



# Our Physical Environment

*The physical environment has a direct impact on human health. At certain levels of exposure, contaminants in our air, water, food, and soil can cause a variety of adverse health effects, including cancer, birth defects, respiratory illness and gastrointestinal ailments.<sup>27</sup>*

## Air Quality

### Outdoor Air Quality

The Air Quality Index (AQI) is a rating scale for outdoor air quality in Ontario. The lower the AQI, the better the air quality. Six key pollutants are monitored by the Ministry of the Environment (MOE) as part of the AQI: sulphur dioxide, ozone, nitrogen dioxide, total reduced sulphur compounds, carbon monoxide, and suspended particulates. In August 2002, a 7<sup>th</sup> pollutant - fine particulate matter - was added to the air quality index. These pollutants are selected because they are harmful to human health and the environment at particularly high levels. There are 33 AQI stations across the province and information from these stations is transmitted continuously to a computer centre at the MOE. The AQI for each station is recorded every hour every day of the year and reports on the AQI are released to the public at regular intervals. The AQI of an area is available on the MOE website at <http://www.airqualityontario.com>.<sup>28</sup>

The AQI scale ranges from 0 to 15 (very good) to 100 and more (very poor). The pollutant with the highest AQI number has the greatest impact. It becomes the "overall" AQI for a particular location. For example, suppose that the AQI for ozone is 20, and this happens to be the highest out of the seven pollutants. It is then reported as the overall AQI or quality of air for a particular location. Specifically, it would be reported as an "AQI of 20, reason: ozone."

When the AQI is expected to be poor, the local Medical Officer of Health is contacted, and Air Quality Advisories (smog alerts) are issued. The Air Quality Advisory provides advice to the public on limiting outdoor activities that could lead to breathing problems (for example, prolonged exercise), and refraining from activities that could worsen the air quality (for example, use of gas-powered equipment, or of paints or solvents).

## At a Glance

There were 9 air quality advisories issued in York Region in 2002.

It is projected that air pollution will have caused the premature death of 88 York Region residents in 2002.

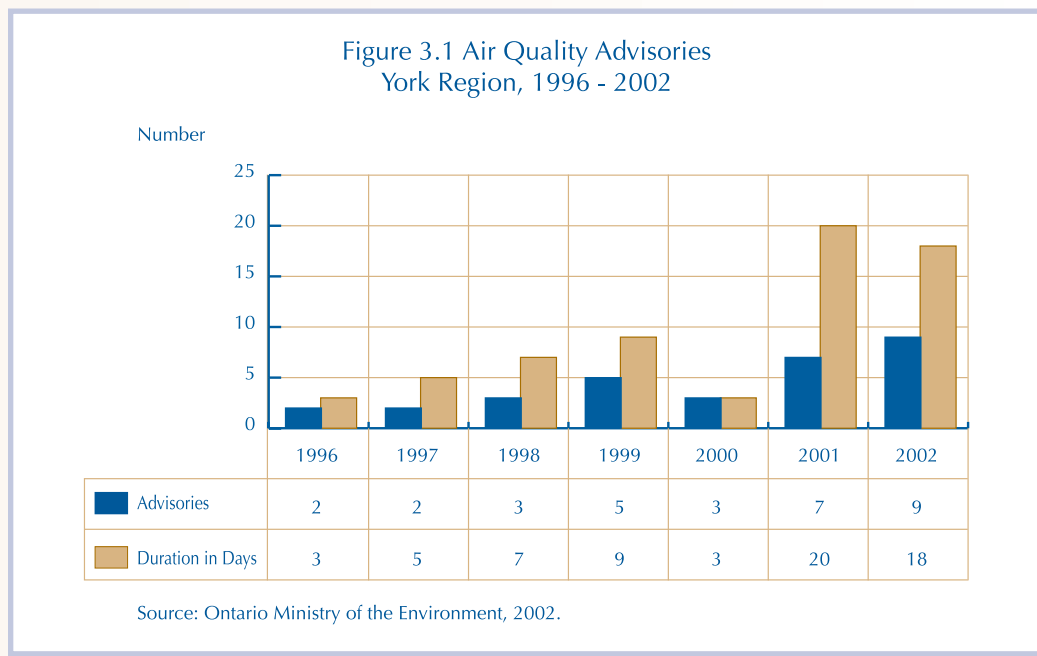
In 2001, there were no confirmed reports of illness related to ingestion of water from York Region drinking water systems.

