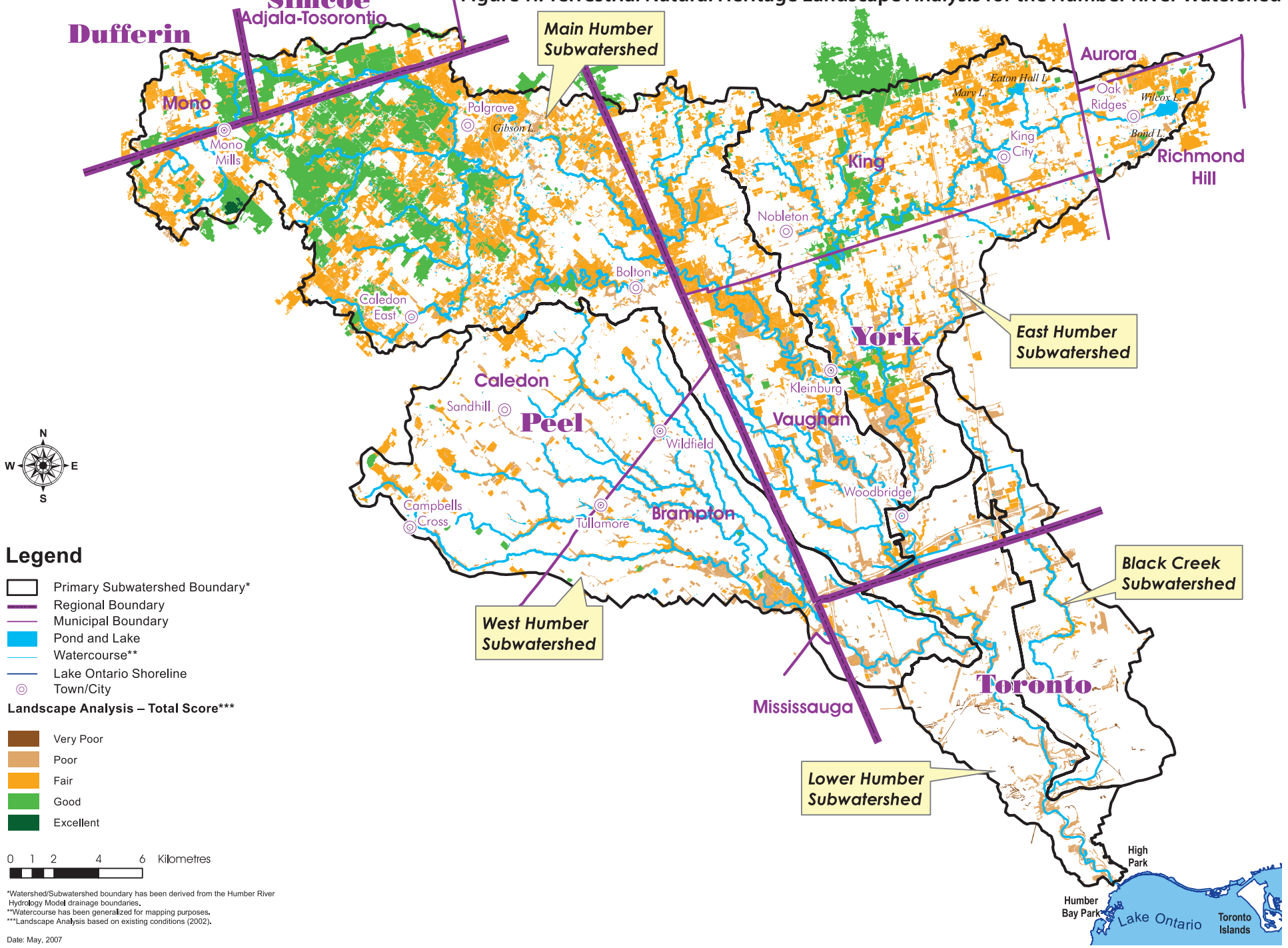
Subwatershed	Average patch quality total score (existing)	Current grade	Average patch quality total score (target)	Target grade
Black Creek	8.0	D	8.2	D
East Humber	9.9	C	11.3	B
Lower Humber	7.7	D	8.3	D
Main Humber	10.3	C	11.7	B
West Humber	8.8	D	10.0	C
Humber River Watershed	**9.9**	**C**	**11.2**	**B**

How to improve:

- Municipalities include the *Terrestrial Natural Heritage System Strategy* recommendations in their Official Plans.
- Maintain the present distribution of natural vegetation cover in the Black Creek and Lower Humber subwatersheds.
- Target the West Humber subwatershed for habitat restoration work.
- Increase vegetation patch sizes by restoring land to natural cover and improve patch shapes to produce lower perimeter-to-area ratios.
- Mitigate the effects of external influences such as urban development, which reduce the quality of natural cover.
- Control the introduction and spread of non-native and invasive plants.
- Set up a system of fixed plots to monitor species, vegetation communities and the factors that affect them to determine changes in biodiversity over time.

Above photo—White Trillium: Species of Conservation Concern

Figure 11: Terrestrial Natural Heritage Landscape Analysis for the Humber River Watershed



*Watershed/Subwatershed boundary has been derived from the Humber River Hydrology Model drainage boundaries.
**Watercourse has been generalized for mapping purposes.
***Landscape Analysis based on existing conditions (2002).

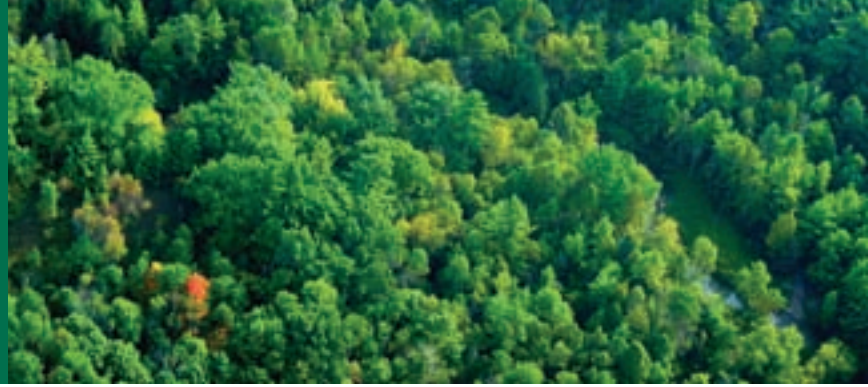
Date: May, 2007

INDICATOR 3:
Forest Cover

How well are watershed forests being protected and regenerated?

Rating:

C



Measure:

Total watershed forest cover, excluding urban street trees, based on interpretation of aerial photographs. *Forests include natural woodlots and coniferous plantations*.

Rating criteria:

Per cent of forest cover in the watershed compared to the 30 per cent *Toronto and Region Remedial Action Plan* target.

A	Greater than 24%
B	21%–23%
C	18%–20%
D	15%–17%
F	Less than 15%

Current efforts:

- Brampton, Caledon and the Region of York have by-laws prohibiting the destruction of woodlots.
- Toronto and Mississauga have by-laws protecting individual trees on private property.
- Toronto has a by-law protecting all trees in ravines.
- Toronto and Region Conservation's (TRCA's) *Terrestrial Natural Heritage System Strategy* has identified core forest habitats and connecting links.
- Toronto and Region Conservation has been planting an average of 62 hectares of trees each year for the last 10 years in the Humber River Watershed.
- Toronto estimates that there are seven million trees in Toronto; 43 per cent of these are on public land and 500,000 are city-owned street trees.
- A Canadian Urban Forest Network was established in 2004 and a strategy for improving Canada's urban forests was included in the *National Forest Strategy 2003-2008*.

Good news:

- **Forest cover remains stable since 2000.**
- According to 2002 aerial photographs, 18.3 per cent or 16,529 hectares of the Humber River Watershed is forested, an increase of 911 hectares from the 1993 figures used in the 2000 report card. However, this modest increase is mainly due to more accurate photographic interpretation and younger trees that are now more visible after 10 years of growth.
- The Humber has relatively large patches of mature remnant forest, particularly in the upper reaches, that support a wide diversity of species including several species of conservation concern (see Indicator 5: Wildlife).
- There is a 490-hectare contiguous forest patch in the north-west corner of the watershed at Airport Road and Finnerty Sideroad (Caledon).
- Toronto and Region Conservation has planted over 400,000 trees and shrubs since 2001 in the Humber River Watershed.

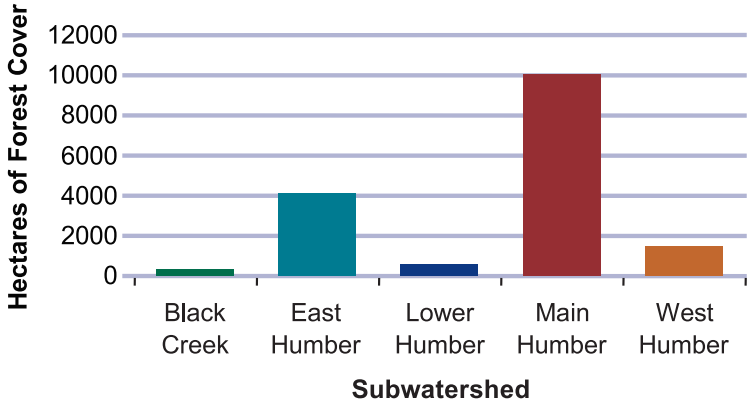
(Above photo courtesy of Lou Wise.)

Table 3: Forest Cover by Municipality in the Humber River Watershed

Municipality	Area of Humber River Watershed (hectares)	Forest cover (hectares) 2002	Per cent forest cover 2002	Rating 2006	Rating* 2000	Change (hectares)
Adjala-Tosorontio	2,015	749	37%	A	A	119
Aurora	148	20	13%	F	F	6
Brampton	7,169	532	7%	F	F	13
Caledon	31,406	7,949	25%	A	B	726
King	14,583	3,028	21%	B	B	46
Mississauga	162	0	0%	F	F	0
Mono	1,768	567	32%	A	A	125
Richmond Hill	1,920	263	14%	F	D	-89
Toronto	13,197	902	7%	F	F	-38
Vaughan	17,888	2,518	14%	F	F	1
Watershed	**90,255**	**16,529**	**18.3%**	**C**	**D**	**910**

Note: *Based on 30 per cent *Toronto and Region Remedial Action Plan* forest cover target.

Figure 12: Total Forest Cover in the Humber River Subwatershed (2002)



Bad news:

- **The West Humber, Lower Humber and Black Creek subwatersheds have only 7.2 per cent, 7.7 per cent, and 4.6 per cent forest cover, respectively. This is far less than the 30 per cent recommended in the *Toronto and Region Remedial Action Plan* (RAP).**
- The amount of interior forest habitat (forest that is more than 100 meters from the forest edge) has decreased by 411 hectares since the last report card to only 1,441 hectares (1.6 per cent of the watershed). This is far less than the 10 per cent recommended in the RAP.
- At the current rate of reforestation it will take 175 years to reach the 30 per cent RAP target, provided there is no loss of forest in the meantime.
- In November 2003, the Asian long-horned beetle, an invasive species that infests and kills a large variety of hardwood trees, was found on the border between the cities of Toronto and Vaughan. By March 2004, 17,000 trees had been cut down in an effort to eradicate this pest.
- Although Toronto, Vaughan and TRCA have planted over 37,800 street trees, saplings, seedlings and shrubs since 2005 to replace those destroyed by the Asian long-horned beetle, it will take years of growth to replace the many mature trees that were lost.
- Approximately 2.8 billion mature trees are needed each year to offset the carbon dioxide emissions for all of the registered vehicles in Peel, York and Toronto.

Targets:

2012

- There is no further loss of forest cover.
- All municipalities have tree and ravine protection policies and by-laws.
- An additional 500 hectares of forest is planted.
- The extent of urban street tree canopy in the entire Humber River Watershed is determined.

Figure 13: Toronto and Region Conservation's Humber River Watershed Plantings

(includes trees, shrubs, seedlings and caliper trees)

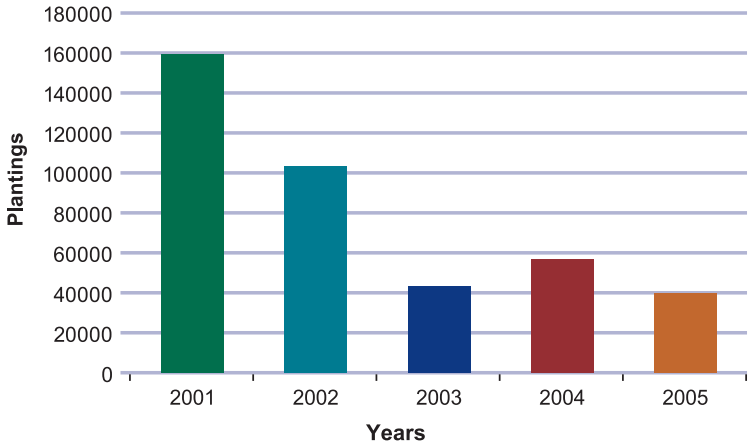
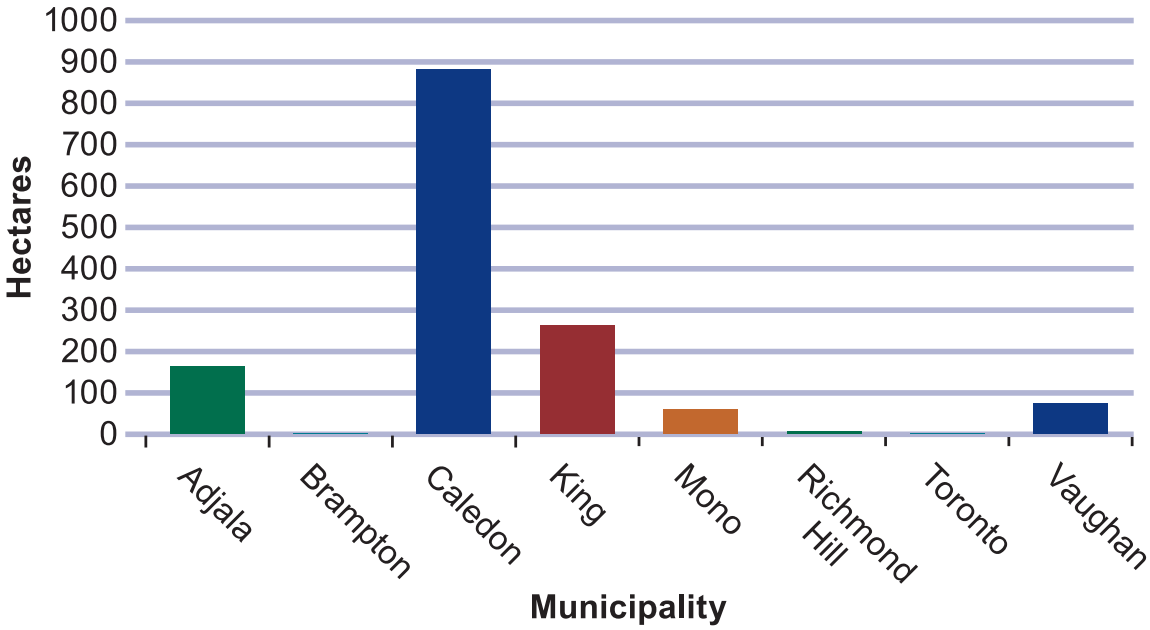


Figure 14: Interior Forest Cover in the Humber River Watershed

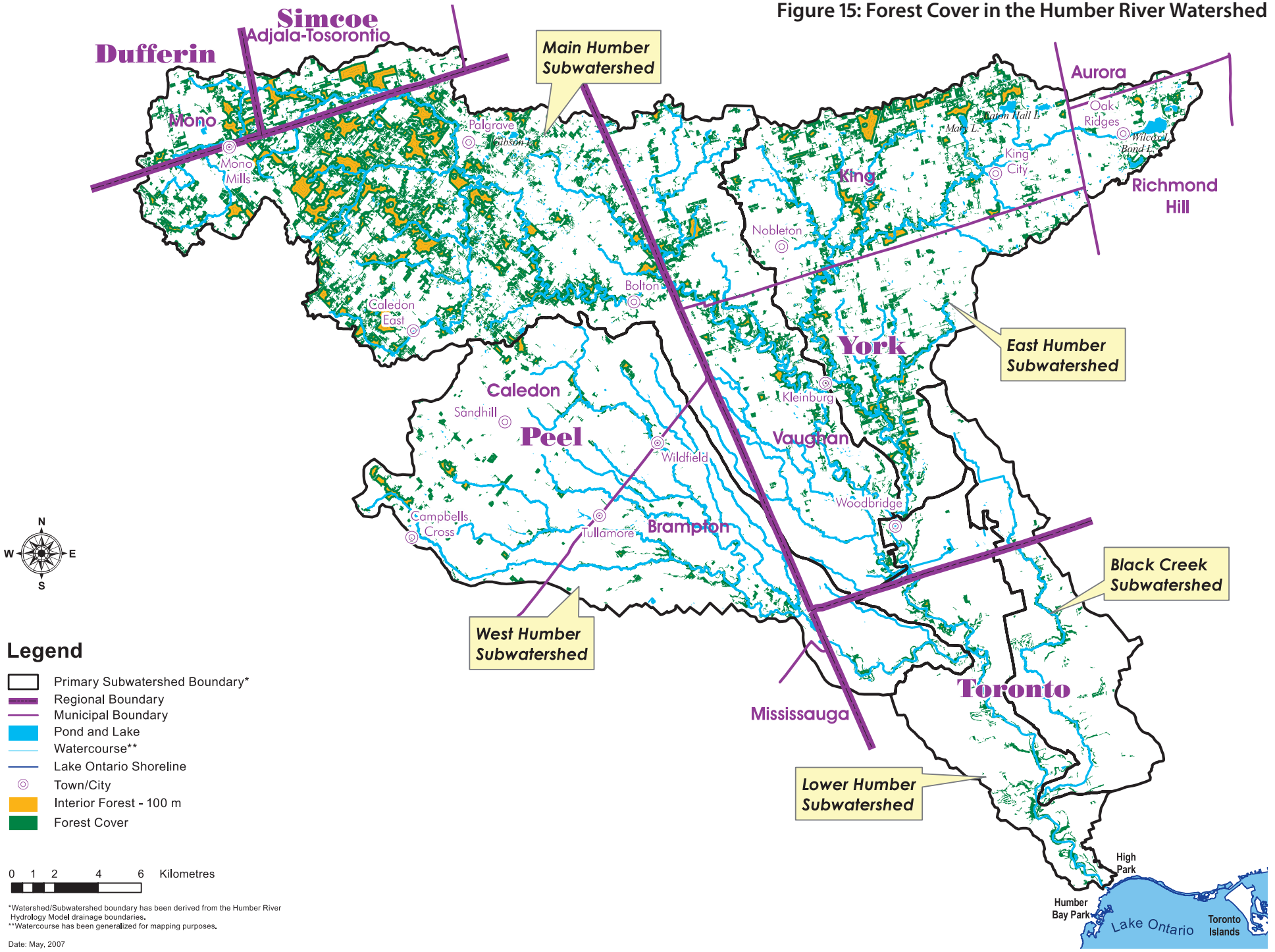


How to improve:

- Toronto and Region Conservation identifies priority areas for forest protection and restoration through its *Humber Watershed Plan Technical Updates*.
- Municipalities assist in protecting, restoring and linking forest cover by adopting recommendations from the *Humber Watershed Plan* when completed and include them in their Official Plans and tree preservation by-laws.
- Municipalities inventory their street trees and define the forest canopy in urban areas.
- Governments, agencies, businesses, institutions and private landowners protect existing forests and trees on their properties, and accelerate tree planting.

Boyd Conservation Area: City of Vaughan

Figure 15: Forest Cover in the Humber River Watershed



Legend

- Primary Subwatershed Boundary*
- Regional Boundary
- Municipal Boundary
- Pond and Lake
- Watercourse**
- Lake Ontario Shoreline
- Town/City
- Interior Forest - 100 m
- Forest Cover

0 1 2 4 6 Kilometres

*Watershed/Subwatershed boundary has been derived from the Humber River Hydrology Model drainage boundaries.
**Watercourse has been generalized for mapping purposes.

Date: May, 2007

INDICATOR 4:
Wetlands

How well are wetlands being protected and restored?

Rating:

F

Measure:

Amount of wetlands present in the watershed. Historically, in this region, they would have covered approximately 10 per cent of the watershed.

Wetlands are lands that are seasonally or permanently flooded by shallow water, as well as lands where the water table is close to the surface. The four major types of wetlands are swamps, marshes, bogs and fens... (Ontario Ministry of Natural Resources, 2002).

Rating criteria:

Per cent of wetland in the watershed compared to the 10 per cent *Toronto and Region Remedial Action Plan* target.

A	Greater than 8%
B	7%–7.9%
C	6%–6.9%
D	5%–5.9%
F	Less than 5%

Current efforts:

- Toronto and Region Conservation (TRCA) has assessed the quality, quantity and connectivity of wetlands, and the effects of surrounding land uses, through the *Terrestrial Natural Heritage System Strategy*.
- Toronto and Region Conservation has identified priority sites for wetland management and is implementing this through its *Humber Habitat Implementation Plan*.
- The Ministry of Natural Resources (MNR) is developing a rehabilitation plan for the Lower Humber Marshes and a wetland restoration plan in the upper reaches of the Humber, particularly on the Oak Ridges Moraine and the Peel Plain.
- Community groups are assisting with wetland restoration projects at Claireville Conservation Area and Seneca College's King Campus.

Good news:

- **There has been no loss of provincially evaluated wetlands since the last report card (2000).**
- **The MNR has evaluated and ranked for quality 1,741 hectares of wetlands. They have identified but not classified an additional 1,555 hectares of wetlands. These wetlands are afforded some level of protection if they fall within the *Oak Ridges Moraine Conservation Plan, Greenbelt Plan or Niagara Escarpment Plan.***
- The new *Ontario Regulation 166/06* will prohibit or regulate changes or interferences with wetlands (see Indicator 1: Significant Landforms).
- The revised *Provincial Policy Statement* (2005) does not permit development and site alteration in significant wetlands.
- The highest quality wetlands in the Humber, located in the headwaters area, are protected by the *Oak Ridges Moraine Conservation Plan*.
- Toronto and Region Conservation and its community partners have created 8.8 hectares of new wetlands; 0.5 hectares in Rexdale Park (Toronto), four hectares in Claireville Conservation Area (Brampton), 0.3 hectares at Seneca College (King), three hectares in the William Granger Greenway (Vaughan) and one hectare in Cold Creek Conservation Area (King).

Bad news:

- **The creation of 8.8 hectares of new wetland did not meet the 2000 report card target of restoring 15 hectares of new wetland by 2005.**
- **Only 3.6 per cent (3,296 hectares) of the Humber River Watershed is covered by wetland. This is far below the 10 per cent target set by the *Toronto and Region Remedial Action Plan*.**
- Only wetlands larger than two hectares are evaluated using the federal/provincial wetland classification system. This overlooks the small wetlands located near first and second order streams (76 per cent of the Humber's stream length) that play a critical habitat function for aquatic and amphibian lifecycles. However, *Ontario Regulation 166/06* considers wetlands as small as 0.5 hectares where Ecological Land Classification data exists.

Target:

2012

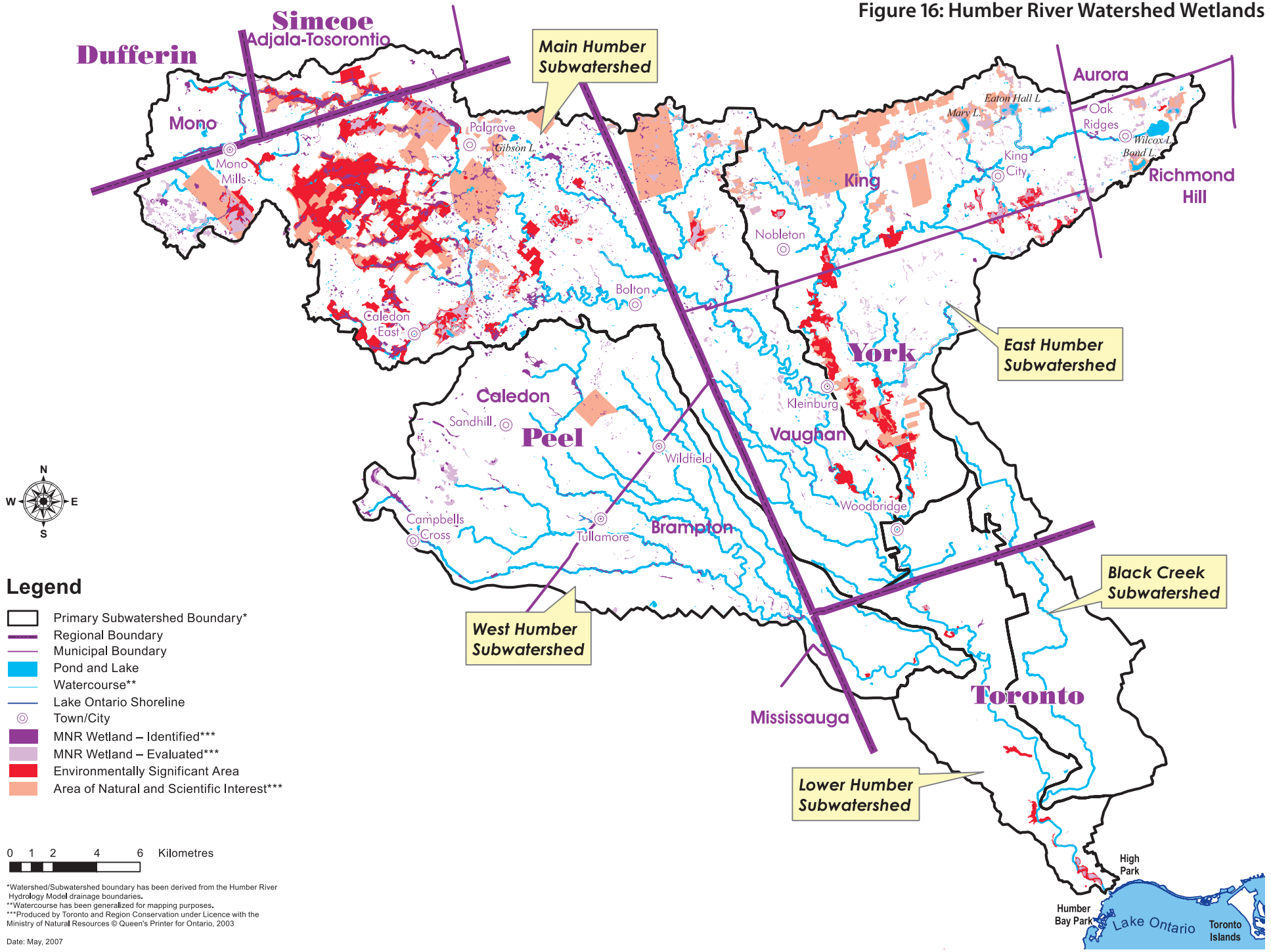
- An additional 15 hectares of wetland are restored within the Humber River Watershed.

How to improve:

- Municipalities adopt wetland protection recommendations from the updated *Humber River Watershed Plan* when completed and include them in their Official Plans.
- Prioritize the protection, enhancement and creation of small wetlands near streams and forests to enhance habitat diversity.
- Educate private landowners and groups on ways to protect, restore and enhance wetlands using Best Management Practices (BMPs), monitoring and Adopt-A-Pond initiatives.
- Municipalities, TRCA and MNR continue to map, evaluate, designate and monitor wetlands.

Above photo—Rexdale Park Wetland: City of Toronto

Figure 16: Humber River Watershed Wetlands



Legend

- Primary Subwatershed Boundary*
- Regional Boundary
- Municipal Boundary
- Pond and Lake
- Watercourse**
- Lake Ontario Shoreline
- Town/City
- MNR Wetland – Identified***
- MNR Wetland – Evaluated***
- Environmentally Significant Area
- Area of Natural and Scientific Interest***

0 1 2 4 6 Kilometres

*Watershed/Subwatershed boundary has been derived from the Humber River Hydrology Model drainage boundaries.
**Watercourse has been generalized for mapping purposes.
***Produced by Toronto and Region Conservation under Licence with the Ministry of Natural Resources © Queen's Printer for Ontario, 2003

Date: May, 2007

INDICATOR 5:
Wildlife

How well is wildlife being protected?