In 2002, York Region public bathing beaches were posted for 10% of the swimming season, due to high levels of bacterial contamination in the water.





Figure 3.1 shows a summary of Air Quality Advisories and their duration in days, issued by the MOE for York Region from 1996 to 2002. These were based on advisory statistics for the Greater Toronto Area (GTA). In 2002, York Region's new air monitoring station located in Newmarket began gathering data. These local data, once reported, will provide additional information to assess air quality in our Region.



## Air Pollution, Asthma and Ill Health

A link between air pollution and adverse human health consequences is supported by several recent studies.<sup>29,30,31,32</sup> During the 1996 Olympic Games in Atlanta, Georgia community efforts to reduce traffic congestion during the games resulted in a substantial decrease in the number of childhood hospital emergency room visits due to asthma. During the 17 days of the games, the noted decreases in ozone (-28%), carbon monoxide (-18.5%) and particulate matter (-16.1%) coincided with a 41.6% decrease in the number of asthma emergency acute care visits recorded for children ages 1 to 6 years.<sup>33</sup> A study conducted in Saint John, New Brunswick also showed a relationship between daily ground-level ozone concentrations and emergency department visits for asthma. Asthma visits increased by 33% two days after the daily ozone maximum exceeded 75 parts per billion (ppb), compared with days when this level was not exceeded.<sup>34</sup>



Children and the elderly, especially those with pre-existing cardiorespiratory diseases, are particularly sensitive to air pollutants. Elevated levels of air pollutants are linked to increased visits to doctors or emergency rooms, increased use of medication, and a rise in the number of hospitalizations and premature deaths.

The City of Toronto Public Health Department estimates that every year there are 1,000 premature deaths and 5,500 hospitalizations in Toronto associated with air pollution.<sup>35</sup> Estimates of the illnesses, premature deaths and economic costs of air pollution in York Region are shown in Tables 3.1 and 3.2.

**Table 3.1 Illness Costs of Air Pollution  
York Region 2002 Projections, All Ages**

Indicator	Number
Premature Mortality	88
Hospitalizations	600
Minor illnesses (Restricted Activity Days, Asthma Symptom Days)	2,460,940

Source: Illness Costs of Air Pollution Software, Ontario Medical Association, 2000.

**Table 3.2 Economic Costs of Air Pollution  
York Region 2002 Projections, All Ages**

Indicator	Cost (\$)
Premature Mortality	187,656,936
Health Care Costs	19,126,634
Lost Productivity	20,804,721

Source: Illness Costs of Air Pollution Software, Ontario Medical Association, 2000.

Targets outlined in the Ontario Anti-Smog Action Plan would save Ontario about 290 premature deaths, 2,000 hospital admissions and 7,700 emergency room visits each year. As well, the number of minor illness cases would drop by about 6 million. The economic benefits of the smog plan in 2015 would total approximately \$1.2 billion annually.<sup>36</sup>





## Working for You

Corporate and community-wide action strategies to improve air quality in York Region are explored in the Corporate Model for Clean Air Initiative, adopted by Regional Council on March 30, 2000.

At the 2002 Smog Summit, the Regional Municipality of York signed the Toronto 2002 Inter-Governmental Declaration on Clean Air. York Region committed itself to:

- move forward on the York Rapid Transit Plan – the heart of the Transportation Management Plan;
- promote reduced car use through the transportation management associations;
- develop the Local Action Plan for Greenhouse Gas Reduction (Partners for Climate Protection Program);
- develop consistent, planned responses to Smog Alerts;
- implement the Pesticide Reduction Guidelines approved by Regional Council in May 2002;
- promote the Forest Awareness and Education Campaign;
- undertake Growth Management and Community Building Initiatives;
- continue the Anti-Idling Awareness Campaign; and
- enhance the Community Smog Alert Response Kits.

## Climate Change and Health

Climate change is likely to have wide-ranging and mostly harmful effects on human health. The most direct risk is heat stress. Increasing frequency and severity of heat waves may lead to an increase in illness and death, especially among the very young, the elderly and the ill. Heat conditions are likely to be most severe in large urban areas. On the other hand, less cold stress in winter would reduce loss of life due to exposure to extreme cold conditions and other winter hazards.

Respiratory disorders and allergy problems may worsen as a result of increased heat and humidity, and declining air quality in some areas. Extreme weather events could result in increased deaths, injuries and stress-related disorders. As well, some infectious diseases may extend their range northward into Canada, making it necessary to increase control measures.

## Indoor Air Quality

In recent years, indoor air quality has become recognized as a significant health issue. Comparative risk studies performed by the U.S. Environmental Protection Agency (EPA) and its Science Advisory Board have consistently ranked indoor air pollution among the five top environmental risks to public health.<sup>37</sup>

The challenge for public health professionals conducting indoor air quality investigations is that many signs and symptoms are non-specific and are difficult to diagnose. Indoor air quality problems have a variety of causes including natural sources, poor building design, inadequate maintenance, structural components and furnishings, consumer products and occupant activities. In Canada, there are no indoor air quality laws or standards. Ventilation standards only exist in the respective provincial building codes.

Room temperature and relative humidity are not considered indoor air pollutants. However, they play an important role in indoor air quality. Temperatures between 20°C and 25°C are considered acceptable for the average person's comfort zone. Relative humidity should be maintained between 40% and 50% to reduce the incidence of upper respiratory infections and to minimize adverse effects on people with asthma or allergies.<sup>38</sup>



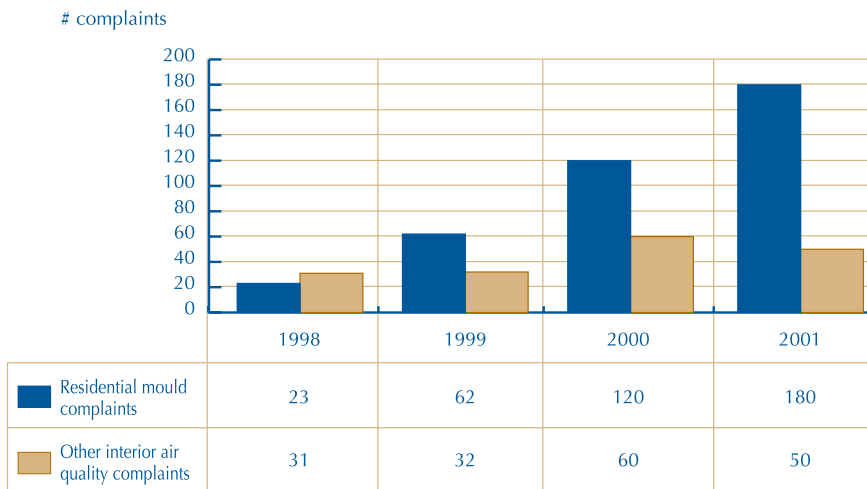
## Working for You

In 2001, York Region Health Services Department tested the indoor air quality of 47 ice surfaces in local arenas. No arenas were closed by the Department in 2001.

In February 2002, the Health Protection Division hosted the Clearing the Air workshop for public health professionals from across the province.

There has been a steady increase in the number of indoor air quality complaints received by the York Region Health Services Department between 1998 and 2001 (Figure 3.2).