Rating:

C

Measure:

Presence or absence of the 25 indicator species. Indicator species are animals that by their presence or absence indicate the condition of the environment, such as the level of pollution, habitat and the size and degree of disturbance.

Rating criteria:

Number of indicator species present in the watershed.

A	Greater than 20%
B	17%–19%
C	15%–16%
D	12%–14%
F	Less than 12%

Current efforts:

- Environment Canada coordinates citizen wildlife monitoring through its *Ecological Monitoring and Assessment Network* (EMAN).
- Bird Studies Canada, the Toronto Zoo and Citizens Environment Watch also coordinate citizen monitoring programs.
- Toronto and Region Conservation (TRCA) conducts a regional monitoring program to collect data on wildlife species.
- Thirty-eight volunteers assist TRCA with the terrestrial monitoring of 19 sites.
- Toronto and Region Conservation, municipalities, schools and community groups participate in habitat improvement by tree planting and bird nesting box installations in the Humber River Watershed.

Good news:

- **The average number of fauna indicator species found across the watershed increased from 15 in 2000 to 17 in 2005.**
- All of the 25 indicator species were found in the Main Humber subwatershed. The number in the East Humber subwatershed remained constant at 24. While the remaining subwatersheds have much lower numbers of indicator species, their numbers all increased since the 2000 report card.
- The West Humber subwatershed showed an increase of six in the number of indicator species.
- Large habitat patches in the East and Main Humber subwatersheds are able to support sensitive species such as least bittern, scarlet tanager and broad-winged hawk.
- The Peregrine Falcon recovery program has been successful because the birds adapt to living in urban conditions, substituting high-rise buildings for cliffs.
- Through reintroduction programs, the wild turkey and trumpeter swan have been experiencing a gradual but successful return to the Humber River Watershed.

Bad news:

- **The low number of species in the Lower Humber (10) and Black Creek (seven) subwatersheds indicate that they have degraded habitats that can only support species relatively tolerant of disturbance and pollution.**
- Despite overall increases, four species that were present in 2000 (one in the East Humber, two in the West Humber and one in the Lower Humber) were absent in 2005.
- Each of the Lower Humber and Black Creek subwatersheds show only two out of eight forest indicator species and low numbers of species that require both wetland and forest habitat to survive and reproduce. The West Humber lost two forest indicator species.
- Continuing urbanization of the watershed, particularly in the Main, East and West Humber subwatersheds, threatens the survival of many indicator species because of loss of natural habitats.
- Invasive plants such as European buckthorn, garlic mustard and dog strangling vine are beginning to take hold and degrade native wildlife habitat.

Targets:

2012

- All 25 of the indicator species are present in the Main and East Humber subwatersheds; 20 of the 25 indicator species are present in the West Humber subwatershed; and 12 of the 25 indicator species are present in both the Lower Humber and Black Creek subwatersheds.
- A self-sustaining population of river otter has been successfully introduced into the upper reaches of the watershed.

Above photo—Eastern Screech-Owl: Species of Conservation Concern

Table 4: Presence of Fauna Indicator Species in the Humber River Subwatersheds in 2000 and 2005*

		Main Humber		East Humber		West Humber		Lower Humber		Black Creek	
		2000	2005	2000	2005	2000	2005	2000	2005	2000	2005
Forest	Eastern chipmunk	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Eastern screech-owl	Y	Y	Y	Y		X				
	Eastern wood-pewee	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Ovenbird	Y	Y	Y	Y		X				
	Pileated woodpecker	Y	Y	Y	Y		X				
	Porcupine	Y	Y		X		X				
	Ruffed grouse	Y	Y	Y	Y		X				
	Scarlet tanager	Y	Y	Y	Y		X				
Wetland	Bullfrog	Y	Y	N							
	Green frog	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Mink	Y	Y	Y	Y						
	Northern leopard frog	Y	Y	Y	Y	Y	Y	Y	Y		
	Swamp sparrow	Y	Y	Y	Y	Y	Y	N			
	Virginia rail	Y	Y	Y	Y			Y	Y		
Meadow	Bobolink	Y	Y	Y	Y	Y	Y				
	Eastern meadowlark	Y	Y	Y	Y	Y	Y		X	Y	Y
	Savannah sparrow	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Meadow/Forest	American woodcock	Y	Y	Y	Y	Y	Y				X
Wetland/Forest	American toad	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Green heron	Y	Y	Y	Y				X		
	Grey tree frog	Y	Y	Y	Y	N					
	Northern spring peeper	Y	Y	Y	Y	Y	Y				
	Striped chorus frog		X	Y	Y	Y	Y				
	Wood duck	Y	Y	Y	Y	N					
	Wood frog	Y	Y	Y	Y	Y	Y				
	Number of indicator species	24	25	24	24	15	19	8	10	6	7
	Rating	**A**	**A**	**A**	**A**	**C**	**B**	**F**	**F**	**F**	**F**

How to improve:

- Municipalities work to improve habitat size, shape, connectivity and distribution according to TRCA's *Terrestrial Natural Heritage System Strategy*, in order to benefit wildlife movement through the watershed.
- Municipalities allow naturalization of passive-use parks and promote backyard naturalization programs to create corridors to connect isolated habitat patches.
- Toronto and Region Conservation and its partners give priority to reforestation and wetland creation in the West Humber, Lower Humber and Black Creek subwatersheds.
- Toronto and Region Conservation and municipalities maintain species monitoring programs and report results.
- Toronto and Region Conservation and other agencies develop recovery plans for selected species.
- The Ontario Ministry of Natural Resources investigates the re-introduction of river otter to the watershed.
- Government agencies work in partnership to develop a detection, monitoring and strategy framework for invasive species threats.

Notes: *Apparent increases in numbers may be due to expanded survey areas and not necessarily improved habitat. 'X' are new species in 2005. 'N' were surveyed in 2000 but not in 2005.

Above photo—American Toad: Species of Conservation Concern

Groundwater drilling. Photo credits: Conservation Authorities Moraine Coalition York-Peel-Durham-Toronto Groundwater Study

Groundwater

The Humber River Watershed has abundant groundwater that lies in underground aquifers. A vitally important resource, this groundwater provides the baseflow for the 750 watercourses that drain the watershed and drinking water for rural residences and local municipalities. About 21,000 residents are now supplied by municipally treated groundwater from 13 drilled, deep aquifer wells, which is down from 29 wells serving 40,000 residents reported in 2000. The existing wells are in the communities of:

- Caledon East (three wells)
- Palgrave (three wells)
- King City (three wells)
- Nobleton (two wells)
- Kleinburg (two wells)

These deep wells average about 100 metres in depth and it is estimated that water from such aquifers can be up to 1,000 years old. There are an estimated 5,000 additional private shallow wells that generally range in depth from 10 to 20 metres. The total annual groundwater consumption for all uses including golf courses and farms amounts to approximately 7.2 million m^3. The annual municipal consumption amounts to about 3.4 million m^3 or 275 litres per person per day.

Opposite photo—Cold Creek Conservation Area: King Township

To assess the health of groundwater in the Humber River Watershed, we used two indicators:

1. Groundwater quantity (groundwater level).
2. Groundwater quality, based on the Ontario Drinking Water Standards (ODWS) for chlorides and nitrates.

Many factors can affect ground-water quantity including deforestation, urbanization, aggregate mining below the water table and groundwater extraction. Such activities can lead to a reduction in stream baseflow, drying up of wetlands and loss of water in shallow wells. Since 2001, maximum permitted pumping rates have increased from 1,300 m^3 per day in Caledon East to a maximum permitted rate of 2,460 m^3 per day, although the actual water use was only 1,304 m^3 per day in 2006. A new well has been drilled for Palgrave, but has not yet been put into service, and therefore the permitted and actual water use has not changed significantly from 2001 to 2006. The number of municiple wells in King City, Kleinburg and Nobleton has remained the same since 2001, but the Regional Municipality of York is currently reviewing water supply options for these communities. Three Mono Mills wells have been decommissioned and one has been retained as part of the Provincial Water Quality Monitoring Network (PGMN). The three Oak Ridges wells are inactive.

Groundwater quality can be affected by many activities including agriculture, road salt use, stormwater runoff and industrial spills. In severe cases, pollution of groundwater can render it unfit for human consumption. We investigated two important pollutants—nitrates and chlorides.

> Almost nine out of 10 (88 per cent) Humber residents agree somewhat (55 per cent) or totally (33 per cent) that safeguarding groundwater is an important issue to them (Pollara, 2006).

Nitrates come from fertilizers and septic systems, and are frequently found as a contaminant in shallow aquifers in Ontario. High levels of nitrate in drinking water can lead to "blue baby" syndrome, where formula-fed babies less than six months of age ingest sufficient amounts of nitrate to cause a reduction of the oxygen-carrying capacity of the blood.

Chlorides come predominantly from road salt. However, wells in High Park (Toronto) have high levels (300 parts per million) of naturally derived chlorides.

Figure 17A: Cross-section of the Oak Ridges Moraine in the Humber River Watershed

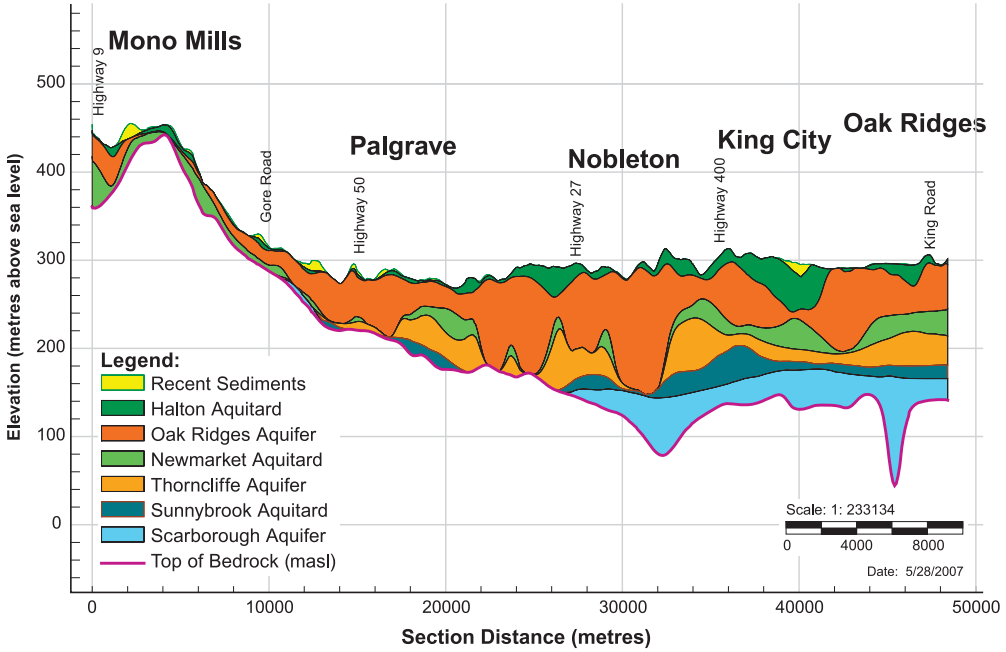
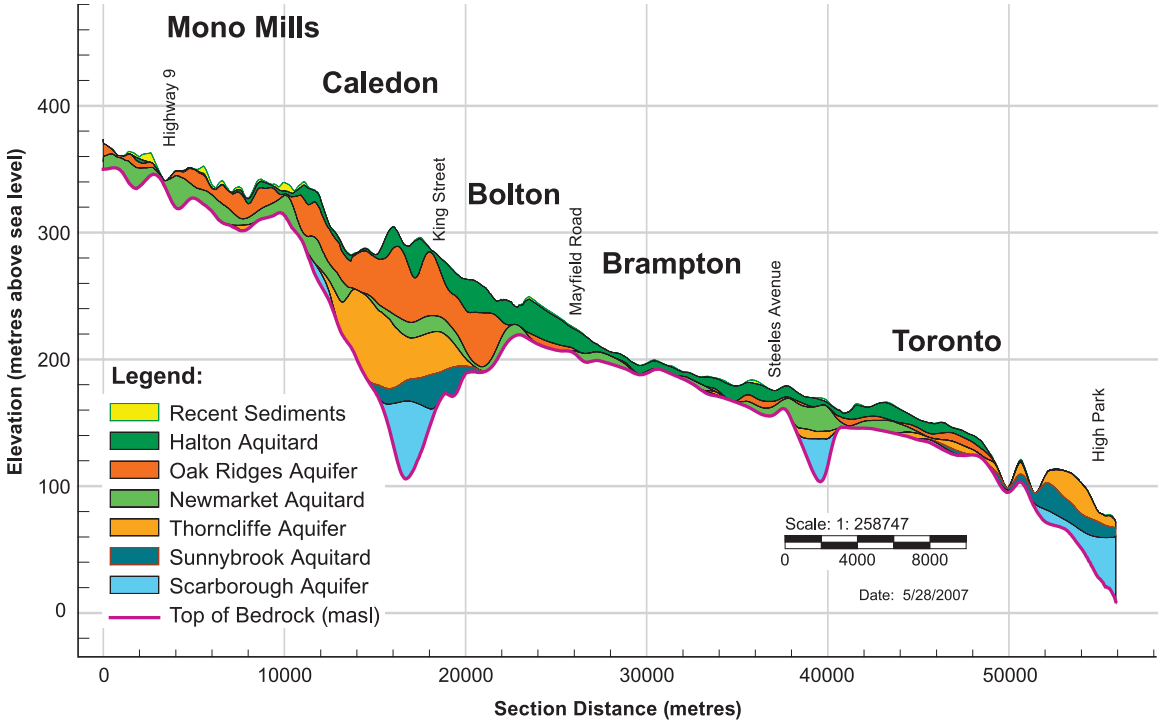


Figure 17B: Cross-section from Palgrave to High Park in the Humber River Watershed



INDICATOR 6:
Groundwater Quantity

Is groundwater being used sustainably?

Rating:

B

Measure:

The rate of groundwater extraction. *Groundwater is precipitation that infiltrates into the soil, moves downward to the water table and collects in aquifers.*

Rating criteria:

In development.

Current efforts:

- Municipalities, working with Toronto and Region Conservation (TRCA), the Geological Survey of Canada, the Ontario Geological Survey, the Ministry of the Environment (MOE), Conservation Authorities Moraine Coalition and neighbouring conservation authorities continue the development and refinement of groundwater management strategies.
- Source water protection legislation was adopted by the provincial government in the fall of 2006.
- All new development projects are required to address the maintenance of recharge and discharge areas.
- The regions of Peel and York and the City of Toronto have expanded their household water-efficiency programs to include public education, as well as rebates for high-efficiency appliances and fixtures.
- Toronto and Region Conservation has hired hydrogeologists to review development projects to ensure groundwater is used sustainably.

Good news:

- **There has not been any observed lowering of water levels in existing active wells since 2000.**
- Potential municipal groundwater extraction in the watershed has decreased by approximately 1,400 m^3 per day to 10,200 m^3 per day, since last reported in 2000. Some wells have been decommissioned (Bolton) or taken out of service, but others (Caledon East) have been added.
- Less than 10 per cent of Humber's annual recharge is withdrawn from the watershed system. However, given that the withdrawals are localized, there may be higher utilization rates in some subwatersheds.
- Municipal water supply wells are located in deep aquifers, thereby reducing impacts on baseflow to streams, since stream baseflow is derived from shallow aquifers (see Figure 17).
- Toronto and Region Conservation has completed a comprehensive water budget for the Humber River Watershed.
- Ten monitoring wells have been established within the Humber River Watershed through the Provincial Groundwater Monitoring Network (PGMN). In 1999 there were none. One installation allows for the monitoring of shallow groundwater resources, which interact more closely with watercourses.
- *Ontario Regulation 387/04* now require both the metering and regular reporting of significant groundwater takings to the MOE.
- The Region of Peel has instituted a fully-funded well decommissioning program.
- Model land use policies for groundwater have been developed through the York-Peel-Durham-Toronto (YPDT) Groundwater Study Project.
- There are no commercial water bottling companies taking water from the watershed.

Above photo—Groundwater drilling. Photo credits: Conservation Authorities Moraine Coalition York-Peel-Durham-Toronto Groundwater Study

Bad news:

- The effectiveness of newly implemented groundwater infiltration technologies have not yet been proven by long-term monitoring and evaluation.
- Some municipalities are switching their water supply from groundwater to surface water. This may cause the importance of groundwater resources to be de-emphasized, resulting in less vigilant protection for them.

Targets:

2012

- Aquifer water levels remain stable at average 2005 levels.
- Install six new PGMN monitoring wells within the Humber River Watershed.
- Develop a modeling method to determine how much precipitation infiltrates the ground and emerges as baseflow in watercourses.

How to improve:

- The province, TRCA and municipalities finalize, approve and implement the *Draft Groundwater Management Policy Recommendations* as outlined in *Watershed Planning from Recommendations to Municipal Policies: A Guidance Document (2005)*.
- A further study to assess withdrawal rates and their relationship to annual recharge at a subwatershed scale should be undertaken.
- Toronto and Region Conservation maintains a source water protection database on groundwater levels and quality.
- Agencies continue to monitor baseflow in rivers and streams to detect possible lowering of water tables.
- Municipalities implement full-cost, user-pay pricing systems to promote water conservation and to provide a funding source for groundwater management programs.
- Residents and businesses continue to practice water conservation.

Provincial Groundwater Monitoring Network Well, Kortright at The Living City Campus®: City of Vaughan

INDICATOR 7:
Groundwater Quality

How well is the quality of our groundwater being protected?

Rating:

B

Measure:

Groundwater meets Ontario Drinking Water Standards (ODWS).

Rating criteria:

In development.

Current efforts:

- Drinking water source protection legislation (*The Clean Water Act*) recieved Royal Assent in October 2006. It ensures communities are able to protect their municipal drinking water supplies through developing collaborative, locally driven, science-based protection plans.
- Regions of York and Peel are refining their Wellhead Protection Areas.
- Deep wells, such as those used by municipalities, are tested regularly to monitor and verify that municipal water quality meets the Ontario Drinking Water Standards (ODWS) criteria.
- All new development schemes are reviewed by Toronto and Region Conservation's (TRCA's) hydrogeologists to provide protection against possible groundwater contamination.

Good news:

- **The quality of groundwater from all deep aquifers generally appears to be good. Health-related parameters have not been exceeded in any Provincial Groundwater Monitoring Network (PGMN) well.**
- Municipalities along with TRCA, the Geological Survey of Canada, the Ministry of the Environment, Ontario Geological Survey, Conservation Authorities Moraine Coalition and neighbouring conservation authorities are developing and refining groundwater management tools for the York-Peel-Durham-Toronto regions.
- The *Nutrient Management Act* is in place providing legal tools to establish groundwater quality protection programs in agricultural areas.
- *Ontario Regulation 903* provides enhanced protection of groundwater resources by requiring specially trained, licensed well technicians to construct, maintain or monitor water wells.
- Failing household septic systems are being replaced with sewage collection and treatment facilities in developed areas such as King City.
- The *Safe Drinking Water Act* (2002) requires mandatory water quality sampling and reporting for potable water supplies from municipal and non-municipal residential systems and designated facilities (e.g., rural schools, senior citizens' residences and hospitals).

Bad news:

- **Private, domestic, shallow water supply wells are tested infrequently by the owners for bacteriological parameters and rarely for chemical parameters.**
- As development continues, there will be increased use of road salt in sensitive groundwater recharge zones.
- At present, there is no practical, low-cost alternative to winter road salting.
- Lack of comprehensive sampling and testing program for shallow groundwater quality.

Targets:

2012

- No increase in contaminant concentration in groundwater.
- Decrease in chloride and nitrate concentration as determined by the *Groundwater Management Strategy*.
- No new, incompatible developments permitted within Wellhead Protection Areas.
- Implementation of Wellhead Protection Area policies across the watershed.
- Six new provincial groundwater monitoring wells installed in the Humber River Watershed.

How to improve:

- The province, TRCA and municipalities develop and adopt a *Groundwater Management Strategy* that includes land use and zoning policies to protect groundwater quality (e.g., Wellhead Protection Areas).
- The province maintains better records on types of contamination, locations and spill frequency.
- Farmers employ Best Management Practices (BMPs) to reduce water contamination (such as nitrates) originating from practices on their property.
- Municipalities and private landowners reduce the use of road salt.
- Monitoring of nitrate and chloride concentration trends is recommended to ensure that development and road salting do not impair the quality of the Humber River Watershed's groundwater resources.
- Provincial Groundwater Quality Monitoring Network extended to monitor groundwater water quality of at least 10 wells.
- Toronto and Region Conservation maintains a groundwater quality database.

Groundwater drilling. Photo credits: Conservation Authorities Moraine Coalition York-Peel-Durham-Toronto Groundwater Study

Above photo—Greenworks Building at The Living City Campus: City of Vaughan

Surface Water

Since we reported in July 2000, Toronto and Region Conservation (TRCA) established a regional monitoring program that provides a great deal of current information on the condition of surface water. Nine stations across the watershed are monitored regularly. The locations of the monitoring stations are illustrated in Figure 18.

Surface water includes lakes, ponds, rivers and streams. To assess their condition, we have used five indicators:

1. Stormwater management in urbanized areas (Figure 19).
2. *Escherichia coli* (*E. coli*) bacteria levels for swimmability (Table 6).
3. Conventional pollutants, such as suspended solids, phosphorus, nitrogen, ammonia and chlorides.
4. Heavy metals and persistent organic contaminants in water and fish tissues.
5. River flow.

Surface water quality varies greatly across the watershed depending on soils, imperviousness and the surrounding land use. The same indicator might range from a *good* grade of A to a *very poor* grade of F, depending on the location. Generally speaking, water quality in the upper reaches of the watershed rank among the cleanest in the Greater Toronto Area, owing to the more natural conditions that prevail there. However, signs of degradation are becoming increasingly apparent as urban development continues to expand.

Urbanization and water removal change the water budget and cause rivers and streams to suffer from increased average annual rates of total flow, increased peak flows and reduced low flows. As a result, there may be too little flow on average and too much when it rains. Increased flow and more frequent high flows aggravate streambank erosion, impacts water quality and affect the lives of animals that rely on stable and predictable river flow.

Baseflow in a watercourse depends on the rate of discharge from stored groundwater. Recharge areas associated with permeable soils such as the Oak Ridges Moraine allow larger volumes of water to infiltrate the ground, thus reducing overland runoff rates. Infiltrated water moves through the soil where many pollutants are filtered or immobilized, generally providing clean water when it eventually emerges in a stream or lake as baseflow. In contrast, fine-grained clay soils and impervious surfaces restrict infiltration, causing higher runoff rates and less contribution to dry-weather base flows.

More than four-fifths (83 per cent) of watershed residents think pollution is the most serious problem facing the Humber River today (Pollara, 2006).

Effective stormwater management aims to mimic the natural hydrologic cycle by exploiting all opportunities to infiltrate water and retaining what can't be infiltrated in stormwater ponds or wetlands. Unfortunately, modelling has shown that even with aggressive controls in the City of Toronto, waterfront beaches could continue to be affected by stormwater contamination that originates in upstream municipalities (80 per cent of the Humber River Watershed is outside the City of Toronto). The soils and surface geology of the rapidly developing upstream municipalities is largely dominated by less impermeable formations which limit the possibilities for water budget control.

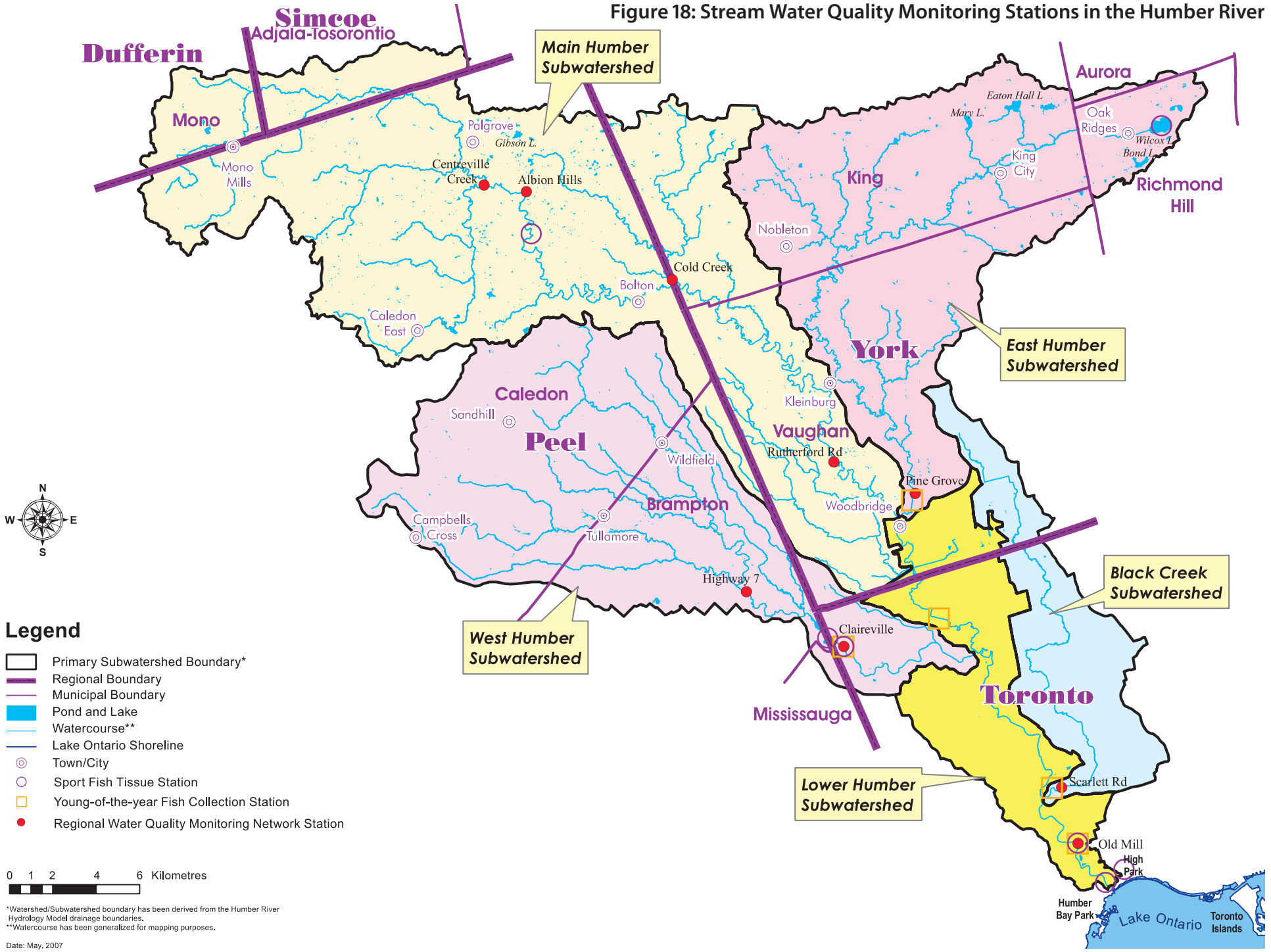
Above photo—Humber Marshes: City of Toronto
(Photo courtesy of Lou Wise)

The swimmability of beaches is assessed on the basis of *E.coli* levels. The swimming season extends from early June to early September at lakefront locations. Beach waters are posted as unhealthy when the count exceeds 100 *E.coli* per 100 millilitres of water. Originating in human, bird, livestock or other mammal faeces, bacteria are conveyed to beaches through sewer cross connections, combined sanitary sewers and in stormwater that flows over areas with animal manure. Bacteria are often accompanied by harmful viruses and pathogens that also pose serious human health risks and reduce recreational use.

Conventional pollutants are assessed with regard to the protection of aquatic life and other values such as aesthetics. Suspended sediments, for example, reduce water clarity, which affects the ability of animals to feed. Sediment smothers incubating fish eggs and impairs habitat for bottom-dwelling invertebrates. Many pollutants become attached to suspended solids and persist in the environment, making the habitat less suitable for aquatic organisms. Phosphorus and nitrogen are nutrients that fuel nuisance plant growth in water. This can lead to reduced oxygen levels, and limit the ability of fish to survive. The main sources of nutrients are fertilizers, combined sewer overflows (CSOs), malfunctioning septic systems and stormwater. The main source of chloride is road salt; at elevated levels it is toxic to aquatic organisms, impairs water for irrigation systems and will render drinking water non-potable.

Heavy metals and persistent organic contaminants are of great concern because of their long-term (chronic) effects on humans and aquatic life. Some substances are known to bio-accumulate in the food chain, magnifying their impact and causing deformities, tumors and lesions. Tissue analysis of juvenile fish and sport fish is undertaken by the province to determine the degree of threat presented by pollutants to aquatic species and to humans by consuming fish. The presence of organic contaminants and metals in fish flesh is an indication that these substances are present in river water or sediments in a form that is biologically available. Synthetic organic chemicals, such as those in pesticides and pharmaceutical products, are also finding their way into the environment through improper use and disposal. Evidence is beginning to show the effects of these contaminants on endocrine disruption and hormone levels in animals and humans. On the bright side, significant progress has been made over the last 15 years to reduce the production and release of organic chemicals. Some, including mirex, chlordane, dichloro-diphenyl-trichloroethane (DDT) and toxaphene, are no longer produced in Ontario. Atmospheric sources of pollutants are usually more significant in urban areas than rural, due to the expansive areas of impervious surface available to capture pollutants.

Figure 18: Stream Water Quality Monitoring Stations in the Humber River



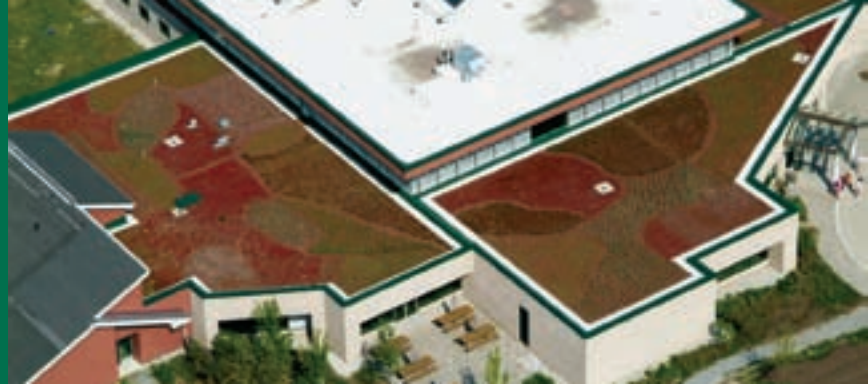
*Watershed/Subwatershed boundary has been derived from the Humber River Hydrology Model drainage boundaries.
**Watercourse has been generalized for mapping purposes.

Date: May, 2007

INDICATOR 8:
Stormwater Management

How well is stormwater runoff from urban areas being managed?

Rating: F



Measure:

The percentage of urban areas that discharge untreated stormwater to rivers and streams.

Rating criteria:

Per cent of urban areas in the watershed that have stormwater controls with quantity and quality functions.

A	Greater than 80%
B	70%–79%
C	60%–69%
D	50%–59%
F	Less than 50%

Current efforts:

- The province has produced guidelines for establishing stormwater management plans.
- Toronto's *Wet Weather Flow Management Master Plan* (WWFMMP) was completed in 2003. Thirteen objectives are prescribed to improve water quality and quantity, natural areas and wildlife, and the sewer system, at an estimated capital cost of $996.5 million. The cost for the first 25 years is $117 million, of which the estimated total cost for the Humber River (south of Steeles Avenue) is $65 million.
- To help reduce storm sewer flows, the City of Toronto provides a free *Downspout Disconnection Program* for home owners.
- To encourage green roof construction, the City of Toronto has approved a *Green Roofs Strategy* (2006) which includes a two-year pilot program that offers grants to builders. The city has also committed to installing green roofs on its new and existing buildings.
- Detailed stormwater retrofit studies, including implementation plans and preliminary designs, have been completed for Richmond Hill and Brampton, and are being initiated in Vaughan.
- Brampton now has a policy to collect development charges from infill development to help fund stormwater retrofit design and construction projects.
- The multi-agency *Sustainable Technologies Evaluation Program* (STEP) is advancing our knowledge about the benefits of green roofs, permeable pavement, bioswales, rainwater harvesting, and erosion and sediment control ponds.
- Toronto and Region Conservation (TRCA) and community groups continue to teach thousands of people annually about the connections among storm sewers, healthy water, river flow and aquatic life through programs such as *Yellow Fish Road*.
- Many community groups are active in raising public awareness of stormwater issues. An example is the launch of RiverSides Stewardship Alliance's *Homeowners' Guide to Rainfall* website (http://www.riversides.org/rainguide/) in 2006 as part of the *Community Program for Stormwater Management*.

Good news:

- **Significant efforts have been made since 2000, but water quantity and quality improvements are not yet measurable.**
- Toronto's Western Beaches Tunnel, which will reduce the discharge of untreated stormwater and sanitary sewage into Lake Ontario, was completed in 2002.
- Various projects have begun as part of Toronto's WWFMMP implementation. Wetland restoration at the mouth of the Humber River, totaling approximately $200,000, occurred in 2006.
- Environmental Assessment (EA) studies for the design and construction of three wet ponds along the West Humber—two wet ponds along the Main Humber and one at the mouth of Humber are scheduled in 2007, pending budget approval. The EA studies and construction of the six wet ponds are estimated to cost four to five million dollars.
- In 2004, Toronto established a $250,000 annual grant program called the *Community Program for Stormwater Management* to assist community groups with projects that help implement the WWFMMP. To date, 17 projects led by community groups have been funded.
- Toronto estimates that in 2005 there were approximately 59 green roofs in the city. An additional 17 more are planned or under construction. (Green roofs help to control stormwater runoff.)

Above photo—Green Roof, Earth Rangers Centre at The Living City Campus®: City of Vaughan

A CSO is a wet weather term for "combined sewer overflows." Toronto's original sewer system was a combined sewer system: it was "combined" because the storm drains and sanitary drains flowed into a single system of pipes that discharged directly to rivers or the lake. Overflow points—combined sewer overflows—were added along the system to protect it from damage caused by excessive flows. In modern sewer systems, storm systems are separate from sanitary sewers.

Courtesy of City of Toronto

Bad news:

- **Only 25.3 per cent of the total urban area in the Humber River Watershed has some level of stormwater management. Only 14.7 per cent of the total urban area has both quantity and quality controls (see Table 5).**
- Only 32 per cent of respondents to a recent public opinion poll were aware that water from storm drains goes untreated into the Humber River (Pollara, 2006). This is down from 63 per cent of respondents in 1999.
- While several municipalities have completed detailed stormwater retrofit studies and several more are initiating that process, no stormwater management retrofit projects are currently being planned or implemented outside of the City of Toronto.
- There are nine combined sewer overflows (CSOs) in the Humber, three along the Main Humber and six in the Black Creek subwatershed.
- Maintenance of stormwater ponds has been neglected in many municipalities due to a lack of funding, increasing the threats of future erosion and flood damage.
- There is a lack of policy and policy enforcement on source controls such as downspout disconnection.
- Climate change is affecting precipitation patterns and could lead to increased stormwater runoff, erosion, flooding and aquatic habitat destruction.

Targets:

2012

- Complete one stormwater management retrofit project per year in Toronto.
- More than 50 per cent of urban areas in the watershed have stormwater quantity and quality controls.
- Watershed residents' awareness of stormwater issues has rise from 32 per cent in 2006 to 50 per cent.

Table 5: Portion of Existing Urban Areas with Stormwater (SW) Controls — Humber River Watershed (2002)

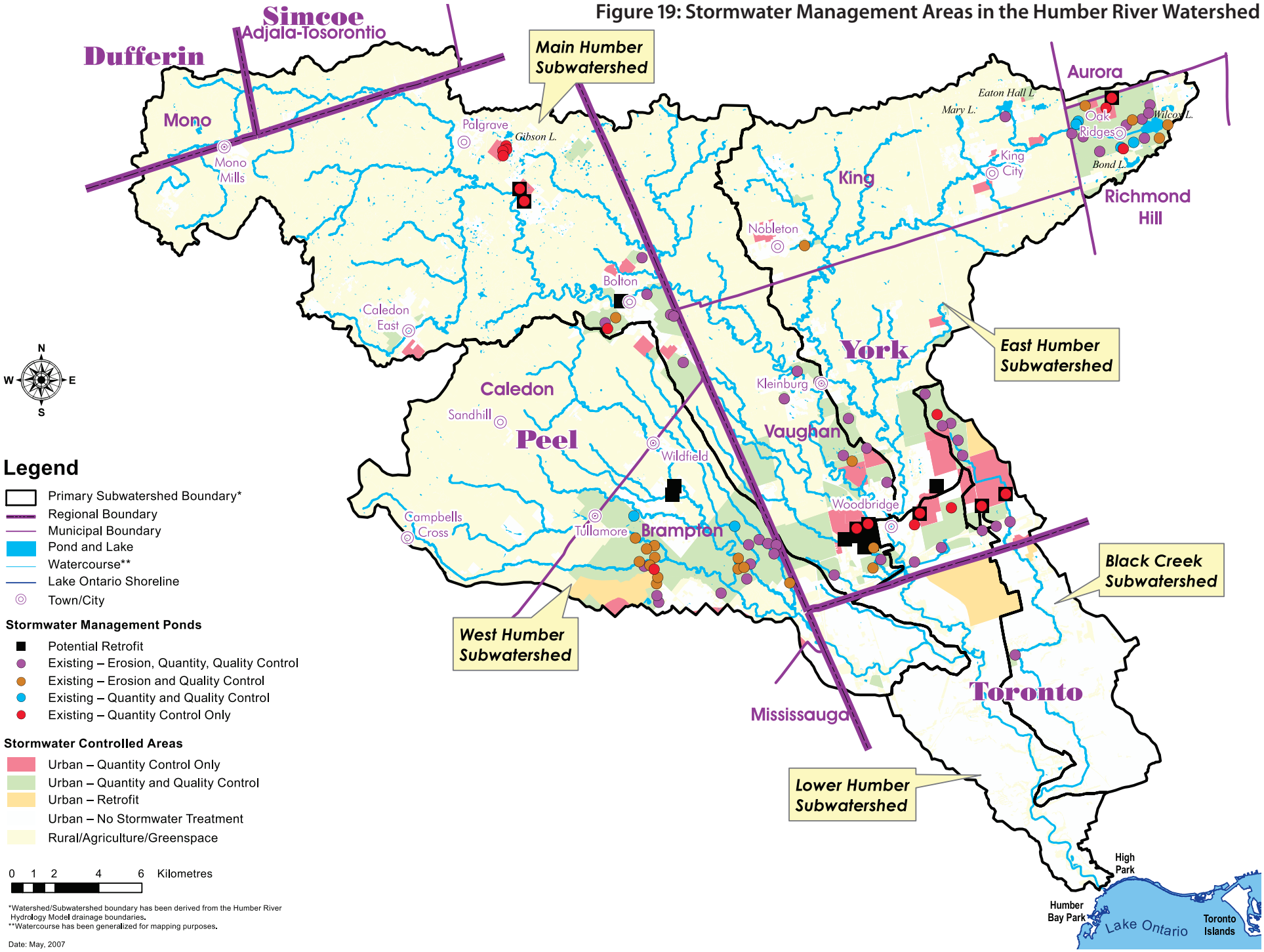
Subwatershed	Portion of urban areas with quantity controls only	Portion of urban areas with quantity and quality controls	Portion of urban areas with retrofitted controls	Portion of urban areas with some level of SW controls
Black Creek	6.9%	7.1%	2.0%	16.0%
East Humber	10.8%	25.1%	0.0%	35.9%
Lower Humber	2.3%	4.7%	10.6%	17.6%
Main Humber	11.6%	25.3%	0.0%	36.9%
West Humber	2.6%	19.5%	5.0%	27.1%
Total	**6.4%**	**14.7%**	**4.2%**	**25.3%**

How to improve:

- Federal and provincial governments support the implementation of the WWFMMP in Toronto to accelerate the recommended actions.
- Municipalities develop comprehensive stormwater management plans similar to Toronto's WWFMMP.
- Municipalities retrofit older developments with water retention and infiltration technologies where opportunities exist.
- Toronto and Region Conservation and partners standardize stringent new stormwater management criteria for maintaining groundwater infiltration, mitigating erosion and eliminating sedimentation caused by new developments.
- Agencies provide incentive programs designed to encourage residents to practice lot-level stormwater Best Management Practices (BMPs) like installing rain barrels, water efficiency and infiltration.

Above photo—Stormwater Management Pond: Town of Richmond Hill

Figure 19: Stormwater Management Areas in the Humber River Watershed



Legend

- Primary Subwatershed Boundary*
- Regional Boundary
- Municipal Boundary
- Pond and Lake
- Watercourse**
- Lake Ontario Shoreline
- Town/City

Stormwater Management Ponds

- Potential Retrofit
- Existing – Erosion, Quantity, Quality Control
- Existing – Erosion and Quality Control
- Existing – Quantity and Quality Control
- Existing – Quantity Control Only

Stormwater Controlled Areas

- Urban – Quantity Control Only
- Urban – Quantity and Quality Control
- Urban – Retrofit
- Urban – No Stormwater Treatment
- Rural/Agriculture/Greenspace

0 1 2 4 6 Kilometres

*Watershed/Subwatershed boundary has been derived from the Humber River Hydrology Model drainage boundaries.
**Watercourse has been generalized for mapping purposes.

Date: May, 2007

INDICATOR 9:
Bacteria

How swimmable are surface waters?

Rating:

F

Measure:

Level of bacteria (*E. coli*) in surface waters and beach closures.

Also see Indicator 8: Stormwater Management.

Rating criteria:

Per cent of water quality samples meeting Provincial Water Quality Objectives (PWQO) for bacteria concentrations.

A	Greater than 80%
B	70%–79%
C	60%–69%
D	50%–59%
F	Less than 50%

Current efforts:

- The *Nutrient Management Act*, passed in 2002, requires farmers to use Best Management Practices (BMPs) for handling and storing bacteria rich products such as animal manure.
- Toronto and Region Conservation's (TRCA's) *Rural Clean Water Program* and community groups such as Action to Restore a Clean Humber (ARCH) and Ontario Streams continue to carry out projects to reduce bacteria inputs from rural areas by controlling soil erosion, restricting livestock access to streams and improving manure storage facilities on farms.
- The Friends of the Greenbelt Foundation has established a $1.4 million grant to help farmers with their costs to improve the environmental practices on their land.
- Toronto's *Wet Weather Flow Management Master Plan* (WWFMMP) is being implemented to reduce bacteria inputs from all sources.
- Toronto, in partnership with Environmental Defence, led the initiation of a *Blue Flag Program* for Canada. Blue Flag is an internationally recognized and respected eco-label awarded to beaches that achieve high standards in water quality, environmental education, environmental management, safety and services. To date, four beaches on the Toronto waterfront have become Blue Flag certified, however, none of these beaches are on the Humber.
- Toronto, Richmond Hill and Brampton have "stoop-and-scoop" by-laws.
- *Don't Feed the Geese* awareness programs are helping to reduce bacteria and other pollutant levels due to animal faeces in stormwater runoff.
- All new urban developments must use stormwater management methods that help to reduce bacteria levels in the Humber River.
- Environment Canada's National Water Research Institute (NWRI) and the City of Toronto have collaborated on a microbial source tracking research project to investigate the primary source(s) of faecal pollution contaminating the western beaches in Humber Bay.

Good news:

- Toronto has made beaches a high priority with initiatives like the *Blue Flag Program* that aims to have city beaches certified and open more frequently to the public for recreation.

Bad news:

- **Overall, there has been no improvement in bacteria levels since the 1990 to 1996 period.**
- **On average, from 2000 to 2005, all of the monitored stations (six within the river and four natural beach sites) only met the provincial water quality standard for bathing during 31 per cent of the season (May to October).**
- The six river monitoring stations met provincial guidelines for *E.coli* (100 coliforms/100 millilitres) less than 21 per cent of the season (see Table 6).
- The three waterfront beaches were unsafe for swimming for 70 per cent of the season from 2000 to 2004, due in large part to their close proximity to the mouth of the Humber River, which is a source of significant bacterial contamination.
- National Water Research Institute studies at other Lake Ontario beaches has suggested that bird faeces from gulls and Canada geese are a significant source of faecal pollution at some beaches.
- Humber beaches are not Blue Flag certified since they do not meet the high quality standards for this designation.

Targets:

2012

- Bacteria levels in surface water at all monitoring stations are generally lower than 1990 to 1996 levels.
- Bacteria levels in the Main, East and West Humber subwatersheds meet Provincial Water Quality Objectives (PWQO) more than 60 per cent of the time.

Above photo—Swimming at Albion Hills Conservation Area: Town of Caledon

Table 6: Humber River *E.coli* Levels between 2002 to 2005

Monitoring station	Geo-mean* *E. coli*+ /100 mL	Per cent of season meeting PWQO of 100 coliforms/100 mL
Black Creek at Scarlett Road	1614	0
East Humber at Pine Grove	125	25
Lower Humber at Old Mill	857	0
Main Humber at Albion Hills	100	46
Main Humber at Rutherford Road	125	36
West Humber at Claireville	228	19
TOTAL COMBINDED AVERAGE per cent of season meeting PWQO of 100 coliforms/100 mL		**21**

Source: *Regional Watershed Monitoring Program*
Notes: *Geo-mean: The best measure of the central tendency of the data.
+Samples were collected from May to October. N=22–26.

Table 7: Humber Beach Swimmability

Beach	Per cent of season SAFE for swimming*					
	2000	2001	2002	2003	2004	Five-year average
Boulevard	36	19	65	47	32	40
Ellis/Windermere	7	11	33	21	15	17
Lake Wilcox	98	83	100	60	60	80
Sunnyside	41	21	49	35	24	34

Source: *City of Toronto Beach Sampling Program*
Notes: *Based on Provincial Water Quality Objective of 100 coliforms/100 mL. Note that year-to-year variations in beach postings are influenced by variations in the intensity and frequency of rainfall events.

- Bacterial levels meet PWQO more than 50 per cent of the time in the Lower Humber and Black Creek subwatersheds.
- At least one Humber beach qualifies for Blue Flag certification, a confirmation of good water quality.

How to improve:

- Implement the recommendations of Toronto's WWFMMP including separating combined sewers, enforcing the sewer use by-law, maintaining storm sewers and ponds, improving conveyance systems and employing lot-level (e.g., stoop-and-scoop domestic pet waste) and end-of-pipe solutions (e.g., wetlands).
- Eliminate combined sewer overflows to the river.
- Upstream municipalities develop and retrofit existing facilities based on a water budget approach to stormwater management and incorporate other concepts of sustainable design.
- Municipalities enforce pet control by-laws.
- Toronto and Region Conservation and partners complete and implement watershed-based source water protection planning.
- Farmers use BMPs to reduce agricultural sources of bacteria in runoff.
- Expand TRCA's Regional Monitoring Network to include specific monitoring for wet weather conditions.
- Agencies find solutions to control gull and geese populations and determine their benefits in terms of improved beach water quality.

Above photo—Lake Wilcox: Town of Richmond Hill

INDICATOR 10:
Conventional Pollutants

How degraded are surface waters with respect to conventional pollutants?

Rating: C

Measure:

Levels of suspended solids, phosphorus, nitrogen, ammonia and chlorides in surface waters.

See also Indicator 8: Stormwater Management.

Rating criteria:

Per cent of water samples that meet Provincial Water Quality Objectives (PWQO) or other specified criteria.

A	• Main, East and West Humber greater than 85%. • Lower Humber and Black Creek greater than 75%.
B	• Main, East and West Humber at least 85%. • Lower Humber and Black Creek at least 75%.
C	• Main, East and West Humber at least 65%. • Lower Humber and Black Creek at least 55%.
D	• Main, East and West Humber at least 45%. • Lower Humber and Black Creek at least 35%.
F	• Main, East and West Humber under 45%. • Lower Humber and Black Creek under 35%.

Current efforts:

- Ontario's *Nutrient Management Act*, passed in 2002, will help reduce pollutants in surface water by requiring the use of Best Management Practices (BMPs) for farming.
- The Region of Peel, in partnership with Toronto and Region Conservation (TRCA) and Credit Valley Conservation (CVC) has developed a seamless *Rural Clean Water Program* for farmers in the Region of Peel to implement a variety of BMPs on their lands.
- Toronto and Richmond Hill have prepared salt management plans and are reducing road salt use through better timing and lighter applications.
- Richmond Hill is currently undertaking studies at Lake Wilcox to reduce the high phosphorous levels in the water.
- The Agriculture Non-Point Source Model (AGNPS) has been used by TRCA to predict water quality and hydrologic response conditions and guide strategic management actions.
- Toronto and Region Conservation has updated their *Erosion and Sediment Control Guidelines* (2006) in order to provide for better protection of receiving waters from excess sediment release from construction sites.
- All new development must use stormwater management techniques to reduce discharge of pollutants to watercourses, as well as prevent and reduce stream erosion.
- Toronto and Region Conservation, in partnership with the Ministry of Enviroment, has developed a GIS-based sewershed mapping system to track toxic spills.
- Toronto and Region Conservation's *Healthy Yards Program* helps landowners choose alternative landscaping approaches that do not require the use of fertilizers.
- Toronto and Region Conservation's web-based *Juturna Project* (www.trca.on.ca/juturna) was established in partnership with York University and Citizens Environment Watch. The program involves community members in watershed monitoring.
- Toronto and Region Conservation's *Sustainable Technologies Evaluation Program* (see Indicator 8: Stormwater Management) will help to provide the real-world data needed to promote broader adoption of sustainable storm-water management practices.

Good news:

- **There have been no significant increases in conventional contaminants since the 1990 to 1996 period, except for chloride.**
- Road salts have been designated as a toxic substance under the *Canadian Environmental Protection Act* (1999).
- Median total suspended solid concentrations in samples collected from 2002 to 2004 at all but the West Humber station (located at Highway 7) were below recommended levels.
- The 2000 report card target was to meet conventional contaminant guidelines in 75 per cent of the samples at all stations on the Main, East and West Humber subwatersheds by 2015. This is already close to being met for all variables except phosphorous. The Lower Humber and Black Creek met the 2015 target, satisfying 50 per cent of the samples for all variables except phosphorus.
- Most kettle lakes in the upper portion of the watershed still have good water quality in terms of conventional pollutants.

Bad news:

- **Chloride levels have continued to rise due to the increase in road networks and the associated salt use. In the winter months, chloride levels are generally exceeding guidelines 100 per cent of the time in the fully urbanized Black Creek subwatershed.**
- Samples from Black Creek and the West Humber subwatersheds at Claireville only met provincial guidelines for conventional pollutants 66.3 per cent and 68 per cent of the time, respectively. Chlorides, phosphorous and nitrates are problems for

these subwatersheds, as well as for the Lower Humber subwatershed.

- Despite the decline of phosphorous levels in the 1970s and 1980s due to the decommissioning of sewage treatment plants, current phosphorous levels still exceed the guidelines between 29 per cent to 100 per cent of the time throughout the watershed. The West Humber subwatershed, just below the Claireville Dam, exceeds the guidelines most frequently. The Main Humber was the only subwatershed that met the PWQO more than 50 per cent of the time. However, the future discharge from the planned Nobleton Sewage Treatment Plant may increase phosphorous levels in this area.
- The recommended level for nitrate concentrations was exceeded in the West Humber 33 per cent of the time, the Lower Humber 38 per cent of the time and Black Creek 73 per cent of the time.
- Un-ionized ammonia concentrations exceeded the PWQO five per cent of the time in the Main Humber and 10 per cent of the time in the East Humber subwatershed. At elevated concentrations, this contaminant can be toxic to aquatic life. Un-ionized ammonia is typically associated with sewage treatment plant effluent.
- Many lakes have high nutrient levels, which can promote herbaceous plant and algae growth that in turn depletes oxygen levels when the plants decompose causing death to fish.
- It is presumed that many illegal sanitary sewer connections exist in the Lower Humber and Black Creek subwatersheds—similar to the highly publicized (2006) problems on the Taylor Massey Creek in the Don River Watershed. These cross-connections are one of the few ways new bacteria sources can enter the watershed during the crucial dry weather (e.g., swimming weather) period.

Targets:

2012

- Levels of conventional pollutants in the Main, East and West Humber subwatersheds meet PWQO or other specified criteria for more than 85 per cent of the samples.
- Levels of conventional pollutants in the Lower Humber and Black Creek subwatersheds meet PWQO for more than 75 per cent of the samples.

Table 8: Per cent of Time Selected Conventional Pollutants met Guidelines at Humber River Monitoring Stations (2002–2004)

	Per cent meeting guideline					
	Total suspended sediment	Chloride	Phosphorous	Nitrate	Un-ionized ammonia	Dissolved oxygen
Black Creek at Scarlett Road	95	38	38	24/90 = 26.7%	100	100
East Humber at Pine Grove	91	90	38	81/95 = 85.3%	90	100
Lower Humber at Old Mill	77	67	19	59/95 = 62.1%	100	100
Main Humber at Albion Hills	95	100	71	100/100	100	100
Main Humber at Centreville Creek	95	100	48	100/100	100	100
Main Humber at Cold Creek	90	100	62	100/100	100	100
Main Humber at Rutherford Road	84	95	34	79/100	95	89
West Humber at Highway 7	48	100	10	71/90 = 70%	100	100
West Humber at Claireville	73	76	0	52/81 = 64.2%	100	95
Guideline (1 to 6)*	30 mg/L[1,5]	250 mg/L6	0.03 mg/L2	1.0/2.5 mg/L3,4	0.02 mg/L2	6 mg/L2

Sources: *Regional Watershed Monitoring Network and City of Toronto Lake and Stream Sampling Program*
* Guideline sources: *1. (EIFAC, 1965); 2. Provincial Water Quality Objectives (MOE, 1999b); 3. (CAST, 1992); 4. (Rouse et al., 1999); 5. Canadian Water Quality Guidelines (CCME, 1999); 6. (EC & HC, 2001)*

How to improve:

- Municipalities monitor the effectiveness of their salt management plans and alter them accordingly.
- Alternatives to salt in low-risk areas such as parking lots and service roads are explored by all municipalities.
- All municipalities enforce and adhere to effective erosion and sediment control guidelines.
- Municipalities retrofit and maintain stormwater management facilities in urban areas.
- Stormwater management approaches focus on maintaining water budgets, instead of only water quality and peak flows.
- Further exploration on the effectiveness and practicality of phosphorous removal trenches at the outlets of stormwater ponds/wetlands should be undertaken.
- Federal and provincial governments increase financial support to accelerate the implementation of the *Wet Weather Flow Management Master Plan* in the City of Toronto.
- Toronto to enhance its program to identify and remediate priority outfalls associated with illegal sanitary sewer connections (particularly in Black Creek).
- All landowners are required to use BMPs including septic tank testing and maintenance, to reduce nitrate and phosphorus inputs to watercourses.
- Schools, community groups and agencies increase public education efforts on water pollution issues and solutions.

INDICATOR 11:
Heavy Metals and Organic Contaminants

What is the condition of surface waters with respect to heavy metals and organic compounds?

Rating: C

Measure:

Levels of persistent organic contaminants, pesticides and heavy metals in surface waters, and in fish (young-of-the-year and sport fish).

Also see Indicator 8: Stormwater Management.