Figure 3.2 Indoor Air Quality Complaints  
York Region, 1998-2001



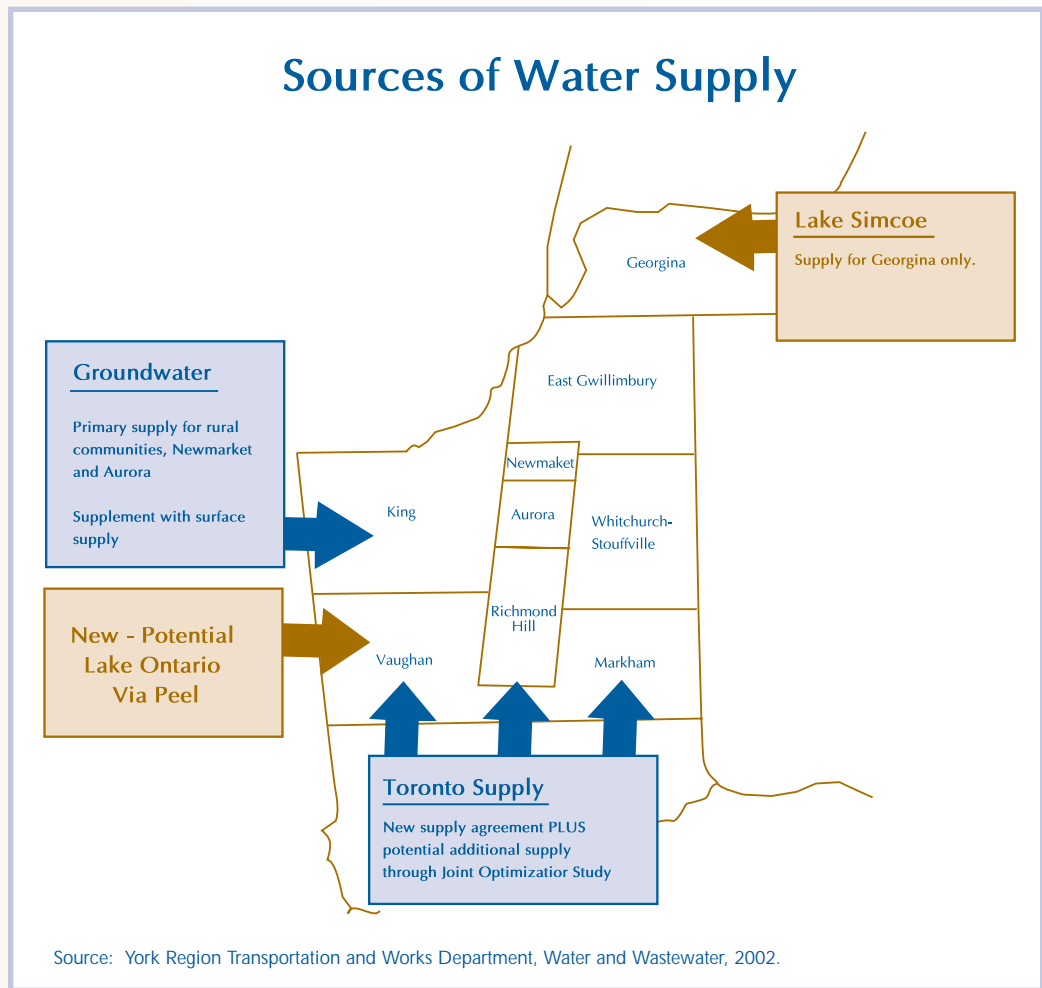
Source: Health Protection Division, York Region Health Services Department, 2002.

## Drinking Water Quality

### Sources of Drinking Water

The urban areas in Markham, Richmond Hill and Vaughan obtain water from the Lake Ontario-based treatment facilities that service the City of Toronto. Groundwater is supplied from municipal wells in Ansnorveldt, Aurora, Ballantrae/Musselman Lake, Holland Landing, King City, Kleinburg, Mount Albert, Newmarket, Nobleton, Queensville, Schomberg, Sharon and Stouffville. In September 2002, York Region began supplementing Aurora and Newmarket water with drinking water from the City of Toronto. Lake Simcoe treatment plants provide municipal water to Sutton and Keswick. The Georgina Water Treatment Plant is currently under construction and, when operational, will provide additional capacity sufficient to cover growth in Georgina up to the year 2031.<sup>39</sup> Another 9% of the population depends on private well water as a source for drinking water (Map 3.1).

Map 3.1 Sources of Drinking Water Supply, York Region



## Drinking Water Systems in York Region

There are various classes of drinking water systems in York Region. Requirements for treatment, water testing and water quality reporting by owners of these systems vary depending on the type of supply and the population served. These systems include:

- municipal and privately-owned large waterworks regulated under the *Drinking Water Protection Regulation*;
- certain small waterworks serving facilities such as schools, day cares and long-term care facilities regulated under the *Drinking Water Protection Regulation - Smaller Waterworks Serving Designated Facilities*;
- unregulated community drinking water systems such as rural restaurants, trailer parks and systems serving small residential communities; and
- private drinking water systems serving single family dwellings.



## Large Water Works

York Region Transportation and Works Department is responsible for sampling and testing the Region's drinking water at the source (the well or water treatment plant) as well as following its treatment, before it enters the distribution system. The water is tested for more than 150 microbiological, chemical and physical parameters. The number and frequency of water tests is dependent on the type of water source (i.e., ground water or surface water), the type of parameter, and the size of the population served. Microbiological testing is conducted weekly, while chlorine concentration and turbidity testing are performed on a daily basis.

The nine Municipal Works Departments are also responsible for sampling and testing drinking water. Samples are taken from within the distribution system to ensure that disinfection levels and water quality are maintained.

Owners of these large water systems must notify specified agencies, including the local Medical Officer of Health, if testing shows the water is unacceptable, or of "Adverse Water Quality". Indicators of adverse water quality include the presence of *Escherichia coli* (*E. coli*), other coliform bacteria, high levels of certain chemicals such as pesticides and heavy metals, and the absence of a chlorine residual in the water distribution system.

Boil water advisories (BWA) or drinking water advisories may be issued by the Medical Officer of Health if results of water analysis indicate adverse water quality concerns, or if confirmed water-borne illnesses are suspected of being associated with a drinking water supply. The Medical Officer of Health for York Region issued two BWAs in 2000, none in 2001 and four in 2002. However, there were no confirmed reports of illness in York Region related to ingestion of drinking water from large waterworks (municipal or privately-owned).

## Smaller Water Works Serving Designated Facilities

Owners of Designated Facilities, including schools, day care centres and long-term care facilities with their own independent drinking water supplies, must also comply with a regulation that outlines specific testing and treatment requirements of the water supply, and owners must notify the local Medical Officer of Health of all "Adverse Water Quality" reports. This is to provide additional protection for certain populations (infants, children, pregnant women, the elderly) that are more vulnerable to contaminants in drinking water.

### Working for You

Water Quality Reports for samples taken by the York Region Transportation and Works Department are available on York Region's website at [www.region.york.on.ca](http://www.region.york.on.ca) under Water Quality Reports.



## Working for You

In 2000 York Region Health Services Department responded to over 5,000 telephone inquiries about drinking water quality.

In 2001, the Health Services Department responded to another 3,300 inquiries about water quality. This increased to 3,600 inquiries in 2002.

Sixty-five Designated Facilities have been identified in York Region since the regulation came into effect in 2002. Of these, 31 have had at least one adverse water quality incident reported. Seven BWAs have been issued as a result of these adverse reports.

### Unregulated Community Drinking Water Systems

While owners of unregulated community drinking water systems use drinking water in their operation, and serve drinking water to the public, they are not required by law to test or treat their water supply.

The owner of the unregulated system is responsible for the operation and maintenance of the water supply, including bacterial and chemical testing. Public Health Inspectors sample drinking water supplies during routine inspections of these establishments (for example, trailer parks or restaurants in rural areas) for bacteriological analysis.

The York Region Health Services Department recommends that operators of these water systems sample their water supply, for bacteriological quality, on a monthly basis. Unacceptable water quality may result in the issuance of a BWA and corrective action such as the installation of water treatment devices.

Through routine inspections, complaints and private household water sample submissions, 424 unregulated community drinking water systems have been identified in York Region since 2000. Of these, 101 have received at least one adverse water quality incident report. There were three BWAs issued in 2000, five in 2001 and twenty-six in 2002 for this type of drinking water system.

### Private Drinking Water Systems

Private drinking water systems (individual wells) supply drinking water to approximately 9% of all York Region households. This represents approximately 19,000 homes with private wells and an estimated 62,000 people drinking water from these sources. As of 2000, the Ministry of the Environment's records identify over 25,000 water well installations in York Region. However, the current status of the wells is unknown. The responsibility for properly maintaining a private well and testing it for bacterial quality rests with the owner.