Current efforts:

- By-laws restricting the use of non-essential pesticides were passed by Caledon and Toronto in 2003. Since then Richmond Hill has also adopted a pesticide reduction policy.
- In 2000, the federal Pest Management Regulatory Agency restricted the domestic use of diazinon and phased out its use on residential lawns.
- Stormwater facilities are now being retrofitted across all the municipalities to improve the quality of stormwater.
- A *Stormwater Pollution Prevention Handbook* was developed in partnership with the Ministry of Environment (MOE), the Great Lakes Sustainability Fund (GLSF), Toronto and Region Conservation (TRCA), Quinte Conservation, the Municipal Engineers Association, and various municipalities. This provides practical information on implementing pollution prevention and flow reduction programs for stormwater runoff and combined sewer overflows.
- The *Toronto Region Sustainability Program* delivered by TRCA and Ontario Centre for Environmental Technology Advancement (OCETA) is helping small and medium business enterprises with pollution prevention planning and action.
- Toronto and Region Conservation has begun source water protection planning for the Humber River Watershed in partnership with the MOE.
- Toronto and Region Conservation's *Healthy Yards Program* and pest management policies encourage the use of alternatives to pesticides on private and public lands.
- Toronto and Region Conservation's *Yellow Fish Road Program* and RiverSides' *Take me out to the Car Wash* help teach youth and adults how they can reduce pollutant inputs to storm sewers and watercourses.

Good news:

- **Of the 159 pesticides sampled, only 10 were detected in the Humber (Struger et al., 2002), and eight of those did not exceed water quality guidelines. Carbofuran exceeded its guideline in only one per cent of the samples. Diazinon exceeded its guideline in 20 per cent of the samples collected; its use is now restricted (see Current efforts).**
- **Comparisons between 1999 and 2004 fish consumption restrictions show no increase over the five-year period. Although the change is not statistically significant, a minor improvement in consumption recommendations for carp at the station located below the Claireville Dam has occurred.**
- In a recent poll of Humber River Watershed residents, only eight per cent of respondents with yards reported that they use pesticides or herbicides (Pollara, 2006).
- Levels of lead, copper, zinc, cadmium, chromium and iron met Provincial Water Quality Objectives for 88 per cent of the samples across the watershed on average.

Bad news:

- **Approximately 900 oil spills and 750 chemical spills were recorded in the watershed between 1988 and 2000 according to data from the MOE's Spills Action Centre. About 50 per cent of these spills involved direct discharges to the Humber River and its tributaries.**
- Declines in levels of some chemicals (such as PCBs, banned in 1985) are slow, with continued detection in streams and fish tissues. In 2003 and 2004, PCBs were still observed at levels exceeding provincial guidelines throughout the watershed. Three of the five young-of-the-year fish monitoring stations also showed that fish tissue exceeded PCB guidelines.
- The Black Creek, Lower Humber and West Humber subwatershed stations exhibited the highest metal concentrations overall,

with levels of iron meeting provincial guidelines on average only 53 per cent of the samples. In Black Creek, the guidelines for zinc were met for only 63 per cent of the samples on average.
- The watershed has 29 abandoned landfill sites that were in existence prior to the passage of provincial regulations on the design of landfills. There is the potential that these sites are currently leaching contaminants into water systems, or will do so in the future.
- Ongoing urbanization, population growth and the increased use of vehicles continue to contribute to high levels of organic contaminants entering the watershed.

Targets:

2012

- No restrictions on fish consumption.
- Concentrations of mercury, PCBs and DDT in young-of-the-year fish meet tissue guidelines at all sites monitored.
- Concentrations of persistent organic contaminants in water samples meet guideline levels more than 90 per cent of the time.

How to improve:

- Governments meet commitments to improve air quality, manage toxic chemicals and eliminate persistent organic contaminants.
- Abandoned landfill sites in the watershed are monitored, assessed and retrofitted as necessary by the MOE, to ensure there is no leaching into surface and groundwater resources.
- The MOE prepares watershed-based spills management plans to identify spill-vulnerable areas and develop preventative and remedial measures.
- Federal and provincial governments increase financial support to accelerate the implementation of the *Wet Weather Flow Management Master Plan* in the City of Toronto.
- Municipalities and businesses adopt environmental management standards such as International Standards Organization (ISO) 14000, in order to focus on having the least harmful impact on the environment during every stage of their activities and processes.
- The governing bodies of the *Canada-Ontario Agreement for the Great Lakes Basin Ecosystem* (COA) study the remaining 28 harmful pollutants they have identified (Tier II contaminants) and set appropriate standards for their control or elimination.
- All 24 golf courses in the watershed reduce pesticide and water use through the completion of an environmental management plan and by becoming certified through the *Audubon Cooperative Sanctuary Program*.
- Residents, businesses and agencies reduce pesticide use and dispose of hazardous wastes properly.
- All municipalities in the Humber adopt pesticide by-laws.

Tier I and Tier II contaminants

Forty-one harmful pollutants were identified under the Canada-Ontario Agreement (COA) for priority management in the Great Lakes Basin ecosystem. The first group of these are called "Tier I" contaminants and consist of 13 contaminants. They are known to persist and biomagnify in the environment and have been targeted for virtual elimination:

- **Aldrin/dieldrin**
- **Benzo(a)pyrene**
- **Chlordane**
- **DDT**
- **Hexachlorobenzene**
- **Alkyl-lead**
- **Mercury**
- **Mirex**
- **Octachlorostyrene**
- **PCBs**
- **PCDD (dioxins)**
- **PCDF (furans)**
- **Toxaphene**

The second group is called "Tier II" contaminants. They are thought to be persistent and have the potential for biomagnification and toxicity but there is not sufficient agreement between Canada and the United States to warrant setting joint targets and goals for them.

INDICATOR 12:
River Flow

How stable are the flows in the Humber River?

Rating: C

Measure:

Median summer low flows at five monitoring stations. ***Low flows represent dry weather flows not influenced by precipitation.***

Rating criteria:

Median summer low flows.

A	Increased by more than 10%
B	Increased by less than 10%
C	Maintained at 2003 levels
D	Decreased by less than 10%
F	Decreased by more than 10%

Current efforts:

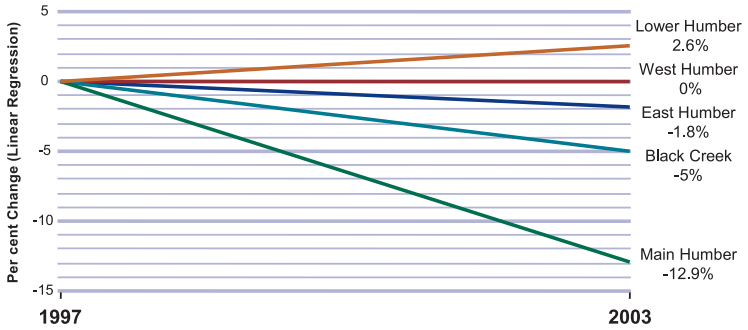
- The provincial *Oak Ridges Moraine Conservation Plan* and *Greenbelt Plan* are helping to protect areas of groundwater recharge and baseflow discharge (see Indicator 1: Significant Landforms).
- The province is making its procedures for water-takings under the *Permits to Take Water Program* more stringent and more focused on environmental considerations such as impact on natural flows, habitats and how much water is already being withdrawn.
- Toronto and Region Conservation is working in partnership with the province and other government agencies to develop a source water protection plan that will identify and protect sensitive groundwater recharge and discharge areas, along with identifying areas under stress due to both surface and groundwater extractions.
- Toronto and Region Conservation and municipalities are updating the *Humber River Watershed Management Plan* to include details on groundwater flow, water budgets, water conservation and the status of Permits to Take Water, including the quantities of water withdrawals.
- Toronto's *Wet Weather Flow Management Master Plan* (WWFMMP) was approved by council in 2003 and will help manage river flow by encouraging the use of water infiltration methods wherever possible.

Table 9: Surface Water Users (Water-taking) in the Humber River Watershed

Subwatershed	Total number of users	Number of high-volume users*
Black Creek	3	1
East Humber	18	7
Lower Humber	2	0
Main Humber	16	1
West Humber	3	2
Watershed Totals	**42**	**11**

Note: *High-volume users are those that have more than 25 per cent of total baseflow discharge allocated for withdrawal.

Figure 20: Per cent Change to Median Summer Low Flows (1997–2003) in the Humber River Watershed



Good news:

- **The West Humber subwatershed showed no change in baseflow discharge between 1997 and 2003 because the coverage by urban impervious surfaces is still low. Precipitation is the primary contributor to annual flow in this subwatershed since the clay soils cause high runoff rates and the Oak Ridges Moraine has little influence.**
- The Lower Humber subwatershed has no high volume surface water users; the Black Creek and Main Humber subwatersheds only have one each.

Bad news:

- **Between 1997 and 2003, median summer low flows have decreased in the East Humber subwatershed by 1.8 per cent, in the Main Humber subwatershed by 12.9 per cent and in the Black Creek subwatershed by six per cent.**
- The East, Main and Black Creek subwatersheds all have high-volume surface water users which can have significant local impacts to the low-flow system, which is cause for concern.
- The West Humber subwatershed has three surface water users with a combined water taking of more than 17 per cent of the measured low flows.
- Development on the Oak Ridges Moraine and other upstream areas will increase river flow volumes unless there is significant public and private investment in stormwater controls.
- The 2.6 per cent increase in low flows in the Lower Humber (1997 to 2003) can likely be attributed to the sewer infrastructure which, through leaky pipes, can pick up groundwater and pipe it directly into the watercourse.

How to improve:

- Develop and implement policies to protect groundwater discharge areas.
- Maintain the healthy, shallow aquifer system by reducing stormwater runoff and allowing infiltration through various stormwater management techniques.
- Toronto implements its WWFMMP; other municipalities develop similar stormwater management policies.
- Toronto and Region Conservation continues to work with the Ministry of Enviroment to restrict surface water-takings to flows that exceed low-flow volume. By installing a fixed intake system, users will have to rely primarily on storm flows.
- Private landowners protect and expand forest cover on their properties, disconnect downspouts from the storm sewer system and install rain barrels to store water.

Targets:

2012

- No increasing trend in average annual and seasonal stream flow volumes.
- No decreasing trend in median daily baseflow rates between May and August.
- Reduce existing flood vulnerable areas and roads.

Irrigation

Above photo—August 19, 2005 Storm: City of Toronto
Finch Avenue, East of Jane Street

Aquatic Habitat

The streams, rivers, ponds, lakes and reservoirs in the Humber River Watershed contribute greatly to biodiversity and form a critical component of the natural heritage system. Aquatic species are adapted to historic patterns in flow, channel structure, water quality and temperature. Closely attuned to their natural conditions, aquatic communities are severely threatened by the impacts of land use change. Changes in stream flow, sediment transport and deposition, contaminants, dams, removal of riparian buffers, wetlands and small streams, and the introduction of aquatic invasive species (e.g., rudd, goby and rusty crayfish) all impact the aquatic community.

To assess the health of the aquatic habitats, we used three indicators:

1. Health of benthic (bottom-dwelling) invertebrates (Table 10).
2. Amount of riparian (streambank) vegetation (Figure 22).
3. Health of fish communities.

Benthic invertebrates are the many organisms without a backbone that dwell in the bottom sediments of a body of water. Typically, these include aquatic worms, leeches, snails, crayfish, clams and the larval stages of flying insects such as black flies, mosquitoes, mayflies, dragonflies and damselflies. Benthic invertebrates perform many important functions such as decomposing organic matter and are a food source for many fish species. Because they are relatively sedentary, short-lived, and have varying tolerances to environmental conditions, they can be used as indicators of the quality of aquatic habitat. Changes in water quality lead to changes in species and community structure. Often environmental change can be detected in the invertebrate community before it is reflected in the fish population.

There are 38 fixed invertebrate collection stations in the Humber River Watershed. A Benthic Aggregate Assessment (BAA) was used to provide a robust measurement of the condition of the stream sites. This methodology considers 10 common benthic indices. Using multiple indices reduces the chance that a site will be improperly assessed. A monitoring station that scores poorly in five or more of these indices is considered in *poor* health, otherwise it was considered in *good* health. In some cases, the stations scored poorly overall based on the BAA but when the species data was weighted against a biotic index, some sensitive species were found, suggesting that the area was in *fair* health.

Another key factor in the health of aquatic systems is the amount of riparian vegetation. Vegetation along watercourses helps to maintain cool water temperatures, absorb nutrients, slow runoff, stabilize streambanks from erosion and add organic material to the food chain. In some cases, grassy riparian vegetation is just as important to the stream system as woody vegetation, particularly for narrow (less than 2.5 metres wide) first-order headwater streams where herbaceous plants can provide enough shade. Although grasses and other herbaceous plants are sufficient in some cases, woody vegetation such as trees and shrubs is preferred. In the past, urbanization and agriculture have led to the loss of riparian vegetation. The replacement of this vegetation is a key requirement for healthy streams and aquatic communities.

The measurement of riparian vegetation is based on a report by Environment Canada (1998) titled *How Much Habitat is Enough: A Framework for Guiding Habitat Rehabilitation in the Great Lakes Areas of Concern*. The guideline states that 75 per cent of the stream length should consist of woody vegetation, a minimum of 30 metres on each side of the watercourse. Using the *Terrestrial Natural Heritage System Strategy* methodology, forests, meadows, successional areas and wetlands in the riparian zone were mapped. There are an estimated 1,400 kilometres of watercourse in the watershed, of which 76 per cent are small first and second order streams. The 30-metre riparian zone area totals approximately 12,167 hectares (13.5 per cent of the watershed). Today, 61 per cent of the riparian zone has some form of natural cover, just over half of which consists of woody vegetation.

A total of 74 species of fish have been found in the watershed over the last 150 years, 64 of which are native. Since 2001, 38 fixed stations have been monitored every three years. Only 40 native fish species were observed. The presence or absence of species over time and changes in numbers and locations of sensitive species can provide a measure of aquatic health, but must be taken in context with the method of fish sampling and the number of different habitat types surveyed. If either of these factors change between years, which they can, the absence of a species requires interpretation and should not be assumed as "lost from the system."

One way of assessing the health of fish communities is to use the Index of Biotic Integrity (IBI), which considers species richness and composition, local indicator species, trophic composition, and fish abundance. Fish communities that receive a high IBI score are considered to be robust, well-rounded communities. Another useful way to assess health is to use target species. Target species for the watershed have been set in the *Humber River Watershed Fisheries Management Plan*. Targets include a range of species from small invertebrate-eating darters to top predators such as the Atlantic salmon that once spawned in the watershed. We know there has been a loss of fish species, which is a strong indication of habitat quality degradation. There is a lack of large fish-eating species and small numbers of specialized species which are often more sensitive to the condition of their habitat. Examples include American brook lamprey, banded killifish, fantail darter and redside dace. Major limiting factors for self-sustaining populations of target species are woody riparian vegetation, water quality and the ability to migrate freely within the river system to forage and satisfy all life stages. There are currently more than 1,200 potential in-stream barriers such as elevated culverts, dams, weirs and watercourse crossings that may prevent or limit fish dispersal.

Fish sampling

INDICATOR 13:
Benthic Invertebrates

How healthy are benthic (bottom-dwelling) invertebrate communities?

Rating: C

Measure:

Score based on an assessment of 10 common benthic invertebrate indices for 38 stations.

Rating criteria:

Per cent of stations in fair or good health.

A	Greater than 80%
B	70%–79%
C	60%–69%
D	50%–59%
F	Less than 50%

Current efforts:

- Since 2000, benthic invertebrate data have been collected annually from 38 stations across the watershed and analyzed by Toronto and Region Conservation (TRCA).
- Easy public access to aquatic data about the Humber River Watershed is available through the web-based *Juturna Project* (www.trca.on.ca/juturna), which was launched by TRCA and Citizens Environment Watch in 2004.
- Riparian planting and stream restoration projects by groups such as Ontario Streams and the Black Creek Conservation Project are helping to improve benthic habitats by reducing erosion and improving streambank vegetation.

Table 10: Per cent of Stations in Fair or Good Health in the Humber River Watershed (2004)

Subwatershed	Fair	Good	Total (fair and good)	Rating
Black Creek (1)*	0 %	0 %	0 %	F
East Humber (7)	57 %	14 %	71 %	B
Lower Humber (7)	28 %	29 %	57 %	D
Main Humber (17)	16 %	56 %	72 %	B
West Humber (6)	60 %	20 %	80 %	A
Humber River Watershed (38)	**31 %**	**37 %**	**68 %**	**C**

Notes: The 2000 report card rated the overall benthic community as a B grade. In 2006 the benthic community was rated as a C grade, but no statistically significant change between 2001 and 2004 was observed.
* ( ) indicates the number of stations in each subwatershed.

Good news:

- **Benthic communities in the Humber are in a relatively stable condition. Studies since 2001 demonstrate no evidence of a statistically significant change.**
- Of the 38 stations monitored in 2004, 26 (68 per cent) were found to be in *fair* or *good* condition.
- The upper reaches were in the best condition for benthic invertebrates, with the East, Main and West Humber subwatersheds in fair or good condition at 71 per cent, 72 per cent and 80 per cent of the stations, respectively.
- The high percentage of stations with fair and good conditions in the West Humber subwatershed is due to the presence of stonefly, mayfly and clam species that require abundant in-stream and riparian cover and natural flow regime.
- Mussel populations, an indicator of good health, have been found in the Main and West Humber subwatersheds. These freshwater mussel populations are the best and healthiest remaining in TRCA's jurisdiction and the only known locations of the Elktoe and Fat Mucket mussels.

Bad news:

- **The upper sections of the watershed, historically the healthiest areas, are showing evidence of decline or stress. Three sites of concern are located on the Oak Ridges Moraine near areas of increasing development. This suggests that land use changes are causing changes in hydrology and sedimentation, which in turn are having a negative impact on benthic communities.**
- Rusty crayfish, a non-native, invasive species was discovered at one station in the Lower Humber subwatershed in 2003. In 2004 it was found at six regional monitoring stations in the Lower, West and East subwatersheds including Purpleville Creek (City of Vaughan).

Above photo —Water Strider. Photo credit: Rich Merritt, part of the NABS Image Library (www.benthos.org)



- Twelve of 38 stations (32 per cent) show little evidence of a healthy benthic invertebrate community.
- Although the condition of benthic communities is relatively stable in the Humber, there is some evidence of shifts towards more tolerant communities particularly in the East and Main Humber subwatersheds.

Targets:

2012

- No deterioration at the locations where good conditions currently exist.
- Three sites go from fair to good condition.
- No further spread of the rusty crayfish.

How to improve:

- Toronto and Region Conservation and municipalities increase the effectiveness of stormwater quality and quantity controls in new developments and retrofit existing controls in older urban developments.
- Toronto and Region Conservation continues to monitor, prioritize and reduce streambank erosion.
- Toronto and Region Conservation, agencies, community groups and private landowners plant trees and shrubs along stream banks.
- The Ontario Benthos Biomonitoring Network continues to develop data analysis models and reference site data.
- The current TRCA and Ministry of Natural Resources (MNR) partnership continues to work on improving the understanding of how land use impacts benthic invertebrate communities.
- Strategies to prevent the spread of rusty crayfish are implemented by the MNR.

Mayfly. Photo credit: Rich Merritt, part of the NABS Image Library (www.benthos.org)

Above photos (left to right—Small Minnow Mayfly, Giant Stoneflies, Spiny Crawler. Photo credits (left to right): Mike Higgins, Rich Merritt, part of the NABS Image Library (www.benthos.org)

INDICATOR 14:
Fish Communities

How healthy are fish communities?

Rating: D

Measure:

Index of Biotic Integrity (IBI) scores and the presence of self-sustaining populations of target fish species.

Rating criteria:

Average IBI score of the watershed.

Letter grade	IBI category	Raw score	Average score
A+	Very good	100	100
A			91.7
A-			87.4
B+	Good	70	79.1
B			70.8
B-			62.5
C+	Fair	40	54.2
C			45.9
C-			37.6
D+	Poor	10	29.3
D			21.0
D-			<12.1
F	No fish	0	0

Table 11: Number of Stations in the Humber River Watershed for each IBI Rating in 2001 and 2004

IBI rating	Black Creek		East Humber		Lower Humber		Main Humber		West Humber		Humber River Watershed	
	2001	2004	2001	2004	2001	2004	2001	2004	2001	2004	2001	2004
No data	1	0	0	0	1	2	1	0	0	0	3	2
Poor	0	1	0	1	4	4	1	1	0	0	5	7
Fair	0	0	3	2	2	2	8	11	1	3	14	18
Good	0	0	4	5	0	0	8	6	4	2	16	13
Very good	0	0	0	0	0	0	0	0	0	0	0	0
Total number of stations	**1**	**1**	**7**	**8**	**7**	**8**	**18**	**18**	**5**	**5**	**38**	**40**

Table 12: Summary of Grades for Humber River Subwatersheds*

	2001	2004
Black Creek	F	D-
East Humber	B-	B-
Lower Humber**	D	D
Main Humber	C+	C+
West Humber	B	C

Notes: *See rating criteria for this indicator for details on IBI grading. **Represents cumulative impacts and can be interpreted as the "overall" watershed grade.

Current efforts:

- In-stream barriers have been modified in Woodbridge, Palgrave, Bolton and Albion Hills Conservation Area to allow for fish passage.
- An Environmental Assessment (EA) to determine how to improve fish passage in the Lower Humber, while controlling the migration of invasive species such as sea lamprey and round goby is being undertaken by Ontario Streams and the Ministry of Natural Resources (MNR).
- A recovery plan for redside dace in Ontario, lead by the MNR, is scheduled for approval by the province in 2006.
- The MNR has stocked the Humber River with over 563,000 fish since 2000 (see Table 13).
- The MNR has improved the enforcement of fishing regulations near the Old Mill weir in the Lower Humber subwatershed.
- Chaminade College (in Toronto), in partnership with Ontario Streams and MNR, has been successfully hatching and releasing brown trout into the Black Creek subwatershed.
- The Greater Toronto Area (GTA) Recreational Fishing Committee is encouraging and coordinating increased participation in environmentally sustainable recreational urban fishing. The MNR, City of Toronto and Toronto and Region Conservation (TRCA) partnered with Bob Izumi to produce a television episode of Bob Izumi's Real Fishing Show, Episode 25-10: *Fishing Around Toronto... The Urban Adventure*.
- An aquatic habitat enhancement demonstration site was implemented in Richmond Hill on Lake Wilcox in 2005. Shoreline enhancements were completed along with the installation of in-water fish habitat structures.

Good news:

- **Over 77 per cent of the monitoring stations scored *fair* to *good* quality in both 2001 and 2004. These stations were all located in the East, Main and West Humber subwatersheds, with the exception of two stations in the Lower Humber subwatershed.**

Table 13: Fish Stocking in the Humber River Watershed, (2000–2005*)

Year	Atlantic salmon	Brown trout	Chinook salmon	Coho salmon	Rainbow trout	Walleye	Total fish per year
2000	30	27,556			20,045		47,631
2001		6,600			13,527	74,272	94,399
2002		3,518			21,535		25,053
2003	800	60,409	13,473		26,242		100,924
2004		53,337	15,000	40,845	22,365		131,547
2005		62,017	22,609	47,000	32,313		163,939
Total fish by species	**830**	**213,437**	**51,082**	**87,845**	**136,027**	**74,272**	**563,493**

*Includes MNR and partner (CFWIP) stocking events.

- Rainbow trout, brown trout and Pacific salmon from Lake Ontario can migrate up the Humber to appropriate spawning grounds for the first time in more than 150 years because in-stream barriers have been modified or removed to allow for fish passage
- Even within an urban setting, the Humber has a large, stable cold-water fish community with a number of sensitive species such as brook trout, American brook lamprey and mottled sculpin. Several sensitive, cool-water species such as redside dace, brassy minnow and rainbow darter have also been found.
- Brown trout fingerlings, which were six centimetres in length when released into the Black Creek subwatershed in 2001, were found in 2003 to have grown to 25 centimetres in length.

Above photos—Fish sampling and Large-mouth bass

Bad news:

- **Fish surveys indicate that between 2001 and 2004, 57 per cent of the monitoring sites saw a decline in fish habitat quality, while only 30 per cent showed improvement and 14 per cent remain unchanged.**
- The 2000 report card target of having 30 per cent of stations with a score of *very good* by 2005 has not been met: no stations scored very good. In addition, the actual median IBI score for the watershed fell from 27 in 1999 to 25 in 2004.
- The number of fish that are found only in specialized habitat, particularly those that require riparian wetland habitat, such as shiners and yellow bullhead, has declined.
- The *poor* IBI scores for the Lower Humber and Black Creek subwatersheds are a reflection of the fact that they have poor water quality, lack sufficient streambank vegetation and are surrounded by urban land uses.
- Not all target species, notably Atlantic salmon, are present and/or self-sustaining in the watershed.
- Recent sampling has found the redside dace, a provincially threatened species, in only small, isolated locations in the East, West and Main Humber subwatersheds.
- The first inland lake recording of the aquatic invasive rudd fish (*Scardinius erythrophthalmus*) in Ontario was found in Lake Wilcox (Richmond Hill) in October 2005.

How to improve:

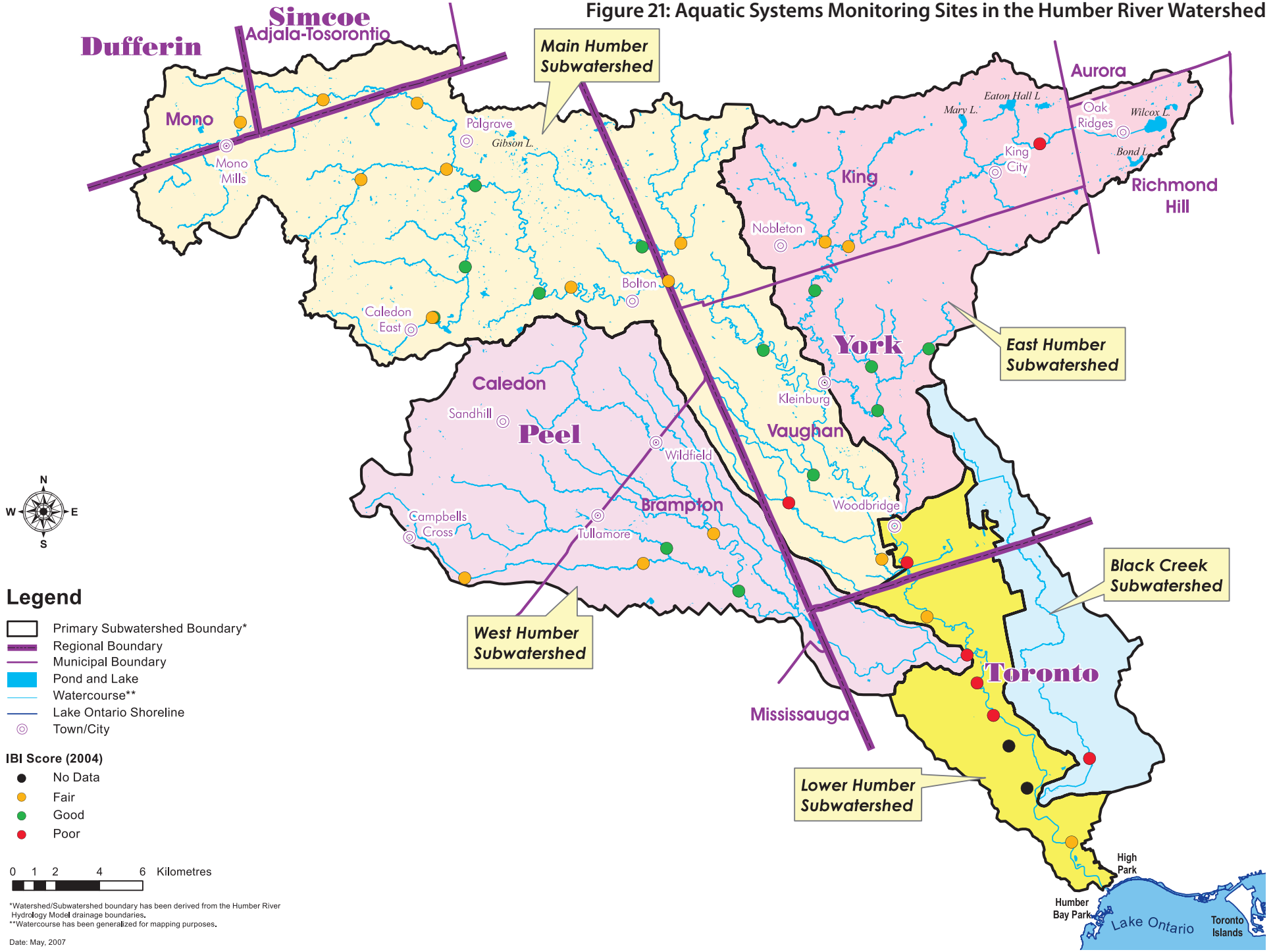
- Toronto and Region Conservation (TRCA), MNR and the Department of Fisheries and Oceans re-evaluate the appropriateness of stocking brown and rainbow trout in water inhabited by redside dace and brook trout.
- Toronto and Region Conservation provides recommendations in the updates to the *Humber River Watershed Plan*, for dealing with over 1,200 potential in-stream barriers, stream crossings and other habitat improvements.
- Toronto and Region Conservation in partnership with the MNR, Ontario Streams and the City of Toronto, further modifies existing barriers in the Lower Humber subwatershed.
- All partners implement a redside dace recovery strategy.
- The MNR implements measures to prevent the spread of aquatic invasive species such as rusty crayfish, rudd and round goby.
- Anglers and the public report illegal angling activities to the MNR Tips Hotline at 1-877-TIPS-MNR.
- Toronto and Region Conservation, agencies, community groups and private landowners plant trees and shrubs along stream banks to help keep stream temperatures low.

Targets:

2012

- Target species are present in the East Humber subwatershed and the median IBI score for the subwatershed is good, with 30 per cent of the streams having a score of very good.
- In-stream barriers in the Lower Humber subwatershed are substantially altered to allow the majority of the jumping fish to pass through.

Figure 21: Aquatic Systems Monitoring Sites in the Humber River Watershed



INDICATOR 15:
Riparian Vegetation

How healthy is riparian (streambank) vegetation?

Rating: C

Measure:

Per cent natural cover in the riparian zone. (The riparian zone is defined as all the land within 30 metres of the watercourse.)

Rating criteria:

Per cent of the riparian zone that is naturally vegetated.

A	Greater 75% (9,125 ha)
B	63%–74%
C	51%–62%
D	38%–50%
F	Less than 37%

Current efforts:

- Riparian areas are protected from development by *Ontario Regulation 166/06: Development, Interference with Wetlands and Alterations to Shorelines and Watercourses, Oak Ridges Moraine Conservation Plan, Greenbelt Plan* and the *Provincial Policy Statement.*
- Streambank vegetation continues to be planted throughout the watershed on private and public land through stewardship programs involving Toronto and Region Conservation (TRCA), municipalities, agencies and community groups such as Ontario Streams and the Black Creek Conservation Project.

Good news:

- **Improvement in riparian cover in the Humber River Watershed is occurring.**
- **Sixty-one per cent (7,422 hectares) of the riparian zone in the entire Humber River Watershed has natural cover, with 35 per cent (4,258 hectares) of this being forest, 18 per cent (2,190 hectares) meadow, six per cent (730 hectares) wetland vegetation, and two per cent (243 hectares) successional growth.**
- The Main and Lower Humber subwatersheds have the most natural riparian cover at over 65 per cent in each. Over 40 per cent of this is forest cover.

Bad news:

- **Over 50 per cent of the riparian zone in the West Humber subwatershed has no natural cover because so many of the headwater streams flow through urbanized or agricultural areas. Less than 20 per cent of it has forest cover.**
- Seventy-six per cent of the 1,400 kilometres of watercourses in the Humber River Watershed consist of small streams, and the lack of riparian vegetation in many of these areas is causing stream temperatures to rise, which negatively impacts the health of the aquatic ecosystem, particularly in the headwater areas.
- Records are not available on the amount of riparian cover established.

Figure 22: Riparian Zone in the Humber River Watershed by Cover Type

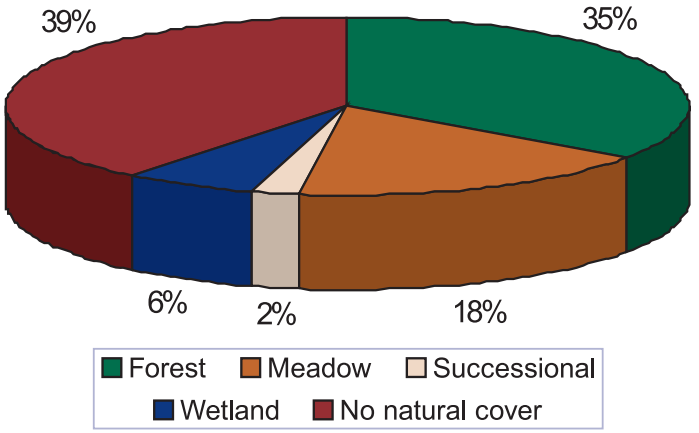
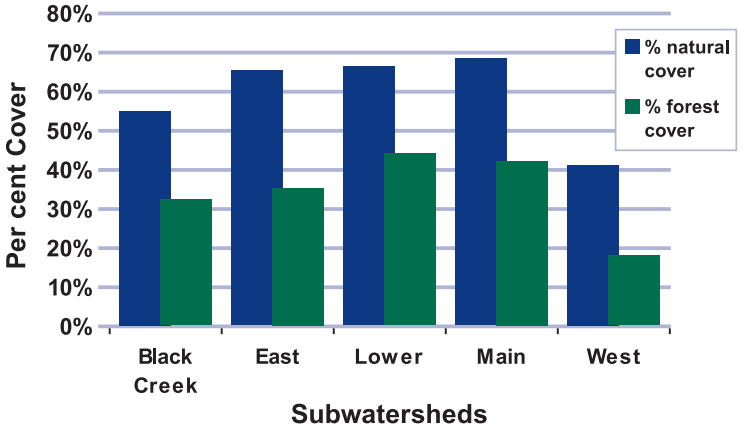


Figure 23: Per cent of Natural Cover and Forest Cover in the Riparian Zone of the Humber River Subwatersheds



Above photo—Cold Creek Conservation Area: King Township

Target:

2012

- An additional two per cent (243 hectares) of the watershed has riparian natural cover.

How to improve:

- Toronto and Region Conservation, agencies, community groups and private landowners protect and plant more woody vegetation in riparian areas, with the West Humber subwatershed as a priority area.
- Toronto and Region Conservation, municipal and community partners coordinate the monitoring of riparian planting efforts, including mapping and scheduled field monitoring, to determine the success of the planting.
- Toronto and Region Conservation and other agencies establish more monitoring sites in the first and second order streams to detect water temperature changes and to help prioritize planting efforts.
- Toronto and Region Conservation tracks riparian planting efforts by all partners in a simple, accessable database.

Cold Creek Conservation Area: King Township

Air

Our air quality is affected by local, regional and global factors. Situated in the densely populated Great Lakes Basin, the Humber River Watershed is affected by long-range transport of pollutants from beyond the city, as far away as the Ohio Valley in the United States. Air contaminants are generated from both human activities and natural processes, as well as from the interactions associated with them. Yet as an essential ingredient for life and the medium for spreading both airborne and waterborne contaminants, air is a critical component of watershed protection. Air pollution affects an ecosystem directly through respiration and atmospheric deposition, and indirectly as a cause of global climate change (also known as global warming of the atmosphere).

Air pollutants can affect human health, vegetation, buildings and climate, and come from many different sources including factories, power plants, smelters, heating and cooling systems, planes, trains and other vehicles. Besides directly affecting people through inhalation, airborne pollutants also contaminate the Humber River. Pollutants either settle directly on the water, or fall on the land and are washed into the river by runoff.

While improved emission controls on factories, incinerators, power plants and vehicles have reduced the ambient levels of many common pollutants such as sulphur dioxide and lead, smog remains a significant and growing air quality concern in the Greater Toronto Area as the number of vehicles increase. Surprisingly, about half of the smog we breathe is attributable to pollution from sources outside the province.

The main ingredients in smog are ground-level ozone and particulate matter, mainly from fuel combustion, incineration, construction and metal processing. The ozone is formed when nitrogen oxides (mostly from vehicle tail pipes) react with volatile organic compounds in the presence of sunlight. Smog affects respiratory functions, causes increased sickness and death from cardiopulmonary disease, and damages natural vegetation and crop plants.

Many of Ontario's air standards were developed more than 20 years ago. Since that time, the science of risk assessment has advanced significantly. According to the current version of *Setting Environmental Quality Standards in Ontario*, the Ministry of Environment (MOE) has placed particular emphasis on reviewing and updating existing air quality standards to ensure that they are current, and provide for adequate protection of human and ecosystem health. In addition, processes have been developed to identify new substances.

The Air Quality Index (AQI) measures overall air quality by examining the levels of six key contaminants: sulphur dioxide, ozone, nitrogen dioxide, total reduced sulphur compounds, carbon monoxide and suspended particles. The AQI has five levels: zero to 15 is very good; 16 to 30 is good; 31 to 49 is moderate; 50 to 99 is poor; and 100 and over is very poor. The most frequent cause of elevated AQI readings in the Toronto area is high levels of ozone and particulate matter. This typically occurs on hot, sunny, windless days, since these conditions favour the production and accumulation of ground-level ozone. The air quality measure we used in this report card is how often the AQI reaches 50. This is when the medical officer of health issues an Air Quality Advisory or "smog alert." It should be noted that the AQI level of 50 or higher may be too high because effects on human health, vegetation and visibility may begin at an AQI reading as low as 31.

Ontario's air quality is monitored by a network of monitoring stations operated by the MOE. Of the 37 continuous monitoring sites across Ontario, there is only one site located within the Humber River Watershed. However, an additional three are nearby in York Region and the City of Toronto. Collectively, these four stations were used as the "Humber area monitoring stations" for the purpose of the air quality indicator. The 'atmospheric region of influence' or 'airshed' for the Humber extends far beyond the watershed boundary.

To improve the quality of the air we breathe requires action and commitment from all of us. In addition to strengthening the standard setting process in Ontario, each of us has to take responsibility. By changing our lifestyle behaviours and consumption patterns on a day-to-day basis, we can improve air quality and work towards a more sustainable future.

INDICATOR 16:
Air Quality

How healthy is the air we breathe?

Rating:

D

Measure:

Number of days each year that the Air Quality Index (AQI) is 50 or more ("smog day") in the Humber River Watershed.

Rating criteria:

The average number of smog days per year where the AQI exceeds 50.

A	0
B	1-3
C	4-6
D	7-9
F	10 or more

Current efforts:

- Government public education campaigns to reduce emissions include the provincial *Drive Clean Program*, federal *One-Tonne Challenge* and municipal anti-idling by-laws, *20/20 The Way to Clean Air* and the *Smart Commute Initiative*.
- In June 2000, the federal, provincial and territorial governments (except Quebec) signed the *Canada-wide Standards for Particulate Matter (PM) and Ozone*. These standards commit government to significantly reduce PM and ground-level ozone by 2010. The *Canada-wide Standards for PM and Ozone* are an important step towards the long-term goal of minimizing the risks of these pollutants to human health and the environment.
- At the sixth annual Smog Summit, the *Toronto and Region Inter-Governmental Declaration on Clean Air,* formalizing a commitment to address smog and greenhouse gas issues, was signed by the federal and provincial governments and 20 municipalities in the Toronto region.
- York Region launched Viva in September 2005, the first rapid transit bus service of its kind in the Greater Toronto Area (GTA). York Region estimates first phase improvements will lead to a 30 per cent increase in transit users or an additional 4.5 million transit riders—removing 7,000 cars from major arterial roads per day.
- Environment Canada has developed a lichen monitoring protocol to help gauge air quality.
- A variety of hybrid vehicles that reduce carbon dioxide emissions are becoming available on the market.
- Community efforts to curb car pollution include Pollution Probe's annual *Clean Air Commute* contest and the Toronto Environmental Alliance's work on car-pooling.

Above photo—York Region Rapid Transit: City of Toronto

Figure 24: Number of Smog Days in the Humber River Watershed

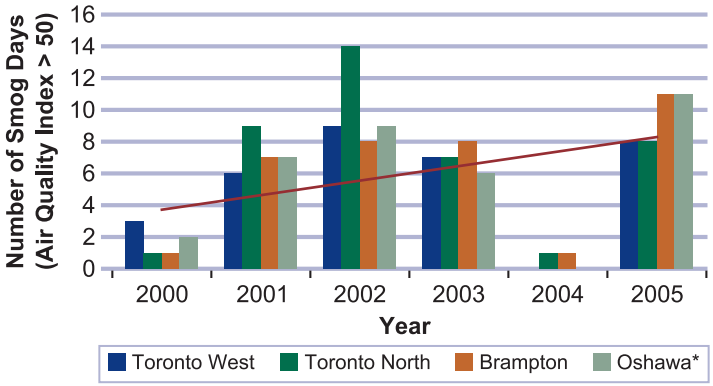
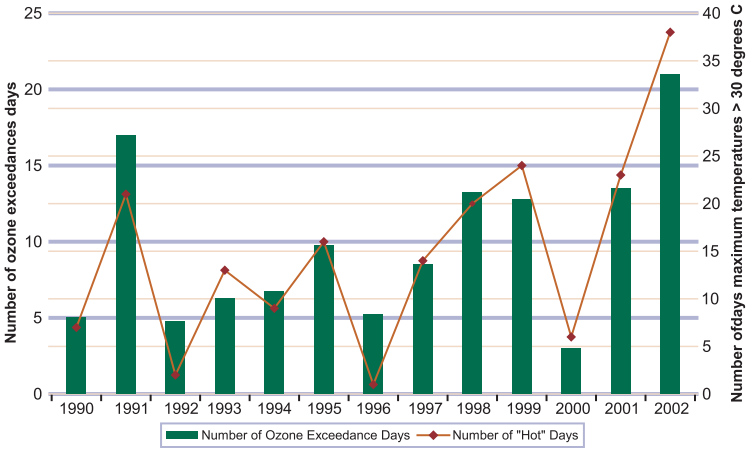


Figure 25: Trend of Ozone Exceedance Days and "Hot" Days in the GTA (1990–2002)



*Note: Average number of smog days from 1990 to 2002 was 7.5.

Good news:

- **Air quality in general has improved over the last 20 years, but ozone and particulates continue to be a problem, particularly in hot weather.**
- The Lakeview coal power plant in Mississauga, a significant source of smog-producing nitrogen oxide and sulphur dioxide, has been eliminated from use by the provincial government as part of their strategy to close all of Ontario's coal-burning stations by 2007.
- Major efforts are being made by governments, businesses, school boards and special interest groups to improve air quality by increasing public awareness of the issue and encouraging lifestyle changes.

Bad news:

- **Fifty-nine per cent of the watershed's residents never use public transit (Pollara, 2006).**
- The AQI exceeded 50 (*poor*) eight times in 2003, once in 2004 and 11 times in 2005. The low number of smog days in 2004 was the result of a relatively cool summer rather than a reduction in emission levels.
- Rising temperatures exacerbate air pollution in the Toronto region. Causes for temperature increases can include climate change, the urban heat island effect, land use and transportation.
- Fifty per cent of the smog in the GTA comes from local and regional sources. The remaining 50 per cent comes from a greater distance including the United States. The positive angle to this is that we can control the 50 per cent that is generated locally and regionally.
- There were 2,768,636 registered vehicles in Peel, York and Toronto in 2004, an increase of 31 per cent since 1998.

Target:

2012

- The AQI exceeds 50 no more than four to six days per year.

How to improve:

- Businesses and consumers reduce the use of fossil fuel-powered equipment, increase the energy efficiency of homes and offices and increase the use of renewable energy sources (e.g., solar, wind).
- Businesses and car owners drive hybrid or small, fuel-efficient vehicles.
- Businesses and municipalities take part in "clean air campaigns" to reduce the use of fuel-powered equipment and promote greater use of public transit.
- Federal and provincial governments increase funding for public transit.
- Increasing accessibility and acceptance of public transit is key to reducing smog.
- Municipalities increase sustainable public transportation opportunities such as pedestrian trails, cycling lanes, trains, streetcars and buses.
- Toronto and Region Conservation, government, community groups and homeowners restore natural cover, especially trees, in both rural and urban areas. This will help to absorb air pollutants and carbon dioxide (greenhouse gas).
- Implement urban heat island strategies (e.g., creating greenroofs, expanding the urban forest and using white or reflective materials to build houses, pavements and roads).

ASSESSING THE HEALTH OF THE WATERSHED:

Society and Economy

Heritage

On September 25, 1999, the Humber River was designated as a Canadian Heritage River, recognizing its outstanding human heritage and contribution to the development of Canada.

The first humans to live along the Humber River were Aboriginal peoples, followed by the French and then English settlers. Surviving physical manifestations of this history including archaeological sites, burial grounds, mill sites, artifacts and heritage buildings are scattered across the watershed. Together with people's memories, ceremonies and stories, these represent the cultural heritage of the Humber River Watershed.

The sophistication and complexity of the Euro-Canadian settlement of the Humber River Watershed is demonstrated in the vast array of architectural styles found in the heritage structures. Over 30 different architectural styles lend a unique identity to the late 18th- to early 20th-century landscape, which sets the Humber River Watershed apart from other areas in Toronto.

In recent decades, the Humber River Watershed has experienced a large influx of immigrants, with a wide range of ethnic origins. The watershed has developed considerably to support and provide for the needs of a growing and culturally diverse population. Affordable housing, employment and education are factors that influence choices by immigrants to settle here.

Based on Statistics Canada data (2001), the top four ethnic origins that residents identified with in the Humber River Watershed comprise nearly 46 per cent of the watershed's population:

1. Italian (20.0%)
2. Canadian (10.6%)
3. English (8.6%)
4. East Indian (7.2%)

Based on Statistics Canada data (2001), the top four recent (1996–2001) immigrants to the Humber River Watershed by country of birth include:

1. India (19.5%)
2. Jamaica (6.3%)
3. Pakistan (6.0 %)
4. Guyana (5.0%)

Given the significant growth and development in the watershed, there is a need to identify and protect cultural resources within urban and urbanizing landscapes. Legislation exists (*Ontario Heritage Act*, 2005) which requires archaeological investigations be carried out prior to development. Unfortunately, prior to the recent establishment of mechanisms for identifying and protecting architectural resources, a number of historic buildings have been destroyed or altered beyond recognition.

Above photo—Canoeing on Canadian Rivers Day: Lake Ontario
Opposite page—Old Mill Bridge: City of Toronto

To assess the health of cultural heritage, we used two indicators:

1. How well are heritage resources being protected?
2. How well is heritage being recognized and celebrated?

The protection of heritage resources is measured by the number of "listed" and "designated" heritage and archaeological sites in the watershed. Listed heritage resources have been recognized by municipalities as having heritage value, but receive little or no protection by law. Designated heritage resources are protected under the *Ontario Heritage Act*. Protection of archaeological sites under the *Ontario Heritage Act* involves avoidance of the site during construction or controlled excavation as per provincial guidelines. In addition, recent initiatives such as the *Oak Ridges Moraine Conservation Plan* and the *Greenbelt Plan* may help to further protect cultural heritage resources in rural areas.

Heritage events heighten our awareness of the cultural and historical past of the watershed. They may be sponsored by municipalities, non-governmental organizations or institutions. Some examples are local fall fairs, heritage hikes along the Toronto Carrying Place Trail, Kleinburg's Binder Twine Festival, Canadian Rivers Day activities and heritage plaque memorials such as Hurricane Hazel.

Understanding, preserving and celebrating our past helps us derive meaning in our lives, and is the foundation of stewardship. Cultural heritage is fragile, non-renewable and increasingly scarce. In a place like the Humber River Watershed, where change is taking place at a rapid rate, protection of heritage resources is an important challenge.

The Humber River Watershed exemplifies the values of the Canadian Heritage Rivers System as follows:

- The 126-kilometre-long corridor of the Main branch of the Humber River and its major tributary, the East Humber River, are of outstanding natural heritage, human heritage and recreational value to the resident population of 670,000 and to the 4.5 million inhabitants of the Greater Toronto Area.
- Has outstanding examples of natural features such as the Niagara Escarpment and Oak Ridges Moraine.
- Was home to aboriginal peoples as early as 12 millennia ago and their legacy of transportation networks is still enjoyed today.
- Contains outstanding examples of aboriginal and historic archaeological sites, 19th and 20th century dwellings, public structures, cemeteries and other testaments to human activity and adaptability to the local environment.
- Is home to many cultural groups, both those who settled in the late 18th century and later immigrants, who have all contributed to the Canadian cultural mosaic.
- Is strongly associated with the careers and works of many famous persons including Étienne Brulé, Louis Joilet, René-Robert de La Salle, Fathers Jean de Brébeuf, Joseph Chaumonot and Louis Hennepin, Jean-Baptise Rousseau, Elizabeth Arden, Pierre Berton, and Norman Jewison.
- Has outstanding recreation, education and tourism opportunities, including natural and human heritage appreciation, that are best afforded by walking, bicycling, camping, canoeing, touring and taking part in special programs that are offered by communities and organizations along the river.
- Is protected by an array of provincial, regional and local laws, regulations, policies and guidelines, coordinated throughout the watershed and among 12 municipalities.
- Has regulatory and planning response mechanisms, such as those of Toronto and Region Conservation, that are outstanding examples of human adaptation to periodic flooding.
- Is an outstanding example of the symbiotic ecosystem links between natural heritage, human heritage and recreation values.

Based on these characteristics and more, the Humber River was officially included in the Canadian Heritage Rivers System on September 25, 1999.

INDICATOR 17:
Heritage Resources

How well are heritage resources being protected?

Rating: C

Measure:

The number of listed and designated heritage and archaeological sites in the Humber River Watershed.

Rating criteria:

Number of listed sites per year that become designated across the watershed.

A	11–20
B	6–10
C	3–5
D	1–2
F	0

Current efforts:

- Recent amendments to the *Ontario Heritage Act* in April 2005 give the province and municipalities new powers to not only delay but also to stop demolition of heritage sites, thereby significantly aiding in the protection and preservation of heritage resources.
- The province has expanded the ability to identify and designate sites of provincial heritage significance and to set clear standards and guidelines for their preservation.
- Toronto and Region Conservation continues to enhance heritage awareness and preservation through archaeological surveys and comprehensive updates to heritage inventories.
- Toronto and Vaughan have recently developed an on-line searchable database and interactive map of heritage properties.
- Toronto and Region Conservation continues to assess its own properties for archaeological resources prior to making any site alterations.

Table 14: Heritage Resources in the Humber River Watershed

Heritage designation	Municipality								TOTAL
	Adjala-Tosorontio	Brampton	Caledon	King	Mono	Richmond Hill	Toronto	Vaughan*	
Designated		3	31	7	1		16	28*	86
Listed	10	42	6	229	3	48	227	512*	1,077
De-listed				1					1
Demolished	3	3		15	2	11	20	20	74
Mills	3		29		2				34
Cemetery	1	8	32	17	2	1	24	23	108
Plaque			1				7	2	10
TRCA-listed				11					11
TOTAL	**17**	**56**	**99**	**280**	**10**	**60**	**294**	**585**	**1,401**

Note: *Kleinburg-Nashville Heritage Conservation District lists and designates all buildings in the district for protection. This district includes numerous modern structures. Although many of these modern structures have no cultural heritage significance of their own, their designation helps to maintain the historical character of the community.

Good news:

- **The increase of 602 listed cultural heritage features (75 per cent) since 2000 represents a positive trend towards protecting and preserving heritage features.**
- All municipalities in the Humber except for Adjala-Tosorontio have a Heritage Committee.
- Four-hundred and forty archaeological sites and 1,401 listed historic buildings, cemeteries, mill sites and other historical sites have been identified in the watershed.

Above photo—Railway Station: King Township

Bad news:

- **Of the 1,401 "listed" historical sites and buildings, only 86 (six per cent) have been "designated" (and therefore protected) under the *Ontario Heritage Act*, an increase of only 21 since 2000. This is below the 2005 target of five new designations per municipality.**
- Seventy-four "listed" built heritage features have been demolished since the mid 1990s.
- Provincial heritage requirements are not always observed on all private lands.
- Many municipalities lack incentives and funding to assess or protect their built heritage.

Targets:

2012

- Make a consolidated inventory of all heritage resources throughout the Humber.

How to improve:

- Local Architectural Conservation Advisory Committees (LACACs) and municipal heritage planners continue to record, categorize and update their heritage inventories and share their updates on a regular basis.
- The Ontario Ministry of Culture standardizes the definitions to be used by LACACs and municipalities for listing heritage properties.
- Efforts are increased to list and designate heritage properties in order to maximize their recognition and protection.
- Specific funds are allocated for the verification of mill site locations, including historical research and field investigation, in order to retrieve physical evidence and spatial information.
- Photographic records are completed for listed sites and are mandatory before demolition occurs.
- Residents and businesses support the preservation of heritage resources.

Double English Wheat Barn. Former McVean Property, Claireville Conservation Area: City of Brampton

Above photo—Former Eaton Estate: King Township

INDICATOR 18:
Heritage Events

How well is heritage recognized and celebrated?

Rating: D

Measure:

Awareness of watershed residents that the Humber River has been designated as a Canadian Heritage River.

Rating criteria:

Per cent of watershed residents that are aware that the Humber River has been designated as a Canadian Heritage River.

A	Greater than 80%
B	70–79%
C	60–69%
D	50–59%
F	Less than 50%

Current efforts:

- Toronto and Region Conservation (TRCA), with the assistance of municipalities and private event sponsors, is developing an inventory of heritage events.
- Local heritage groups and municipalities are taking an active role in hosting and promoting events, such as fall fairs and historic interpretive walks that celebrate the heritage of their communities.
- The Humber Watershed Alliance is working to produce a fourth Discovery Walk in the community of Weston, promoting the heritage of the Humber.
- The City of Toronto's Inner City Out-Tripping Centre hosts an annual Canadian Rivers Day and a "Hustle Up the Humber" event.
- La Société d'Histoire de Toronto has completed a feasibility study for a historical park on the Lower Humber River below St. Clair Avenue.

Good news:

- **Five books (*The Humber: Tales of a Canadian Heritage River*, by Ron Fletcher; *Rain Tonight*, by Steve Pitt; *Hurricane Hazel: Canada's Storm of the Century*, by Jim Gifford; *Palgrave – The United Church and the Community*, by the Palgrave United Church and *Glascow: A Hamlet on the Humber*, by Heather Broadbent) about Humber heritage and two DVDs (*Hurricane Hazel – 50th Anniversary: Personal Recollections*, by Heritage York, and *Hazel's Legacy: A Hurricane that Changed our Landscape Forever*, by TRCA) which commemorate the 50th anniversary of Hurricane Hazel, were released.**
- Since 2000, the Humber Watershed Alliance and the City of Toronto have produced three new *Discovery Walks: Humber Arboretum and West Humber River Valley, Humber River Old Mill and Marshes, and Lambton Hotel and Lower Humber River* to promote the heritage of the river.
- A brochure produced in 2004, *A Guide to the Humber River: A Canadian Heritage River*, highlights the natural, human and recreation values that have made the Humber a Canadian Heritage River.
- In 2003, the Federal Minister of Heritage proclaimed the second Sunday in June as Canadian Rivers Day and since then, annual events have been held each June to commemorate this day and celebrate the Humber's history.
- To commemorate the 50th anniversary of Hurricane Hazel, the Ontario Heritage Foundation unveiled a heritage plaque in Toronto's Kings Mill Park on October 16, 2004.
- In 2005, a sculpture of Jean de Brebeuf and an aboriginal guide "pointing the way" was erected near the intersection of Islington Avenue and Major MacKenzie Drive in Vaughan.

Bad news:

- **According to a recent poll, only 36 per cent of the watershed's residents are aware that the Humber River has been designated as a Canadian Heritage River (Pollara, 2006).**
- Several municipalities offer no Humber-related heritage events.

Targets:

2012

- Develop a picture book of the Humber River Watershed to celebrate the 10th anniversary of the designation of the river as a Canadian Heritage River and the 60th anniversary of the former Humber Valley Conservation Authority.
- Consolidate TRCA's heritage data collection with other heritage organizations.