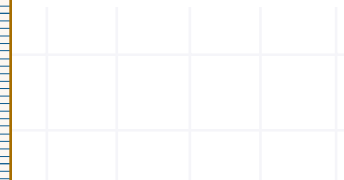
Before the summer of 2001, all results from the sampling of private well water were sent only to the owner of the well. However, after the Walkerton, Ontario *E. coli* outbreak associated with a contaminated municipal drinking water supply, a change in reporting of private well water results was initiated by the Laboratory Services Branch of the Ontario Ministry of Health and Long-Term Care. All results are now copied to the local health units in Ontario. The York Region Health Services Department received 5,393 test results from private wells from January 1, 2002 until July 31, 2002. In 21% of those test results, the water was considered unsafe for drinking. Health Services Department staff have quick access to these results in order to respond to inquiries from private well owners. Residents who depend on private wells for their drinking water supply should test their drinking water two to three times a year, particularly after snow runoff and after heavy rainstorms.

## Fluoride in Water

The Canadian Dental Association supports the fluoridation of municipal water supplies as a safe, economical and effective means of preventing tooth decay in all age groups.<sup>40</sup> Combined with fluoridated toothpaste and the appropriate use of fluoride supplementation, the fluoridation of water supplies has resulted in a dramatic improvement in the oral health of Canadians.

In 2000, the Ministry of the Environment recommended that the optimal level of fluoride in water supplies, where fluoride is added, be decreased from between 0.8 to 1.2 milligrams per Litre (mg/L) to between 0.5 to 0.8 mg/L. The change in the range ensures that the amount of fluoride in drinking water optimizes the benefit of preventing cavities, while minimizing the risk of fluorosis (white chalky spots on permanent teeth), especially since fluoride is available from other sources.

In York Region, all municipal water supplies in Georgina, Richmond Hill (including Oak Ridges), Markham, and Vaughan (excluding Kleinburg) are fluoridated. In addition, beginning in 2002, the Newmarket and Aurora water supplies are supplemented with fluoridated City of Toronto water.





## Alternatives to Tap Water

The trend of drinking bottled water has increased in recent years. For various reasons, some people choose to drink bottled water rather than tap water. Municipal tap water in York Region is safe to drink, however some people object to the taste or treatment of their municipal supply. People on a private water supply may choose to drink bottled water rather than water of unknown or unacceptable quality.

Bottled water in Canada is generally of good quality, although it is not considered to be safer than municipal tap water. Health Canada has not identified any water-borne disease outbreaks associated with drinking bottled water to date. While provincial regulations strictly control the quality of municipal water supplies, bottled water is not yet subject to the same standards. Bottled water is treated as a food product and regulated under Health Canada's *Food and Drugs Act*. It is subject to inspection for bacteriological quality but there is no requirement for water bottlers to test for trace toxic contaminants. Health Canada is investigating newer and stricter regulations and guidelines to prevent bacterial and chemical contamination.

## Recreational Water Quality

### Seasonal Posting of Public Bathing Beaches

The York Region Health Services Department is responsible for routine testing of all public bathing beaches within the boundaries of York Region. Public bathing beaches within York Region are located at Lake Simcoe, Lake Wilcox, Musselman's Lake and Seneca College (King Campus). Public Health Inspectors sample 18 sites in York Region. Over the past five years, beaches have been sampled two times per week from the middle of June until the first week in September.

The bacterium *Escherichia coli* (*E. coli*) is used as an indicator of water pollution and fecal contamination. If water results show high levels of contamination, a sign is posted warning bathers that high levels of bacteria have been identified in the beach water. High bacterial counts may cause skin rashes, gastrointestinal illness and ear and throat infections. Rainfall, surface water run-off, turbidity, air and water temperature, as well as the number of bathers, and time of sampling, all affect the bacterial counts in the individual water samples. As Figure 3.3 indicates, the proportion of days during each swimming season that local beaches have been posted is increasing each year.

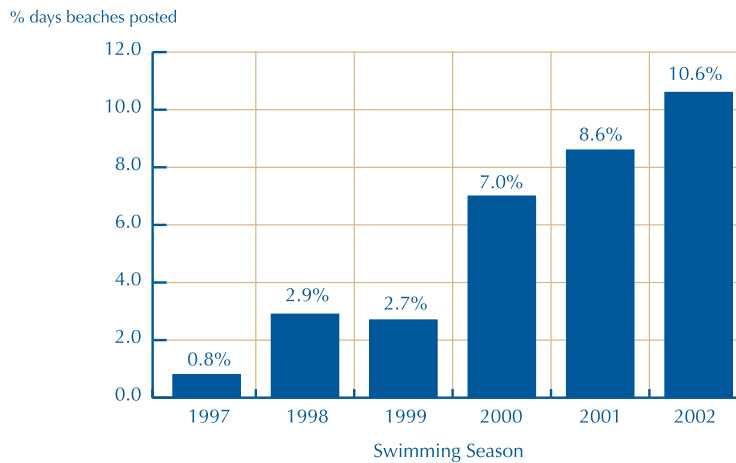


## Working for You

On May 16, 2002, Regional Council adopted the report entitled "Pesticide Reduction Guidelines for Lands Owned by the Regional Municipality of York". The report recommends reducing the use of non-essential pesticides by employing plant health care and integrated pest management techniques.

In August 2002, the York Region Pesticide Reduction Guidelines Implementation Team was established with the task of applying the recommendations of the "Guidelines" to all York Region-owned and leased properties in 2003.

Figure 3.3 Proportion of Days Per Season that York Region Beaches are Posted, 1997 to 2002



Source: Health Protection Division, York Region Health Services Department, 2002.

In summer 2001, the Rapid Risk Factor Surveillance System asked York Region adults (ages 18 and over) whether they felt that York Region beaches were safe for swimming or other water sports. Forty per cent of respondents indicated that they considered York Region beaches safe to use. Another 28% considered the beaches unsafe and 32% did not know about the quality of the Region's beaches.

## Pesticide Use

Since 1973, surveys of agricultural pesticide use have been carried out every five years by the Ontario Ministry of Agriculture and Food (OMAF) in consultation with the Ontario Ministry of the Environment (MOE). The most recent survey, conducted in 1998, covered pesticides used on field crops, fruit and vegetable crops, and selected other agricultural crops (nursery, sod and ginseng). The report shows that agricultural pesticide use continues to decline as measured by total active ingredient (A.I.). The overall decrease from 1983 to 1998 was from 8,700 tonnes A.I. to 5,200 tonnes.<sup>41</sup>

The amount and extent of pesticide use on residential and commercial lawns and gardens is not tracked by the MOE or the Pest Management Regulatory Agency, which is the organization that registers all pesticides used in Canada. However, several municipalities including York Region, are incorporating pesticide reduction strategies into their grounds maintenance plans. The York Region Health Services Department has developed a pesticide reduction education campaign targeting homeowners and the general public.



Children are more vulnerable to pesticides in their environment than adults because they play close to the ground, have frequent hand-to-mouth behaviour, and have unique dietary patterns. Children breathe in, ingest and absorb more air, water, food and soil per unit body weight and consequently they ingest more of the contaminants found in these media.<sup>42</sup> There were six hospitalizations among York Region residents and 184 hospitalizations among Ontario residents attributed to accidental poisonings by pesticides between 1997 and 2001.

*York Region's physical environment is affected by, and affects, the physical environment of other regions. Hence the Region is, for example, working with other local governments in the province to improve outdoor air quality. This is an issue of key importance, since high levels of air pollution can lead to illness and premature death, especially among the young and the old. Chapter 8 (Chronic Diseases) includes a discussion of the incidence of asthma, which is linked to poor air quality. Some aspects of indoor air quality are discussed in Chapter 5 (Lifestyle Behaviours and Health), which outlines efforts to reduce smoking rates, initiatives to ban smoking in public places, and information about exposure to second hand smoke. Chapter 1 (Our Growing Community) discusses other aspects of York Region's physical environment, such as the population density of various parts of the Region.*