Above photo—Peel Children's Water Festival: City of Brampton

How to improve:

- Toronto and Region Conservation, municipalities, community groups and provincial heritage agencies identify, register and produce a guide to promote heritage events.
- Toronto and Region Conservation, municipalities and groups market the Humber River as a Canadian Heritage River through public events, promotional advertising and publications.
- Toronto and Region Conservation organizes an annual Humber River event to promote recreation, natural values and human heritage of the Humber.
- Municipalities, TRCA and school boards incorporate local heritage education programs in their events.
- Municipal, community and corporate partners work together to organize an annual "Riverfest."
- Toronto and Region Conservation to host a 10th anniversary celebration of the Humber's Canadian Heritage Rivers designation.

"Humankind has not woven the web of life. We are but one thread within it. Whatever we do to the web, we do to ourselves. All things are bound together. All things connect."

— Chief Seattle, 1855

Metis Festival: Black Creek Pioneer Village

Hurricane Hazel Commemorative: City of Toronto, 2004

Above photo—Toronto and Region Conservation Multicultural Day

Outdoor Activities

Greenspace is highly valued for its aesthetic, social, recreational and spiritual benefits. It provides outdoor recreation opportunities ranging from hiking, bird watching, cycling, camping and picnicking, to swimming, fishing and a host of other active and passive activities. It is well documented that active lifestyles promote a sense of well-being and an overall healthier population will lessen the burden on our health care system. Through greater interaction with the outdoor environment, people gain an appreciation for their natural surroundings and are more likely to support watershed protection and restoration efforts.

To assess the health of outdoor activities, we used three indicators:

1. Amount of publicly owned greenspace.
2. Extent and use of outdoor recreational facilities.
3. Status of the trail system.

For the purpose of this report card, greenspace is all publicly owned property including federal and provincial land, municipal parks and Toronto and Region Conservation owned lands but does not include golf courses, cemeteries, utility corridors and road right-of-ways. Large parts of the watershed's natural areas are not in public ownership and not readily accessible.

In 1996, a survey of Canadians by the Government of Canada revealed that Canadians commit large amounts of their leisure time to activities that depend on natural areas and wildlife. Furthermore, the population of the Greater Toronto Area continues to grow and is expected to reach six million by 2021. This growing urban population will put increased pressure on the publicly owned greenspace system. The challenge is to provide a publicly accessible and connected greenspace system that links natural features, recreational venues and tourism destinations without destroying the integrity of the natural system.

There are many opportunities in the Humber River Watershed for recreational activities thanks to the large inventory of publicly owned greenspace. The number of outdoor recreational opportunities is one measure of the "liveability" of a place. Use of these outdoor recreational opportunities is a measure of people's awareness and ability to access them. Recreational activities help diversify local economies. Rural areas are broadening their tourism markets by offering family resource-based recreational activities such as farm-style mazes, wineries and pick-your-own produce. Recreational opportunities will have to keep pace with the increased demand originating from not only a larger population, but also an aging population. By 2010, the number of people over 65 years of age is expected to rise by 50 per cent.

Trails allow people to walk, hike and bike through and between natural areas. The recreational use of trails has more than doubled in North America since 1970. The development of a system of inter-regional trails through the greenspace system has been identified as a priority. In response, some municipalities have recently completed comprehensive and integrated trail master plans including multi-use, single-use and street bicycle lanes. Large portions of this trail system are currently in place. Completing the system will require some land purchases by public agencies, but lack of funds is a significant challenge. Other strategies such as conservation easements, bequests, donations and agreements with landowners will be needed to help connect the gaps between existing trail sections. Retrofits will be required along streets to help connect trail sections and provide safe transportation options.

INDICATOR 19:
Public Greenspace

How much publicly owned greenspace is there?

Rating: B

Measure:

Per cent of publicly owned and accessible greenspace in the watershed.

Greenspace is all publicly owned and publicly accessible valley and stream corridors, municipal parks and conservation lands owned by Toronto and Region Conservation (TRCA), municipalities and federal and provincial agencies but does not include golf courses and cemetaries, utility corridors and road right-of-ways..

Rating criteria:

Per cent of publicly owned and accessible greenspace in the watershed.

A	12 – 15% (10,800 – 13,500 ha)
B	10 – 11% (9,000 – 10,800 ha)
C	8 – 9% (7,200 – 9,000 ha)
D	5 – 7% (4,500 – 7,200 ha)
F	Less than 5% (4,500 ha)

Current efforts:

- The City of Toronto provided Toronto and Region Conservation (TRCA) $2 million in 2005 and $500,000 in 2006 for source water protection, which includes land acquisition.
- The regional municipalities of York and Peel have set up land acquisition reserves, which are accessible for the purchase of conservation lands.
- The Oak Ridges Moraine Foundation has a fund of $15 million for land acquisition, stewardship and habitat restoration on the Oak Ridges Moraine.
- The *Conservation Land Tax Incentive Program* reduces the financial burden on conservation organizations by providing a 100 per cent tax exemption on eligible portions of a property.
- The *Managed Forest Tax Incentive Program* provides a 75 per cent tax exemption on managed forest lands.
- Toronto and Region Conservation continues to acquire priority greenspace and is better equipped to do so with the guidance of the newly completed *Terrestrial Natural Heritage System Strategy*.
- The *Planning Act* requires developers to convey five per cent of new developments to the municipality for parkland or other public recreation purposes, or provide an equivalent cash value.

Table 15: Publicly Owned and Accessible Greenspace in the Humber River Watershed (2004)

Subwatershed	Provincial and Federal Parks (ha)	Municipal (ha)	TRCA (ha)	Total (ha)	Per cent of watershed
Black Creek	211	238	232	681	0.8%
East Humber	319	82	1,098	1,499	1.7%
Lower Humber	52	347	548	947	1.1%
Main Humber	23	485	3,795	4,303	4.8%
West Humber	0	388	971	1,359	1.5%
Total	**605**	**1,540**	**6,644**	**8,789**	**9.9%**

Notes: Total area of the Humber River Watershed is 90,255 hectares.
*Includes the 428-hectare Oak Ridges Corridor Park located in the East Humber subwatershed (355 hectares of the 428 hectares is in the Humber River Watershed).

Good news:

- **The inventory of publicly owned greenspace grew to 8,789 hectares, which is 232 hectares more than in 2000 (8,557 hectares).**
- In 2001, the Province of Ontario reached an agreement to exchange 428 hectares of privately owned land in Richmond Hill for provincially owned lands in Pickering. This land exchange is expected to be completed in 2007 and will protect the last remaining natural corridor link between the eastern and western parts of the Oak Ridges Moraine in Richmond Hill. The area is currently referred to as the Oak Ridges Corridor Park. Approximately 83 per cent of this property is in the Humber River Watershed and the remaining portion is in the Rouge River Watershed.
- Provincial legislation such as the *Niagara Escarpment Plan*, *Oak Ridges Moraine Conservation Plan* and *Greenbelt Plan* all support the protection of greenspace (see Indicator 1: Significant Landforms).
- Toronto and Region Conservation, Brampton and Richmond Hill acquired 110 hectares, 151 hectares and 18 hectares, respectively.
- In 2006, the Government of Canada eliminated the tax on capital gains for all certified 'Ecological Gift' donations made on or after May 2, 2006. Environment Canada's *Ecological Gifts Program* (1995) enables individual and corporate landowners to protect their cherished piece of nature forever by donating ecologically sensitive land to an environmental charity or government body.

Above photo – Aerial: City of Vaughan

Fourty-six per cent of residents who think there are not nearly enough parks and natural spaces would support the creation of new park areas by spending more tax dollars (Pollara, 2006).

Bad news:

- **Significant portions of the valley and stream corridors in the East and West Humber subwatersheds still do not have connected, publicly accessible greenspace areas.**
- Greenspace per 1,000 residents decreased slightly from 14 hectares in 2000 to 13.5 hectares in 2005. However, the average greenspace per 1,000 residents in a study of Canadian cities by the Evergreen Foundation (2004) was nine hectares.
- Public greenspace continues to come under pressure from the increasing demand for municipal infrastructure and other proposals.

Targets:

2012

- Toronto and Region Conservation and municipalities each acquire another 200 hectares of publicly accessible greenspace in the watershed.

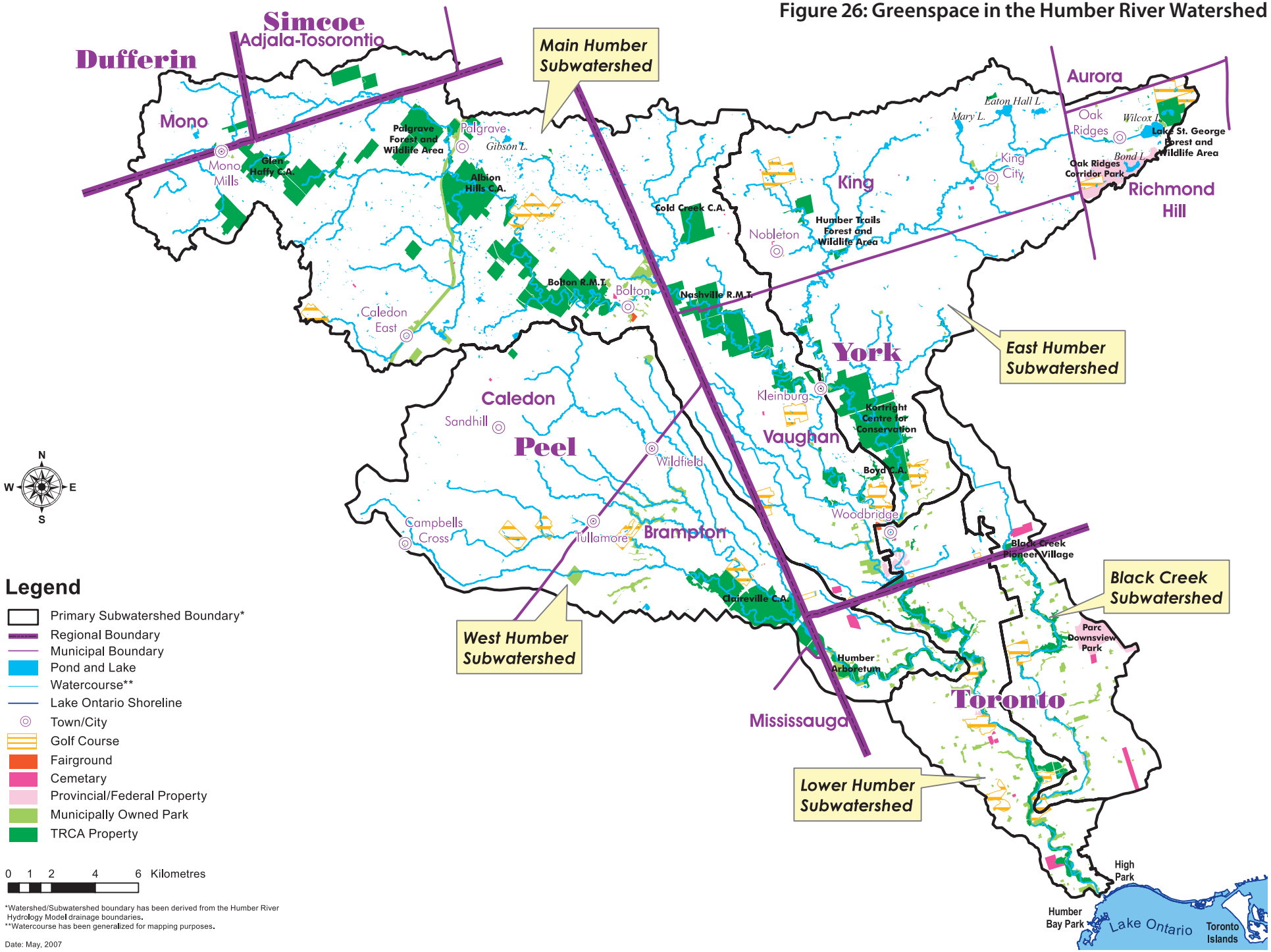
How to improve:

- Public agencies set priorities and maintain funding for the acquisition of greenspace using science-based information such as TRCA's *Terrestrial Natural Heritage System Strategy*.
- Toronto and Region Conservation and municipalities continue to acquire greenspace through the development process, bequests, donations and conservation easements.
- Toronto and Region Conservation and municipalities cooperate with land trust organizations (e.g., Oak Ridges Moraine Land Trust, Nature Conservancy of Canada) to secure land for conservation and public recreational use.
- Toronto and Region Conservation, municipalities and the Ontario Land Trust Alliance work together to develop a comprehensive database to track publicly accessible greenspace.
- Toronto and Region Conservation and partner organizations implement the management plan for

Bond Lake: Town of Richmond Hill

Oak Ridges Corridor Park in Richmond Hill once the land has been transferred to the province.

Figure 26: Greenspace in the Humber River Watershed



Legend

- Primary Subwatershed Boundary*
- Regional Boundary
- Municipal Boundary
- Pond and Lake
- Watercourse**
- Lake Ontario Shoreline
- Town/City
- Golf Course
- Fairground
- Cemetary
- Provincial/Federal Property
- Municipally Owned Park
- TRCA Property

0 1 2 4 6 Kilometres

*Watershed/Subwatershed boundary has been derived from the Humber River Hydrology Model drainage boundaries.
**Watercourse has been generalized for mapping purposes.

Date: May, 2007

INDICATOR 20:
Outdoor Recreation

How extensive are outdoor recreation opportunities?

Rating: C

Measure:

Participation in outdoor recreation.

Rating criteria:

Per cent of residents that have visited the Humber River or any of its parks or tributaries in the past 12 months (based on market research).

A	Greater than 80%
B	70–79%
C	60–69%
D	50–59%
F	Less than 50%

Current efforts:

- One hundred and seventy-five conservation areas and municipal parks have been established in the Humber River Watershed.
- Outdoor recreation facilities in the watershed include: 15 parks with baseball diamonds, seven parks with basketball courts, five parks with bocci courts, five parks with cricket pitches, 11 public areas for cross-country skiing, 38 parks with picnic areas, 56 parks with playgrounds, 17 parks with soccer fields, eight parks with splash pads, 10 parks with tennis courts and 24 golf courses.
- Conservation areas and municipal parks are being upgraded and diversified to meet consumers' needs, to reflect changing demographics and to enhance visitor experiences.
- Implementation of the internationally acclaimed "Tree City" design at Parc Downsview Park began in the fall of 2005. Located in the Black Creek subwatershed, this is Canada's first urban national park.
- Toronto has been providing canoeing opportunities at the Claireville Conservation Area through the Inner City Out-Tripping Centre.
- The Ministry of Natural Resources (MNR), working with local partners, is promoting recreational urban fishing at Eglinton Flats in Toronto and Eaton Hall Lake in King Township.
- The Caledon Cycling Club and Chico Racing is working with Toronto and Region Conservation (TRCA) to improve cycling opportunities in Albion Hills Conservation Area and the Palgrave Forest and Wildlife Area.
- Community groups such as the Friends of Claireville and the Cold Creek Stewardship Committee are providing recreational and educational events at respective TRCA properties.

Good news:

- **Eighty-two per cent of watershed residents agree totally (26 per cent) or somewhat agree (56 per cent) that improving the quality of the Humber River and its parks and tributaries will improve their quality of life (Pollara, 2006).**
- More than two-thirds of watershed residents have visited the Humber River, or any of its parks or tributaries in the past 12 months, with the majority of those having used these areas for hiking or walking (82 per cent) (Pollara, 2006).
- More than half (57 per cent) of watershed residents rate the

Table 16: Attendance at TRCA Facilities Located in the Humber River Watershed (2001–2006)

TRCA Property	2001 attendance	2002 attendance	2003 attendance	2004 attendance	2005 attendance	2006 attendance
Albion Hills Conservation Area and Campground	93,645	82,483	78,091	104,875	100,642	99,043
Boyd Conservation Area	47,981	49,649	65,512	55,045	43,343	42,735
Glen Haffy Conservation Area	27,474	25,356	23,144	21,558	21,066	18,946
Indian Line Campground	75,883	106,839	78,200	59,027	65, 744	55,654
Kortright at The Living City Campus	141,329	141,092	121,992	111,454	108, 336	105,793
TOTAL	**386,312**	**405,419**	**366,939**	**351,959**	**338,130**	**322,171**

Six-year average = 361,822

Above photo—Mountian bike races at Albion Hills Conservation Area: Town of Caledon

overall quality of the Humber River, its parks and adjacent greenspace as "good" (55 per cent) or "excellent" (2 per cent) (Pollara, 2006).

Bad news:

- **Attendance at TRCA conservation areas and campgrounds has remained relatively static since 2000, with annual fluctuations likely due to weather.**

Target:

2012

- Attendance at TRCA facilities and conservation areas is up from the current six- year average (2001–2006) of 361,822.
- A greater variety of programs and formalized specific uses are offered at TRCA locations including hiking, cycling, skiing, snowshoeing, horse-back riding, fishing, boating, swimming in natural open water, picnicking and camping.

How to improve:

- Public agencies monitor and adapt public spaces to meet consumer needs in ways that are compatible with the protection of natural systems.
- Toronto and Region Conservation, municipalities, agencies and community groups continue to improve the quality of the environment and promote eco-tourism.
- Toronto and Region Conservation, municipalities and local community groups develop partnerships to provide outdoor recreational programming at conservation areas.
- Toronto and Region Conservation provides additional recreation opportunities that are less weather dependent, to minimize the impact of bad weather on visits.
- Toronto and Region Conservation works with settlement agencies and community groups to encourage new immigrants to participate in outdoor recreation activities.

- Toronto and Region Conservation, municipalities, MNR and community groups promote the Humber River as a Canadian Heritage River.
- Toronto and Region Conservation and its partners work to improve water quality for activities like swimming and fishing.

Above photo—Cross-country skiing at Albion Hills Conservation Area: Town of Caledon

INDICATOR 21:
Trails

What progress has been made in developing a system of trails?

Rating:

A

Measure:

Degree of completion of a network of connected trails.

Rating criteria:

Additional kilometres of trail built by 2012.

A	Greater than 24 km
B	21 km–23 km
C	18 km–20 km
D	15 km–17 km
F	Less than 15 km

Current Efforts:

- A five-kilometre, multi-use trail was completed by Toronto and Region Conservation (TRCA) in 2006 in the Oak Ridges Corridor Park in Richmond Hill.
- A 5.5-kilometre, multi-use trail has been completed by TRCA in the Granger Greenway in Vaughan.
- Vaughan has prepared a *Pedestrian and Bicycle Master Plan*.
- Brampton's *Pathways Master Plan* won a Canadian Institute of Planners Award in 2003.
- The new chapter of the Humber Valley Heritage Trail Association was established in 2004 in Kleinburg.
- The Cold Creek Stewardship Committee established 6.5 kilometres of walking trails in 2005 in the Cold Creek Conservation Area (King Township).
- The Town of Caledon built 0.8 kilometres of hiking trails in Palgrave along the Humber River in 2003.
- The Friends of Boyd Park are working with TRCA to establish a trail in the Boyd Conservation Area which would commemorate Pierre and Janet Burton.
- The Humber Arboretum in partnership with TRCA and the City of Toronto completed a 10-kilometre, self-guided Discovery Walk in 2006.
- Toronto and Region Conservation is preparing a trail plan for the Palgrave Forest and Wildlife Area that will accommodate hiking, cross-country skiing, cycling and equestrian enthusiasts.

Table 17: Trails in the Humber River Watershed (2004)

Municipality	Local Trails (km)	Inter-regional Trails (km)
Adjala-Tosorontio	0	0
Aurora	1	0
Brampton	32	0.4
Caledon	117	88
King	38	21
Mississauga	3	0
Mono	10	10
Richmond Hill	39	0
Toronto	84	84*
Vaughan	52	9
Watershed Total **	**376**	**213**

Notes: Inter-regional trails are trails which cross the boundaries of more than one municipality. Local trails include municipal and other trail systems that are not included in the inter-regional trail system. Trails can be single use (such as hiking, cycling, cross-country skiing or equestrian) or multi-use. There were 185 km of inter-regional trails in 2000.
* Local trails in the City of Toronto are part of an inter-regional trail system.
**Watershed totals based on exact measurements. This may not equal the total of individual columns in this table as municipal numbers were rounded to the nearest decimal point (except Brampton because of a value under one).

Good News:

- **The length of completed trails has increased by 28.4 kilometres since 2000, exceeding the 2005 target of a 17-kilometre increase.**
- There are 213 kilometres of inter-regional trails in the watershed.
- More than two-thirds (68 per cent) of watershed residents have visited the Humber River, or its parks or tributaries in the past 12 months. The majority have used these areas for hiking or walking (82 per cent) (Pollara, 2006).

Bad News:

- **Gaps in priority trail sections along the Main, East, West and Lower Humber subwatersheds still exist.**
- Conflicts exist between trail user groups (e.g., hikers versus cyclists versus horseback riders).
- Implementation of Toronto's *Bicycle Master Plan* (2001) is far behind schedule.

Above photo—Albion Hills Conservation Area: Town of Caledon

- Most municipal trail plans do not include hiking-only footpaths.
- Motorized vehicles on trails have become a serious problem in the upper watershed because they pose risks to pedestrians, and cause severe damage to trails and their surrounding natural environments.

Target:

2012:

- An additional 30 kilometres of trails are built in the watershed, with 25 per cent of these trails designated for hiking only.

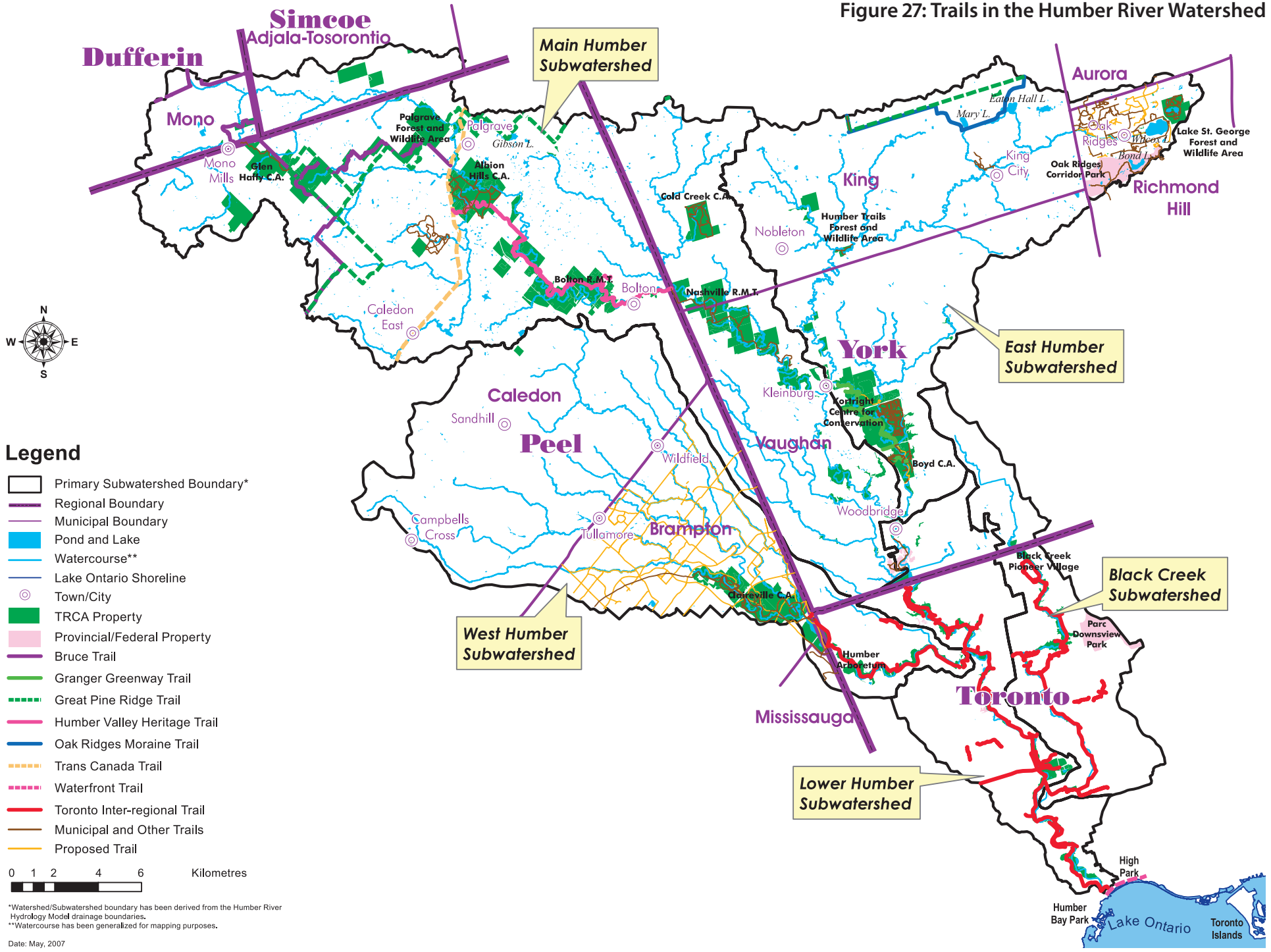
How to improve:

- Identify and set priorities for locations where trail links are needed.
- Toronto and Region Conservation, municipalities, trail clubs and community groups work together to determine the best location for different types of trails (e.g., formal hiking-only trail, multi-use trail, cycling trail, etc.) in order to provide a range of quality wilderness and parkland experience for different user groups.
- Toronto and Region Conservation, municipalities and community groups obtain trail easements on privately owned land to connect trail sections in greenspace.
- Residents form trail associations and work with agencies to build, monitor and maintain trails.
- Trail associations educate users in trail etiquette, stewardship and trail maintenance to minimize and manage trail conflicts.

Humber Valley Heritage Trail: Town of Caledon

Above photo—Cold Creek Conservation Area: King Township

Figure 27: Trails in the Humber River Watershed



Agriculture

The agricultural industry contributes significantly to the economy and quality of life in the Greater Toronto Area (GTA). Agricultural areas in the Humber River Watershed help make the region a desirable place to live by contributing to the local food supply and providing recreational, environmental, educational and heritage opportunities. Maintaining a viable food production industry close to the millions of people in the GTA is a necessity for sustainable communities in the future.

The *GTA Agricultural Action Plan* (2005) provides practical strategic directions to help keep the GTA agricultural industry competitive despite economic, land use and environmental pressures. All four GTA regional councils formally endorsed the Action Plan in principle, and the GTA Federations of Agriculture, Ontario Ministry of Agriculture and Food (OMAF), Ontario Ministry of Municipal Affairs and Housing (MMAH), Agriculture and Agri-Food Canada (AAFC) all indicated their support and commitment to its implementation. Recent provincial planning reforms such as the *Provincial Policy Statement* (PPS) and *Greenbelt Plan* recognize the importance of the agricultural industry. The PPS indicates that Prime Agricultural Lands are to be protected for agricultural use. Agricultural policies need to maintain a critical mass of agricultural land and prevent its fragmentation into non-farm parcels. Policies need to help ensure farmers have the flexibility to adapt to new markets forces.

Most of the land in the GTA is classified as "Prime Agricultural Land," which includes classes 1 to 3 soil capability based on the Canada Land Inventory (CLI). A large proportion of the area south of the Oak Ridges Moraine in the Humber River Watershed is CLI classes 1 to 3. In addition to productive soils, local agricultural areas have the following advantages: abundant fresh water, heat units conducive to high crop yields, proximity to markets and consumers, an extensive transportation network and proximity to research, development and learning facilities.

Studies show that 47 per cent of the farmland in the GTA is rented. This condition prevails in the Humber River Watershed as well. Rented farmland may be owned by retired farmers, speculators or other non-farmers who want a rural lifestyle but do not want to farm. Unfortunately, short-term land leasing creates instability in the agricultural industry and often leads to unsustainable farming practices.

The viability of traditional field crops in the Humber River Watershed, such as corn and soy beans, is diminishing. The near-urban agricultural industry has changed significantly over time. Consequently, new opportunities need to be defined and promoted in a coordinated fashion to take advantage of the unique strengths that existing conditions could support. For example, the cultural diversification of the population must be considered. The changing demographics will have different consumer preferences and this needs to be understood. New products or new technologies can create more options for farmers, and make the remaining agricultural areas productive, desirable and a valuable contribution to sustainable communities.

INDICATOR 22:
Agricultural Land

How well is agricultural land being conserved?

Rating: D

Measure:

Amount of Prime Agricultural Land (land having classes 1 to 3 soils) that is protected from development.

Rating criteria:

Amount of hectares (ha) of the 17,000 hectares (year 2000) still protected as Prime Agricultural Land.

A	Greater than 13,600 ha
B	11,900 ha to 13,599 ha
C	10,200 ha to 11,899 ha
D	8,500 ha to 10,199 ha
F	Less than 8,500 ha

Current efforts:

- The provincial *Greenbelt Plan*, the *Oak Ridges Moraine Conservation Plan* and *Places to Grow Act* were adopted to support the long-term viability of agricultural lands by directing development to growth areas.
- Municipalities have begun the process of updating their Official Plans to conform with the *Greenbelt Plan*.
- The *Agricultural Policy Framework* (2003) and *Provincial Policy Statement* review (2005) provide opportunities to increase federal and provincial commitment to protecting agricultural land and farm viability.
- In 2005, four regional councils in the Greater Toronto Area (GTA) endorsed a *GTA Agricultural Action Plan* that provides strategic direction on how to keep the GTA agricultural industry competitive in the face of economic, land use and environmental pressures.
- All GTA regional municipalities are consistent in their Official Plan approach, recognizing the significance of the agricultural land base and having Agricultural Advisory Committees that advise on planning matters affecting agriculture.
- Toronto and Region Conservation (TRCA) leases 360 hectares of land in the Humber River Watershed on an annual basis for agricultural purposes (e.g., hay, pasture, cash crops).
- Toronto and Region Conservation and the City of Toronto have partnered to establish a three-hectare urban organic farm near Jane Street and Steeles Avenue in the City of Toronto.
- In 2006, Local Flavour Plus, a non-profit organization which supports local sustainable food systems by certifying farmers and processors and linking them to the local market, was launched.

Good news:

- There is a new momentum arising within the agriculture and food community, which calls for new partners, new crops and new ways of doing business.
- Different options for market farming, community supported agriculture and urban community gardening are being explored by citizens and community groups such as Everdale Organic Farm and Environmental Learning Centre, FoodShare and The Stop Community Food Centre.
- Despite the higher price, almost nine out of 10 (87 per cent) residents of the Humber say they would be somewhat (45 per cent) or very likely (42 per cent) to purchase locally grown fruits and vegetables (Pollara, 2006).

Bad news:

- **Since 2000, nearly 7,036 hectares of the reported 17,000 hectares of protected Prime Agricultural Land in the regions of York and Peel has been developed or re-designated.**
- There is only 9,964 hectares of Prime Agricultural Land left in the Humber River Watershed protected by provincial and municipal policy (e.g., *Greenbelt Plan , Oak Ridges Moraine Conservation Plan*, Niagara Escarpment and municipal and regional Greenlands Systems), 4,739 hectares in the Region of York and 5,225 hectares in the Region of Peel.

Targets:

2012

- When municipalities bring their Official Plans into conformity with the *Provincial Policy Statement, Greenbelt Plan* and *Places to Grow Plan* much of the remaining 9,964 hectares of Prime Agricultural Land will be protected.
- No new development on any of the Prime Agricultural Land still unprotected within regional Official Plans.

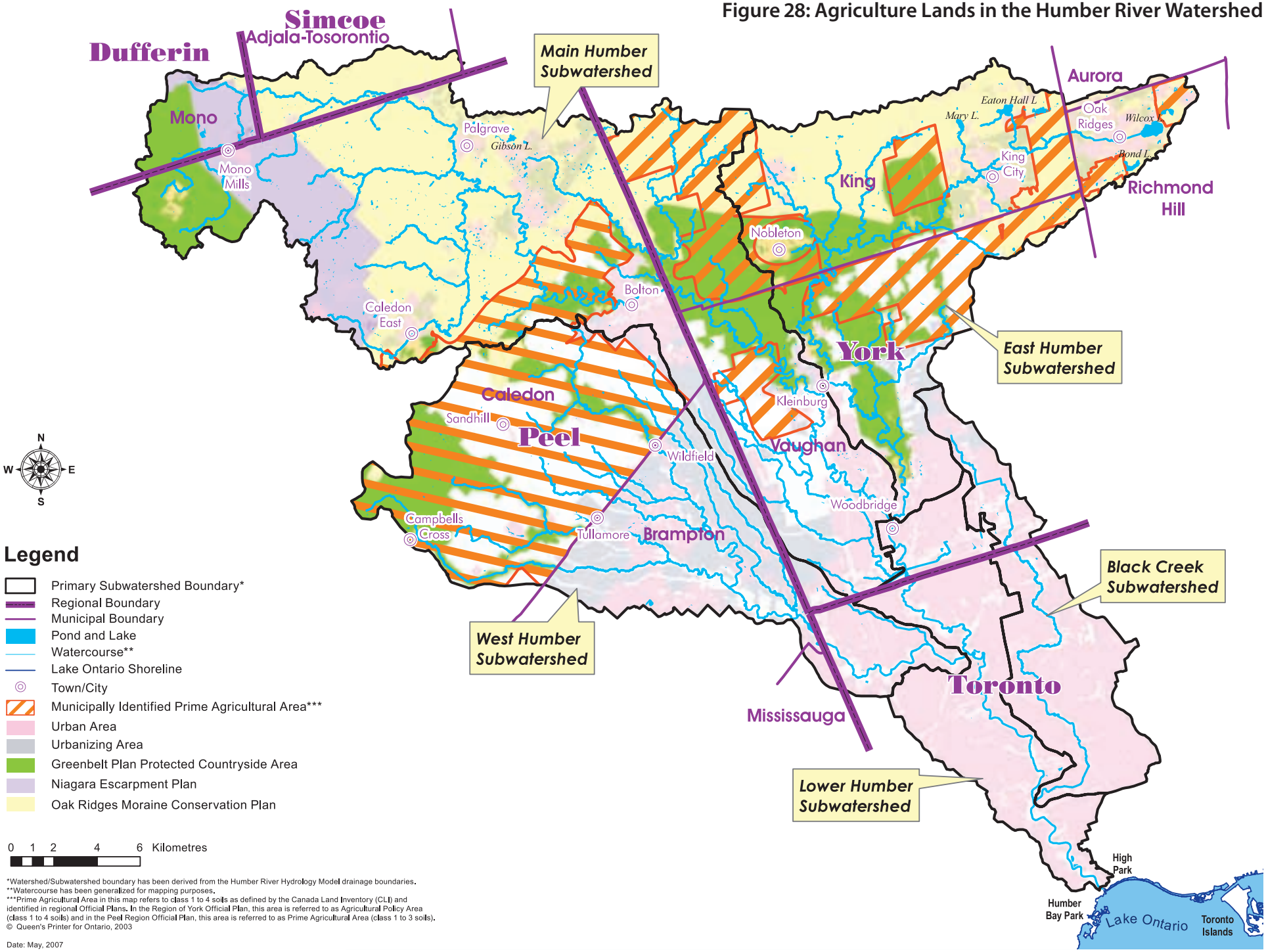
How to improve:

- All levels of government work together with partners to implement the *GTA Agricultural Action Plan*.
- Toronto and Region Conservation maintains Environmental Farm Plans for its agricultural properties to ensure Best Management Practices (BMPs) are being employed.
- Municipalities enforce policies to protect Prime Agricultural Lands in their Official Plans.
- Toronto and Region Conservation to develop a strategy regarding the use of TRCA land for new near-urban agriculture.

Private near urban agriculture

Above photo—Black Creek Urban Farm: City of Toronto

Figure 28: Agriculture Lands in the Humber River Watershed



*Watershed/Subwatershed boundary has been derived from the Humber River Hydrology Model drainage boundaries.
**Watercourse has been generalized for mapping purposes.
***Prime Agricultural Area in this map refers to class 1 to 4 soils as defined by the Canada Land Inventory (CLI) and identified in regional Official Plans. In the Region of York Official Plan, this area is referred to as Agricultural Policy Area (class 1 to 4 soils) and in the Peel Region Official Plan, this area is referred to as Prime Agricultural Area (class 1 to 3 soils).

Date: May, 2007

Sustainability

Sustainability is our ability to perpetuate ecological health while continuously supporting vibrant communities and an equitable quality of life for all inhabitants. A sustainable society lives within its environmental means. It mimics nature by using only renewable energy and resources, and by returning 'resources,' not 'garbage' or 'pollutants,' to the environment. It seeks creative synergies among the needs of the environment, human society and the economy, and understands their interconnections. In 1987, the United Nations (UN) Bruntland Commission defined sustainability as *"Meeting the needs of the present generation without compromising the ability of future generations to meet their needs."*

Sustainability in the Humber River Watershed is measured by how effectively people are using resources and living a sustainable lifestyle. We used three variables to measure the sustainable use of resources:

1. Ecological footprint (for the regions of York and Peel and the City of Toronto): A measure that gives a global perspective on the sustainability of resource use. An ecological footprint is the area of land and water required to produce all the products a person consumes and to absorb all their wastes. A footprint that exceeds what the earth can produce and absorb indicates an unsustainable rate of consumption.
2. Water conservation (e.g., water use per capita, water conservation plans, by-laws).
3. Solid waste diversion (e.g., residential solid waste/person, solid residential waste diversion) in the Humber River Watershed municipalities.

Although energy conservation is another key variable to consider in any discussion of sustainability, it is not reported on at this time because energy use and conservation data were not available. However, municipal and Toronto and Region Conservation (TRCA) energy conservation programs and initiatives are mentioned.

The Federation of Canadian Municipalities (FCM) produced a report in 2003, entitled *Ecological Footprints of Canadian Municipalities and Regions*. They found that municipalities across Canada had a range of footprints from a low of 6.87 hectares/capita in Greater Sudbury to a high of 9.86 hectares/capita in Calgary. European Union countries have a footprint of three to six, while many developing countries have footprints that are in the 0.5 to three range. Globally, when the total area of ecologically productive land and water area on earth is divided by the human population, there is about 1.89 hectares available for each person.

The ecological footprint is computed using variables such as household personal consumption expenditures, income per capita, average household size, population and population density, energy consumption and commuting distances.

Water conservation is an important variable for measuring sustainability that can reduce the ecological footprint of a region or municipality. Water is a critical life-sustaining resource and is threatened by climate change, extreme weather events (e.g., drought, flooding) and population growth. To address water supply concerns, municipalities in the Humber River Watershed set targets for water conservation, and determine the infrastructure they need to supply water to their residents. They also develop and implement effective water conservation programs, tools, resources and policies for their residents.

Solid waste diversion is another key variable required to calculate the ecological footprint. Waste diversion includes the recycling and composting of wastes, thereby diverting it from disposal at a landfill or by incineration. Waste diversion contributes to reducing the ecological footprint by allowing materials such as glass, steel, paper and plastic to be recycled into useful consumer items rather than being thrown away. Waste diversion can also reduce the amount of energy needed to collect and transport waste for disposal and extends the life of landfill sites.

The lifestyle of the average Humber River Watershed resident is largely consumer-oriented. Success and stature are often based on the accumulation of wealth and the consumption and acquisition of goods (houses, cars, fashionable clothing). All the resources we consume use the earth's capacity: the land to grow crops, raise animals, quarry building materials, extract fossil fuels, assimilate sewage or absorb air pollution. The more material we consume and waste, the greater the impacts on the water, land, habitats and air in the watershed. Long-term protection of the watershed requires that we all make choices and change our practices to live a sustainable lifestyle. Human activities should be redirected towards less material and resource dependent measures of human well-being and towards activities that add ecological and social value.

Everyone needs to consume less, recycle and reduce waste.

INDICATOR 23:
Sustainable Use of Resources

How well are people doing at using resources wisely and living a sustainable lifestyle?

Rating:

C

Measure:

Ecological footprint, water conservation and solid waste diversion.

Rating criteria:

	Ecological footprint	Water use per capita	Solid waste diversion
A	Less than two hectares/person	Less than 150 L/day	More than 60% of residential waste is recycled or composted
B	Two to 3.9 hectares/person	151–250 L/day	40–59%
C	Four to 5.9 hectares/person	251–300 L/day	30–39%
D	Six to 7.9 hectares/person	301–350 L/day	20–29%
F	Greater than eight hectares/person	More than 350 L/day	Less than 20% residential waste is recycled or composted

Current efforts:

- Three municipalities in the Humber River Watershed (Toronto, Mississauga and Richmond Hill) are now participating in the *Mayor's Megawatt Challenge* and are working with Toronto and Region Conservation (TRCA), Natural Resources Canada and Hydro One™ to increase municipal water and energy savings.
- Toronto has adopted a target of purchasing 25 per cent of its energy needs in the form of green power (solar, fuel cells, wind).
- Toronto City Council adopted a *Conservation First* energy strategy that positions conservation and demand management as the preferred first action to meet the energy needs of the city.
- The Region of Peel has undertaken energy conservation initiatives at over 70 of its facilities. Activities have included monitoring, auditing and the retrofit of infrastructure, in order to reduce energy consumption.
- Municipalities are promoting water conservation through public education campaigns, summer lawn watering bans and rebate programs for residents and businesses that install water-efficient fixtures.
- The Green Building Alliance, composed of the Canadian Urban Institute, Sustainable Buildings Canada, Canada Green Building Council and TRCA, are working together to advocate for green building technologies and practices.
- Toronto and Region Conservation has begun the planning process for creating *The Living City Campus* at the Kortright Centre for Conservation (Vaughan) as a place to learn about sustainable living and sustainable technologies, and to influence the broader community and region.
- The Earth Rangers Centre, one of the most energy-efficient buildings in Canada, was established at *The Living City Campus* in 2004. It uses 63 per cent less energy than other buildings of its size.

Good news:

- **In 2005, Kortright at the Living City Campus moved to 100 per cent green energy.**
- Because of their use of new technology to improve energy efficiency, four buildings in the watershed have been certified as Leadership in Energy and Environmental Design (LEED) buildings by the Canada Green Building Council.

Table 18: Measures of Sustainability in the Humber River Watershed

Sustainability measure	Toronto	York Region	Peel Region
Ecological footprint* (ha/person)	7.35	8.28	7.83
Residential water use (2004) L/day/person	237	236	248 Mississauga 215 Brampton 213 Caledon
Residential solid waste going to landfill (kg/person/year)	228 (2004)	257 (2004)	220 (2005)
Residential waste diversion (2004)	36%	26%	45%

*Federation of Canadian Municipalities, *Ecological Footprints of Canadian Municipalities and Regions*, 2003.

Above photo—Solar panels

Table 19: Current Water and Energy Conservation and Waste Reduction Initiatives by Humber River Watershed Municipalities

Municipality	Current initiatives: plans/programs/by-law		
	Water conservation	**Solid waste diversion**	**Energy conservation**
City of Toronto	• Toronto Water Efficiency Plan • Toilet Rebate Program • Washing Machine Rebate Program • ICI Water Saver Program/Water Buy-back Program • Spray n' Save Program • TRCA's Mayors' Megawatt Challenge • TRCA's Greening Health Care	• Green Bin Program • Yellow Bag Program • Community Environment Day (collects household waste) • TRCA's Greening Health Care	• TRCA's Mayors' Megawatt Challenge • TRCA's Greening Health Care • TRCA's Home Energy Clinic • Better Buildings Partnership • Energy Retrofit Program • Ontario Conservation Bureau's Every Kilowatt Counts Campaign
York Region	• Water for Tomorrow • Region of York Children's Water Festival • Outdoor Water Use Restriction By-laws (exist for all municipalities within York Region) • TRCA's Sustainable Schools Program • TRCA's Mayors' Megawatt Challenge (Richmond Hill) • TRCA's Greening Health Care	• Durham/York Residual Waste Study • Expansion of Blue Box Program • Public Awareness Campaign • Think Inside the Box Program • Public Awareness Campaign Tools to Tackle Yard Waste • TRCA's Greening Health Care	• TRCA's Mayors' Megawatt Challenge (Richmond Hill) • TRCA's Greening Healthcare • TRCA's Sustainable Schools Program • TRCA's Home Energy Clinic • Ontario Conservation Bureau's Every Kilowatt Counts Campaign
Peel Region	• Water Smart Peel Program (includes toilet replacement rebates, water wise gardens, rain barrel sales) • Region of Peel Water Efficiency Plan • Peel Region's Children Water Festival • TRCA's Mayors' Megawatt Challenge (Mississauga) • TRCA's Greening Healthcare	• Peel Region Organics Recycling Program • TRCA's Greening Health Care • Algonquin Power Energy from Waste Facility • Long Term Waste Resource Management Strategy	• TRCA's Mayors' Megawatt Challenge (Mississauga) • TRCA's Greening Health Care • TRCA's Sustainable Schools Program • TRCA's Home Energy Clinic • Ontario Conservation Bureau's Every Kilowatt Counts Campaign • Britannia Road Landfill Gas Plant • Corporate Energy Management Division—Awarded Ontario Leader in Sustainable Energy Practices • Packing Up, Power Down Computer Energy Saving Initiative

- Innovative programs to promote energy conservation (e.g., Ontario Conservation Bureau's *Every Kilowatt Counts* campaign) are being developed through partnerships between utility companies and retailers. One example is the Toronto Hydro and Home Depot® partnership, whereby residents could obtain free energy-saving compact florescent bulbs to replace traditional incandescent light bulbs.
- In a social marketing study by TRCA and Great Lakes Sustainability Fund (GLSF) titled *Action Plan for Sustainable Practices – Implementation Strategies for the Residential and Business Sections in the GTA* (2006), that covered parts of the Humber River Watershed, 82 per cent of respondents said they were willing to consider using rainbarrels for collecting rainwater for watering their lawn.
- Seventy-nine per cent of Humber River Watershed residents are somewhat or very interested in visiting an information centre promoting the latest environmentally friendly technologies (Pollara, 2006).
- Toronto and Peel Region have set solid waste diversion targets that are more aggressive than the 60 per cent goal set by the province: Toronto's goal is for 60 per cent diversion by 2006, 80 per cent by 2009 and 100 per cent by 2010; Peel has a goal of 69 per cent diversion by 2016.
- Toronto has a goal of a 15 per cent reduction in water use by 2011; Peel's target is 10 per cent by 2015; and York Region intends to reduce consumption by 20 per cent although it has not set a target date.
- Eighty-eight per cent of Humber River Watershed residents say they have recycled in the last 12 months (Pollara, 2006).

Above photo—Earth Rangers Centre at The Living City Campus®: City of Vaughan

Bad news:

- **The total amount of waste being generated is not decreasing. Little action is being taken to decrease the amount of unnecessary packaging. The focus is on solid waste diversion, ignoring the total amount of solid waste being generated.**
- There is a lack of available energy consumption and conservation data that can be analyzed. This information is a key component for calculating the ecological footprint.
- Our highways continue to be clogged with vehicles and according to a public opinion poll (Pollara, 2006), 59 per cent of the watershed residents do not use public transit (see Indicator 16: Air Quality). One of the largest factors in the energy use component of the ecological footprint is vehicle use.

How to improve:

- Manufacturers and businesses reduce the amount of packaging for the goods they sell.
- Utilities increase water and energy conservation activities through aggressive incentive programs.
- The private sector develops and promotes water and energy saving products.
- All sectors develop and implement new environmental and conservation technologies such as developing clean renewable energy sources (wind and solar, for example).
- Connections are established with municipal energy suppliers to obtain energy consumption data for watershed municipalities.
- All municipalities develop and implement large-scale energy conservation programs or public awareness campaigns for residential dwellings.

Targets:

2012

- All municipalities meet or exceed the provincial solid waste diversion target of 60 per cent or their individual target if more stringent (refer to Good news).
- All municipalities reduce water use by five per cent or by their individual target if more stringent.

Sustainable House at The Living City Campus®: City of Vaughan

Above photo—Porous pavement: King Township

ASSESSING THE HEALTH OF THE WATERSHED:

Getting it Done

Stewardship

A healthy watershed is everyone's responsibility. Success will require extensive participation by individuals and groups, residents and visitors, private business and government. We did not revisit the topics of aesthetics and business outreach in this edition of the report card. Although both of these indicators could provide important information in the future, not enough progress or new information was available at this time. We used three indicators to measure stewardship:

1. Level of participation in "watershed-friendly" activities.
2. Level of outdoor environmental education.
3. Extent of municipal stewardship.

Inside the home, watershed-friendly activities include such actions as recycling, proper disposal of household hazardous products and water conservation. Outside the home, stewardship includes activities such as composting, naturalizing gardens and yards with drought resistant plants, native tree and shrub planting, eliminating fertilizer and pesticide use, using public transit and getting involved in community events such as clean-ups and stream restoration activities.

The level of environmental education is a measure of awareness of environmental issues and the likelihood of taking part in environmentally friendly activities such as recycling. The indicator measures the number of students taking part in environmental programs at six outdoor education centres and the school boards taking part in the *EcoSchools Program*. The number of students includes the public and Catholic school boards in the City of Toronto and the regions of York and Peel. Statistics do not include participation in similar programs by the general public.

This section of the report card also considers how municipalities are participating in the protection and restoration of the watershed through the existence of policies and other regulatory tools. We do not assess the effectiveness of the policies or regulatory tools but this should be undertaken in the future.

Above photo—Parc Downsview Park, Earth Day 2005: City of Toronto

INDICATOR 24:
Community Stewardship

To what extent are people taking responsibility as stewards of the Humber River Watershed?

Rating:

C

Measure:

Per cent of residents engaged in watershed-friendly activities.

Rating criteria:

Per cent of watershed residents that engage in stewardship activities to improve the Humber River Watershed. Based on how many watershed residents had:

- **Planted a tree for the community;**
- **Reduced waste/recycled; and**
- **Reduced energy use.**

A	Greater than 80%
B	70–79%
C	60–69%
D	50–59%
F	Less than 50%

Current efforts:

- Toronto and Region Conservation's (TRCA's) *Healthy Yards Program*, offered in the Region of Peel and Richmond Hill, gives homeowners information on organic lawn care including advice on what native trees and shrubs to plant, and how to create habitat for local wildlife in their own backyards.
- In 2001, TRCA committed to a *Multicultural Environmental Stewardship Program* that helps "new" Canadians get involved in environmental education programs and events.
- In 2005, TRCA's new *Environmental Experience Subsidy Program* provided the opportunity for about 250 new Canadians, disadvantaged youth and other community members who face social and economic barriers to participate in watershed activities.
- The *Caring for the Moraine Project* was established with the funding assistance of the Oak Ridges Moraine Foundation in 2005. The project includes landowner contact and stewardship activities in the Centreville Creek Conservation Priority Area number 2.
- The *Claireville Community Stewardship Project* was launched in 2006 in partnership with the Friends of Claireville and The Ontario Trillium Foundation to encourage local stakeholders to become actively involved in the wise use and protection of the natural environment in Claireville. A similar community-based stewardship project was previously launched in 2004 for the Centreville Creek subwatershed (Caledon) in partnership with Trout Unlimited and The Ontario Trillium Foundation.
- The Region of Peel, in partnership with TRCA and Credit Valley Conservation (CVC) has developed a seamless *Rural Clean Water Program* for farmers in the Region of Peel to implement a variety of Best Management Practices (BMPs) on their lands.
- Toronto and Region Conservation's seasonal *Family Nature Events* (formerly *Conservation Seminars*) provide watershed residents and their families with knowledge about wildlife, environmental issues and stewardship actions to change the way we all live on the landscape.
- Community-based groups such as the Toronto Environmental Alliance, Action to Restore a Clean Humber (ARCH), Black Creek Conservation Project, Ontario Streams, Humber Watershed Alliance, Caledon Countryside Alliance, Ontario Nature, and Riversides promote stewardship activities such as the elimination of pesticide use, proper disposal of hazardous waste, habitat restoration, lawn naturalization, volunteer monitoring and trail construction.

Good news:

- **In a recent poll of Humber River Watershed residents, only eight per cent of respondents with yards reported that they use pesticides or herbicides (Pollara, 2006).**
- Since 2001, the *Multicultural Environmental Stewardship Program* has involved approximately 4,720 people. From 2001 to 2003, participants planted about 2,500 trees and shrubs, and 2,500 aquatic plants.
- In the first year of implementation (2006) of the *Caring for the Moraine Project*, 130 landowners on the Oak Ridges Moraine were contacted by mail, with 20 requesting site visits from TRCA stewardship staff. Toronto and Region Conservation is currently working with 10 landowners to implement projects that will improve natural cover, enhance wetland habitat and protect water resources on the moraine.

Above photo—Cold Creek Stewardship Committee: King Township

- During its first year (2006), the *Claireville Community Stewardship Project* has engaged over 200 local volunteers in activities such as tree plantings and clean-ups.
- Since 2004, more than 1,600 community volunteers have planted 12,000 native trees and shrubs as part of the *Centreville Creek Stewardship Program*.
- To date, eight farmers have participated in the *Peel Rural Clean Water Program* throughout the region, assisting with livestock access restriction, buffer strip plantings and nutrient management planning.
- More than 5,000 participants in TRCA's *Family Nature Events Program*.
- A total of 180 wood duck boxes, 1,500 songbird boxes and 180 mallard nesting tubes have been installed.

Bad news:

- **Only 10 per cent of the watershed's residents have volunteered their time to a cause which aims to improve the environment (Pollara, 2006).**
- New regulations such as the *Nutrient Management Act*, the *Greenbelt Act*, the *Oak Ridges Moraine Conservation Act* and *Generic Fill Regulations* have all created numerous challenges and have been sources of frustration for the agricultural community. However, new opportunities to assist farmers exist through the *Rural Clean Water Program*, the third edition of the *Canada-Ontario Environmental Farm Plan* and the *Oak Ridges Moraine Environmental Enhancement Program*.

One-third (31 per cent) of residents would be willing to support TRCA by volunteering their time to help, with 15 per cent willing to make a small financial donation and one out of 10 willing to pay slightly more on their water bill.

Target:

2012

- One hundred per cent of watershed residents can name more than one activity they are doing at home or in their community to improve the water quality or quantity of the watershed.

How to improve:

- Governments, agencies and the private sector fund education programs and social marketing campaigns to achieve widespread behavioural change.
- Community groups supported by public and private funding continue to recruit volunteers, conduct outreach, and plan and implement stewardship projects.
- More municipalities offer the *Healthy Yards Program* to residents.
- Municipalities continue to fund projects to protect and restore habitats and educate landowners on BMPs.

Above photos—Trail building

INDICATOR 25:

Experiential and Outdoor Environmental Education

To what extent are young people being educated about the environment through hands-on and outdoor experiences?

Rating:

C

Measure:

Number of students in the watershed taking part in formal outdoor environmental education programs annually.
There are approximately 121,500 students in 226 schools in the watershed (excluding private and French boards).

Rating criteria:

Per cent of students in the watershed that are participating in formal experiential and outdoor environmental education programs through hands-on and outdoor experiences.

A	Greater than 80%
B	70–79%
C	60–69%
D	50–59%
F	Less than 50%

Current efforts:

- Toronto and Region Conservation (TRCA) continues to operate environmental education programs at three outdoor education centres: one at the Albion Hills Conservation Area in Caledon, Lake St. George Field Centre in Richmond Hill, as well as at Kortright at The Living City Campus in Vaughan.
- Toronto and Region Conservation's outreach education has also continued through programs like *Watershed on Wheels*, an in-class environmental education program, and the *Aquatic Plants Program*, which allows students the hands-on experience of growing and caring for aquatic plants.
- The Toronto District School Board operates an outdoor education centre at the Claireville Conservation Area in Brampton and another at Albion Hills Conservation Area.
- The Humber Arboretum, which provides environmental/outdoor education programs, is building a new state-of-the-art Centre for Urban Ecology, a model of energy efficiency and environmental sustainability.
- The *Ontario EcoSchools Program*, launched in 2004, helps school boards operate their schools more sustainably and places high priority on energy conservation, waste reduction, ecological literacy and school-yard greening. This program was adopted by the Toronto District School Board in 2002 and by the Peel District School Board in 2006. The Toronto Catholic District School Board and York Region District School Board will have certified *EcoSchools* in the 2006/2007 school year.
- Toronto and Region Conservation has initiated a *Sustainable Schools Program*, whereby they help school boards take action to improve the energy and environmental performance of new schools.
- In March 2006, the Region of Peel launched the *Peel Water Story Program*, a school curriculum resource about water and water conservation.

Good news:

- **Sixty per cent of the student population attending public or Catholic schools in the Humber River Watershed receives formal outdoor environmental education at local TRCA field centres. Existing facilities are operating at full capacity.**
- From 2001 to 2005, 6,850 children from schools in the Humber River Watershed attended outdoor education programs at the Albion Hills, Lake St. George and Claremont field centres.
- From 2000 to 2006, 437,950 students from all watersheds attended Kortright at The Living City Campus.
- In 2005, seven schools were Gold Certified *EcoSchools* and one school was a Silver Certified *EcoSchool*.
- In 2006, three TRCA outdoor education facilities—Kortright, Albion Hills and Lake St. George—were Gold Certified *EcoSchools*. The Black Creek Pioneer Village is Silver Certified.
- Since 2000, more than 19,370 students have taken part in the *Watershed on Wheels Program*.
- The Humber Arboretum Centre for Urban Ecology reaches an average of 11,660 students per year and the Toronto District School Board's Etobicoke Outdoor Education Centre reaches an average of 7,250 students per year.
- York and Peel's *Children's Water Festivals* are each attended by over 5,000 students and community members from those regions each year.
- Since 2000, TRCA's *Aquatic Plants Program* has engaged more than 3,750 students. They have planted approximately 15,000 aquatic plants at nine wetland restoration sites.
- Humber Watershed Alliance members and other community members have been spearheading schoolyard naturalization projects across the watershed including Nobleton High School, Lorna Jackson Public School, Shoreham Public School and Don Bosco Catholic Secondary School.

Above photo—Husky/Earth Rangers celebration event at Albion Hills Field Centre: Town of Caledon

Bad news:

- **The Boyd Residential Field Centre closed in 2001.**
- There is ineffective integration of environmental learning into the core subjects of the Ontario school curriculum.
- Teachers are finding it more difficult to provide their students with outdoor environmental education activities such as field trips, canoeing and swimming because of funding restrictions and school board concerns about liability.

How to improve:

- The province includes outdoor environmental education as part of the curriculum.
- School boards support outdoor environmental education programming at TRCA and other field centres, beyond present efforts.
- School boards work with municipal parks and recreation departments to deliver outdoor environmental programming throughout the year.
- Public and private sectors cooperate to fund outdoor education centres and programs.
- Private and French-language school boards adopt the *EcoSchools Program*, and more schools become certified *EcoSchools* within the boards that have already adopted it as policy.

More than one-half (54 per cent) of residents think it is very important for people to learn about the environment in an outdoor setting and one-third, or 31 per cent, say this is somewhat important (Pollara, 2006).

Targets:

2012

- Seventy per cent of students in the watershed are taking part in outdoor environmental education.
- All the public and Catholic school boards in the watershed adopt the *EcoSchools Program* as a board-level policy and actively support its promotion in schools.
- Fifty per cent of the schools in the watershed are Gold Certified *EcoSchools*.

Aquatic studies at Kortright at The Living City Campus®: City of Vaughan

INDICATOR 28:
Municipal Stewardship

To what extent do municipalities take responsibility as stewards of the watershed?

Rating:

B

Measure:

Presence or absence of selected policies and by-laws that contribute to the health of the watershed.

Rating criteria:

Per cent of the selected policies and by-laws identified in Table 20 that are in place in municipalities:

A	Greater than 80%
B	70–79%
C	60–69%
D	50–59%
F	Less than 50%

Current efforts:

- Current municipal policies, by-laws and programs are listed in Table 20.
- Municipalities have been forthcoming in funding watershed and subwatershed planning studies and initiatives.
- All of the planning studies to meet the requirements of the *Oak Ridges Moraine Conservation Plan* are near completion.
- Toronto's Roundtable on the Environment and Environmental Advisory Committees in King Township and the Town of Caledon are municipally appointed committees comprised of citizens and professionals whose role it is to advise municipal councils on environmental issues.
- Municipal Official Plans are being brought into conformity with the *Greenbelt Plan*.

Good news:

- All municipalities have Official Plan policies that protect the form and function of the Humber River and its tributaries, and protect aquatic and terrestrial habitats.
- Six watershed municipalities on the Oak Ridges Moraine, Niagara Escarpment and Greenbelt areas are mandated by the province to have Official Plan policies in place to protect significant landforms.
- Ten municipalities have Official Plan policies to protect groundwater resources, as well as have water conservation programs in place (e.g., water efficiency kits, lawn watering bans).
- Four municipalities have introduced policies or approved practices for the reduction of road salt.
- Two municipalities have introduced requirements for subwatershed plans or studies to be undertaken prior to the approval of new developments.
- Four municipalities have introduced by-laws or policies that protect trees on private property.
- The new *City of Toronto Act* provides new taxation options and other powers that should make it easier for Toronto to implement new and innovative environmental policies.

Bad news:

- No comprehensive assessment has been done on the effectiveness of municipal policies and practices on environmental conditions.
- Eight municipalities in the watershed still do not enforce topsoil preservation, and sediment and erosion control.
- Seven municipalities still do not have polices or practices in place to reduce fertilizer use.
- Nine municipalities still do not have a ravine protection by-law in place to protect forest cover.

Targets:

2012

- All municipalities have assessed their environmental policies and practices, and made modifications to ensure maximum effectiveness.

How to improve:

- Municipalities maintain effective environmental policies.
- Municipalities incorporate recommendations of the updated *Humber River Watershed Management Plan* into Official Plans and other policy documents.
- Municipalities ensure that supporting public education and awareness programs are in place to promote policies.
- Municipalities carry out self-evaluation of policy effectiveness.

Above photo—Aerial, Oak Ridges: Town of Richmond Hill

Table 20: Municipal Stewardship Inventory of Environmental Policies and By-laws in the Humber River Watershed

Y = yes
P = proposed/under consideration
N = no
N/A = not applicable to this municipality or level of government, or information not available

	Mono	Adjala-Tosorontio	Peel	York	Caledon	King	Brampton	Mississauga	Vaughan	Richmond Hill	Toronto*
PROTECT SIGNIFICANT LANDFORMS											
Official Plan policies dealing with landforms (e.g., Niagara Escarpment, Oak Ridges Moraine).	Y	Y	Y	Y	Y	Y & P	N/A	Y	Y	Y	Y
PROTECT WATER RESOURCES – Water Quantity											
Official Plan policies to protect the form and function of the Humber River and its tributaries.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Subwatershed plans or studies required prior to approval of new developments.	Y	N	Y	N/A	Y	Y	Y	Y	Y	N	Y
Fill by-law to control the alteration or interference of existing watercourse channels.	N	N	N	N	Y	Y	Y	N	Y	Y	Y
Water conservation programs in place (e.g., water efficiency retrofit kits, lawn watering, etc.).	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y
Official Plan policies to protect groundwater resources.	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
Programs to promote stormwater management including best management practices for lot management such as downspout disconnection, rain barrels, permeable surfaces, etc.	Y	N	N	Y	N/A	Y	Y	Y	Y	Y	Y
PROTECT WATER RESOURCES – Water Quality											
Topsoil preservation by-law or a sediment and erosion control by-law to prevent sediment from entering nearby watercourses.	Y	N	N	N	N	N	Y	Y	N	N	N
Policies or approved practices for reduction of:											
a) salt	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
b) pesticides	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
c) fertilizer	N	N	N	Y	N	Y	N/A	Y	N	N	Y
d) oil/grease entering watercourses	N	N	N	Y	N	Y	Y	Y	N	N	Y
Staff training for proper environmental use of salts, pesticides and fertilizers.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N/A
Sewer use by-law to prevent the dumping of toxic waste into the sewer system.	N/A	N	Y	Y	N/A	Y	Y	Y	N/A	Y	Y
Hazardous waste depots to drop off hazardous waste materials (e.g., paint, oil, tires, etc.).	Y	N	Y	Y	N/A	Y	Y	Y	Y	Y	Y

	Mono	Adjala-Tosorontio	Peel	York	Caledon	King	Brampton	Mississauga	Vaughan	Richmond Hill	Toronto*
IMPROVE AIR QUALITY											
Official Plan policies to improve air quality.	N	N	Y	Y	Y	N	Y	Y	N	Y	Y
Dust control plans required prior to building approval.	Y	N	N	N/A	N/A	N	Y	Y	N	Y	Y
PROTECT WILDLIFE HABITATS											
Official Plan policies to protect aquatic habitats (e.g., fish habitat, wetlands, etc.).	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Watercourse naturalization projects in the Humber River Watershed.	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
Ravine by-law to protect vegetation, slope stability and the discharge of water, or the dumping of waste.	N	N	Y	N	N	N	N	N	N	N	Y
Official Plan policies to protect natural areas and terrestrial habitats (e.g., greenlands systems, natural features designations, environmental protection areas, etc.).	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Tree by-law to control the injury or destruction of trees in specified areas (private property).	Y	N	N	Y	Y	Y	Y	Y	Y	P	Y
Official Plan policies or approved practices to encourage naturalization in municipal parks and open spaces.	N	N	Y	N	N/A	Y	Y	Y	Y	Y	Y

Notes:
*The Toronto column represents an inventory of policies, by-laws and practices within the five pre-amalgamation municipalities located within the Humber River Watershed: Metro Toronto, York, Etobicoke, North York and Toronto. The number of former municipalities with a particular initiative is indicated.
Aurora is excluded from this municipal stewardship inventory as it comprises less than one per cent of the Humber River Watershed.

SUMMING UP:

What Does it All Mean?

How healthy is the Humber River Watershed? If we imagine that a doctor has just given the watershed a thorough check-up, what is the diagnosis? Based on the grades that were assigned to 26 carefully chosen indicators of health, here's what the doctor can tell us:

The results are mixed, showing a wide range of conditions. The grades reported range from an "A" for protection of significant landforms, which is *very good*, to an "F" for protection of wetlands, which is an acknowledged failure due to the significant historic loss of this habitat type. The ratings for many of the indicators, such as forest cover and conventional pollutants, vary widely from the upper reaches of the river to the lower reaches. These variations reflect the large size and diverse nature of the watershed, the range of land uses and the different stresses imposed in different areas. Environmental health is generally better in the upper reaches of the watershed, which are dominated by agricultural and rural land uses, than in the heavily urbanized southern reaches.

A few aspects of the Humber River Watershed are relatively healthy. Six of the 26 indicators were graded as very good or *good*. The two indicators with an "A" rating are the protection of significant landforms and progress in developing an inter-regional trail system. "B" ratings, indicating good conditions, were assigned to the sustainable use of groundwater, the protection of groundwater quality, the amount of public greenspace and municipal stewardship initiatives.

Most aspects of the Humber River Watershed are still in fair health. Approximately 50 per cent of the 26 indicators received a *"C"*, or *fair* grade, indicating that the watershed has many problems, and there is much that should be done to improve on current conditions.

Some aspects of the Humber River Watershed are in poor health. Seven of the indicators were rated "D" or "F" (*poor* and fail, respectively). Several of these relate to water quality and aquatic habitats: fish communities, stormwater management and the levels of bacteria affecting swimming opportunities. A related concern is the failure of wetland protection. Poor grades were assigned to air quality, the protection of agricultural land, and the recognition and celebration of human heritage.

Some aspects of watershed health appear to be declining. It is disappointing to report that six indicators received worse ratings in 2006 than in 2000. This is due, in part, to the availability of much more new information, data collection methods and assessment criteria. Four of these—wetland protection, levels of bacteria in surface waters, benthic

Above photo—Long-tailed duck

invertebrates and fish communities—are direct reflections of environmental conditions. The other one—outdoor recreation opportunities—reflects a deficiency of public investment in activities that could help to raise awareness and increase stewardship among watershed communities.

Many aspects of watershed health appear to be improving. It is encouraging to find that five indicators have improved and are showing upward trends, reflecting actions that have been taken by agencies, businesses, community groups and citizens. The improvements are shown in the protection of significant landforms, groundwater quantity and quality, conventional pollutants and trails. Six other indicators also appear to show the hopeful signs of upward trends, but not yet enough to result in improved grades. They are the amount of natural vegetation cover (quantity), percentage of urban areas that discharge untreated stormwater to rivers (stormwater management), heavy metals and organic contaminants, riparian vegetation, heritage events and public greenspace.

Overall, the watershed is in fair shape, but under significant stress. On average, the Humber River Watershed receives only a "C" grade. Development pressures continue in the watershed, particularly in the upper reaches, and the population is expected to grow from 670,000 to over a million people by 2021. Depending on where and how this growth is undertaken, we could expect increased impacts on the water cycle, water quality, aquatic systems, air quality, terrestrial systems and human heritage.

What is the prescription for better health? As any doctor would tell us, prevention is better than cure, so we want to ensure that those indicators with very good and good ratings remain in a healthy state and continue to improve. We need to step up our efforts across the board to address the prevalent fair conditions. The greatest priority for immediate remedial action should go to those indicators that show poor, failing and declining conditions. This report card suggests key actions that should be taken to improve conditions and work towards our targets. In addition, an update to the *Humber River Watershed Plan* is in progress that will provide more details and an integrated approach to achieving our vision of the watershed as a vital and healthy ecosystem where we live, work and play in harmony with the natural environment.

Working together we can achieve a healthy Humber River Watershed, one that is liveable, sustainable and prosperous. Through our collective actions, we intend to ensure that the rich legacy of the Humber River Watershed is passed on to future generations.

SUMMARY OF INDICATORS AND GRADES

CATEGORY	INDICATOR	2000 GRADE	2007 GRADE
Environment			
Landforms	*Indicator 1: Significant Landforms* How well are significant landforms being protected?	C↓	A
Terrestrial Habitat	*Indicator 2A: Quantity of Natural Vegetation Cover* How well is the quantity of natural vegetation cover being protected and restored?	Not rated	C↑
	Indicator 2B: Quality of Natural Vegetation Cover How well is the quality of natural cover distribution being protected and restored?	Not rated	C
	Indicator 3: Forest Cover How well are forests being protected and regenerated?	C↓	C
	Indicator 4: Wetlands How well are wetlands being protected and restored?	E↓	F
	Indicator 5: Wildlife How well is wildlife protected?	C↓	C
Groundwater	*Indicator 6: Groundwater Quantity* Is groundwater being used sustainably?	C↑	B
	Indicator 7: Groundwater Quality How well is the quality of our groundwater being protected?	D↓	B
Surface Water	*Indicator 8: Stormwater Management* How well is stormwater runoff from urban areas being managed?	F↑	F↑
	Indicator 9: Bacteria How swimmable are surface waters?	E↓	F
	Indicator 10: Conventional Pollutants How degraded are surface waters with respect to conventional pollutants?	D↑	C↑
	Indicator 11: Heavy Metals and Organic Contaminants What is the condition of surface water with respect to heavy metals and organic compounds?	C↑	C↑
	Indicator 12: River Flow How stable are the flows in the river?	C	C
Aquatic Habitat	*Indicator 13: Benthic Invertebrates* How healthy are benthic (bottom-dwelling) invertebrate communities?	B	C
	Indicator 14: Fish Communities How healthy are fish communities?	C	D
	Indicator 15: Riparian Vegetation How healthy is streambank vegetation?	C↑	C↑
Air	*Indicator 16: Air Quality* How healthy is the air we breathe?	D	D
Society and Economy			
Heritage	*Indicator 17: Heritage Resources* How well are heritage resources being protected?	C	C
	Indicator 18: Heritage Events How well is heritage recognized and celebrated?	D↑	D↑
Outdoor Activities	*Indicator 19: Public Greenspace* How much publicly owned greenspace is there?	B↑	B↑
	Indicator 20: Outdoor Recreation How extensive are outdoor recreation opportunities?	A	C
	Indicator 21: Trails What progress has been made in developing a system of inter-regional trails?	C↑	A
Agriculture	*Indicator 22: Agricultural Land* How well is agricultural land being conserved?	C↑	D
Development	*Indicator 23: Sustainable Use of Resources* How well are people doing at using resources wisely and living a sustainable lifestyle?	Not rated	C
Getting it Done			
Community Stewardship	*Indicator 24: Community Stewardship* To what extent are people taking responsibility as stewards of the Humber River Watershed?	C	C
	Indicator 25: Experiential and Outdoor Environmental Education To what extent are young people being educated about the environment through hands-on and outdoor experiences?	C↑	C
	Indicator 26: Aesthetics What is the aesthetic condition of the watershed?	C	Not rated
Business Stewardship	*Indicator 27: Business Stewardship* To what extent are businesses taking responsibility as stewards of the Humber River Watershed?	C↑	Not rated
Municipal Stewardship	*Indicator 28: Municipal Stewardship* To what extent do municipalities take responsibility as stewards of the watershed?	B	B

GLOSSARY

Air Quality Index (AQI): Real-time information system that provides the public with an indication of air quality in rural and urban areas across Ontario.

Area of Natural and Scientific Interest (ANSI): Designated by the Ministry of Natural Resources (MNR) for natural heritage, scientific or educational value.

Aquifer: A zone of soil or rock saturated with water.

Baseflow: The amount of stream flow that is sustained in a watercourse during extended periods of dry weather generally supplied by groundwater discharge.

Benthic invertebrates: Benthic invertebrates are organisms that inhabit the bottom substrates (sediments, debris, logs, microphytes, filamentous algae, etc.) of aquatic environments for at least part of their life cycle. These organisms include such things as crayfish, leeches, clams, snails, and the larval stages of insects such as midges, blackflies, stoneflies, caddis flies and mayflies. Benthic invertebrates are an important part of the food chain, supporting many higher organisms.

Biodiversity: The number and variety of species and habitats within a given region.

Best Management Practices (BMP): An environmentally responsible action such as using an organic fertilizer.

Chloride: The chemical signature of road salt, sodium chloride, as measured in water.

Community Action Site: A location where resources are focused and actions are taken to achieve the environmental, social and economic objectives of *Legacy: A Strategy for a Healthy Humber.*

Conservation Authority: Local, watershed management agencies that deliver services and programs that protect and manage water, and other natural resources in partnership with government, landowners and other organizations.

Conventional pollutants: Pollutants such as suspended solids, phosphorus, ammonia, nitrogen, chlorides, oil and grease.

Cumulative impacts: The sum of all individual impacts occurring over space and time.

DDT: Dichloro-diphenyl-trichloroethane, a type of chlorinated hydrocarbon or synthetic pesticide that is extremely toxic and slow to degrade naturally in the environment.

Discharge: The movement of water from a saturated underground zone to the surface where it flows into a watercourse or lake.

Escherichia coli (*E. coli*): A type of coliform bacteria when present indicates potential contamination with human or animal feces.

Ecosystem: A term used to describe the interdependence of species in the living world, both with one another and with their physical environment.

End-of-pipe: Methods used to remove already formed contaminants from a stream of air, water, waste product or similar. These techniques are called "end-of-pipe" as they are normally implemented as a last stage of a process before the stream is disposed of or delivered (www.greenfacts.org).

Environmental Assessment (EA): A decision-making process used to promote good environmental planning by assessing the potential effects of development projects on the environment. In Ontario, this process is determined by the *Environmental Assessment Act* (EAA). If the project involves the federal government, the *Canadian Environmental Assessment Act (CEAA)* takes precedence.

Environmentally Significant Area (ESA): An area identified by Toronto and Region Conservation (TRCA), because it contains critical wildlife habitat, rare flora or fauna, or performs a vital ecological function (e.g., groundwater recharge, wildlife corridor or nursery area).

Erosion: The displacement of material, such as soil, by wind, water and ice.

Flow: The volume of water that passes a given point per unit of time.

Forest interior habitat: Habitat that is at least 100 metres from the forest edge.

Formalized hiking trails: Publicly accessible trails that are designed for pedestrian-only use. Generally, these are narrow 0.5-metre-wide, unpaved footpaths.

Fossil fuels: Carbon-based materials used for the creation of heat. For example, natural gas, petroleum and coal.

Fragmentation: Non-continuous patches of habitat that can limit the movement of species.

Geographic Information Systems (GIS): A computer-based tool designed to gather, manipulate, analyze and display data.

Greenroof: Engineered rooftops designed to promote the growth of vegetation, while protecting the structural integrity of a roof. Environmental and human health benefits of greenroofs include air purification, urban heat island amelioration, lower building energy costs, increased urban biodiversity, reduced stormwater runoff and improved stream water quality.

Groundwater: Water that enters the soil, moves downward to the water table and collects in aquifers.

Habitat: The place in which an animal or plant lives. The sum of environmental circumstances in the place inhabited by an organism, population or community (MNR, 1998).

Headwaters: The uppers parts of a river drainage system or source of a river.

Hectare: 10,000 m^2 or 2.47 acres.

Hydrologic cycle: The circulation of water from the atmosphere to the earth and back though precipitation, runoff, infiltration, groundwater flow and evapotranspiration.

Imperviousness: Function by which water and other liquids can not pass through soil or other surface material.

Index of Biotic Integrity (IBI): A biological rating that considers the number of species and composition, local indicator species, trophic composition and fish abundance when determining the condition of aquatic health.

Indicator species: Animals or plants that infer the condition of the environment such as the level of pollution, habitat type and quality, and the size and degree of disturbance.

Infiltration: The process by which water enters into the soil or other porous material in a downward direction through pores or other small openings from the surface.

Inter-regional trails: Trails that travel through more than one municipality. Examples include the Waterfront Trail, Oak Ridges Moraine Trail and Bruce Trail.

International Joint Commission (IJC): Established in 1909 to assist Canada and the United States in decisions regarding the lakes and waterways that form the boundaries between the two countries.

In-stream barrier: A structure in a river or stream that hinders or prevents the movement of fish and other aquatic organisms.

Invertebrate: Animals which have no backbone—a category that makes up more than 97 per cent of all animals. Some, such as worms, have no skeleton. Others, such as insects, have skeletons on the outside of their bodies.

Kettle lake: A body of water formed when a block of ice buried in a ground moraine, an outwash plain or valley floor melts, leaving behind a steep-sided hole that is filled with water.

Landscape analysis model: A quantitative tool for measuring patch quality. It uses three indicators—size, shape and matrix influence—to evaluate the current or future quality of a habitat patch whether existing or hypothetical.

Local Architectural Conservation Advisory Committee (LACAC): A committee of each municipal council, appointed under the *Ontario Heritage Act,* to advise council on designating properties of architectural or historic interest and importance, as a measure towards preserving them. These committees also standardize heritage record keeping and categorization of built heritage resources in municipalities.

Local trails: Trails that do not travel through more than one municipality; these trails may include local sections of inter-regional trails (for example, part of the Caledon Trailway is a section of the Trans Canada Trail).

Matrix influence: The land use adjacent to natural cover that will impact the quality of the habitat and includes uses such as urban development and agricultural use.

***E. coli* Microbial source tracking:** A forensics approach of using techniques like DNA fingerprinting and antibiotic resistance profiling to measure the similarity between *E. coli* bacteria. These techniques provide an ability to infer where the beach water *E. coli* are likely to be coming from.

Multiuse trails: Generally three to four metres wide, asphalt-paved trails that are able to accommodate a wide range of users (e.g., walking, cycling, inline skating, strollers).

Terrestrial Natural Heritage System Strategy (TNHSS): A document being developed by TRCA to identify core habitats and corridors, and provide guidelines for the protection and restoration of terrestrial habitat.

Official Plan: A document prepared by municipalities to guide long-term land use and development.

Organic contaminants: Carbon-based chemicals, such as solvents and pesticides.

Patch (habitat patch): Is a distinct, separately mapped block of one type of natural cover. That is, a block of forest and an abutting block of wetland are two separate patches.

Polychlorinated Biphenyls (PCBs): A group of toxic organic compounds that were once widely used as liquid coolants and insulators in industrial equipment, such as power transformers.

Permeable pavement: Pavement that has spaces within it that allows for rainwater to slowly infiltrate into the ground. It helps to restore natural infiltration functions to the landscape and reduce impacts to watercourses.

Priority toxics: Persistent substances that are extremely toxic which are targeted for virtual elimination through significant reduction in their use, generation or release (e.g., banned substances such as mirex, aldrin, chlordane and DDT that are no longer manufactured but are still present in the environment).

Provincial Water Quality Objectives (PWQO): Objectives that have been established for each key water quality parameter (e.g., suspended solids, phosphorus, chloride, dissolved oxygen) in order to protect a particular use.

Remedial Action Plan (RAP): A plan developed and implemented for designated Areas of Concern (AOC) in the Great Lakes Basin to improve various conditions such as drinking water, and fish and wildlife habitat. An Area of Concern, as defined by the *Great Lakes Water Quality Agreement*, is a geographic area where water pollution is severe enough to endanger wildlife populations or impair beneficial water uses.

Recharge: The movement of surface water through the soil into the saturated zone (aquifer).

Remotely sensed data: Refers to data that has been collected by a sensor that is not in direct contact with the area being mapped.

Restoration: The return of an ecosystem or habitat area to a more natural state.

Riparian: Relating to, living on or located on the bank of a watercourse or a body of water.

Urban heat island: A metropolitan area which is significantly warmer than its surroundings. It is the result of an abundance of dark, hard surfaces in urban areas. Large amounts of dark materials on roads, sidewalks, parking lots and roofs absorb heat from the sun, creating warmer areas.

Sediment: Sand, silt and clay particles derived from weathered rock.

Source water: Untreated water from streams, lakes or underground aquifers that people use to supply private wells and public drinking water systems. It comes from one of two sources: surface water or groundwater. Source water protection is about protecting both the quality and the quantity of these water sources, now and into the future (Pollution Probe™, 2004).

Stewardship: The promotion and application of environmentally responsible practices (e.g., recycling, composting and native plant gardens).

Stormwater: Rain and snowmelt that runs off urban and rural areas into ditches and municipal storm drain systems, and empties into lakes and streams.

Subwatershed: Smaller units that more easily allow for the identification of problems and opportunities. The five subwatersheds of the Humber River Watershed are the Main, East, West, Lower Humber, and Black Creek.

Stormwater Assessment Monitoring and Performance (SWAMP): This program was initiated in 1995 by the Government of Canada's Great Lakes Sustainability Fund, the Ministry of Environment, TRCA and the Municipal Engineer's Association, along with host municipalities and other owner/operators. The major goals of the program are to evaluate the effectiveness of stormwater technologies and disseminate study results and recommendations within the stormwater management community.

Successional habitat: A vegetation community that is in transition, part way in the evolution of becoming a climax community such as a mature or old-growth forest. "Successional community" often means old field or thicket (shrub) vegetation. Soils generally have a less developed duff layer than the soils of climax forests.

Sustainability: A philosophy that dictates that we must meet the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland Report).

Wastewater: Water that has been affected by human activity, such as water discharged from residential, industrial and commercial locations/ sources.

Water budget: Natural watershed systems have developed a balance between precipitation, runoff to lakes, rivers and wetlands, etc., infiltration to the groundwater system and water which either evaporates (from open water surfaces) or transpires from vegetation (evapotranspiration), completing the natural cycle back into atmospheric moisture and precipitation. It is necessary to understand this "balance" or "water budget" in order to sustain the resource and its environmental and human connections in the watershed. Water budget analysis is seen as a fundamental tool which can assist in assessing the resource and understanding of how land use change will affect the availability of the water resource for existing and potential users (e.g., input to long-term planning of municipal water supplies); possible degradations in water quality and supply, and maintenance or improvement of environmental conditions (e.g., chemical/biological, fish habitat, etc.).

Watershed: The entire area of land whose runoff water, sediments and dissolved materials (nutrients and contaminants) drains into a lake, river, creek or estuary. Its boundary can be located on the ground by connecting all the highest points of the area around the river, stream or creek, where water starts to flow when there is rain. It is not man-made and it does not respect political boundaries.

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