CHAPTER 3
York Region Context

3.0 York Region Context

York Region and its nine local municipalities are part of the Greater Golden Horseshoe in southern Ontario (Figure 3.1). The Region stretches north from Toronto to Lake Simcoe, covering an area of 1,762 square kilometres. Over 1 million people reside in its nine local municipalities: Aurora, East Gwillimbury, Georgina, King, Markham, Newmarket, Richmond Hill, Vaughan and Whitchurch-Stouffville. Approximately 38% of York Region area is dedicated to farming activities while 25% are urban areas.[12]

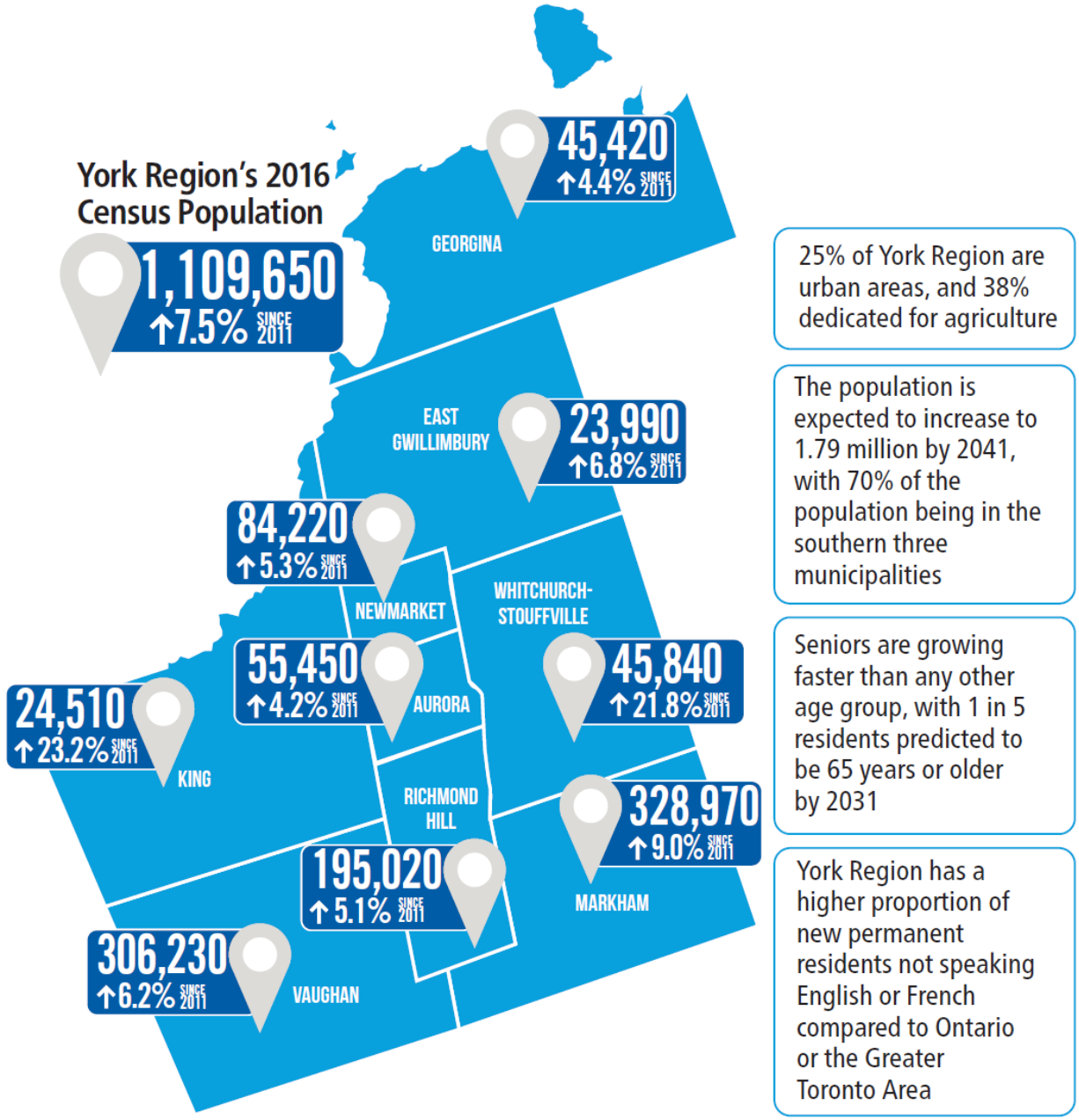
York Region is growing at a faster rate than the national and provincial averages. From 2011 to 2016, its population increased by 7.5%.[13] In 2016 it was home to 1,109,650 residents, with a population density of 629.9 people/km^2. The population of York Region is projected to increase to 1.79 million by 2041,[14] and approximately 70% of which is expected to occur in the Region's southern municipalities of Markham, Vaughan and Richmond Hill. York Region's growing population is also aging and diversifying with an influx of new permanent residents to Canada. The population in 2041 is expected to have a lower proportion of the population between ages 40 and 59 (~31 to 24.2%) but an increase in the proportion of the population above the age of 70 (~9.5% to 18.7%).

The two major landforms in York Region are the Oak Ridges Moraine and the Lake Simcoe Basin. The Oak Ridges Moraine is a massive ridge formed from glacial deposits constituting of gravel and sand. It crosses through the middle of York Region, covering approximately 31% of the geographical area. Much of the Region also includes the protected areas of the Greenbelt Protection areas and Oak Ridges Moraine (which covers 69% of the geographical area).

The Lake Simcoe basin consists of sandy and swampy lowlands which covers Georgina and East Gwillimbury. Some of the major river and stream systems feeding into Lake Simcoe include the Holland River and Black River. These river and wetland systems are areas of focus for riparian flooding events. The Oak Ridges Moraine runs through parts of Markham, Whitchurch-Stouffville, Newmarket, East Gwillimbury, Aurora, Richmond Hill, Vaughan and King.

York Region currently falls in the jurisdiction of two conservation authorities who are involved with local conservation and water protection, Lake Simcoe Region Conservation Authority in the north and the Toronto and Region Conservation Authority in the south.

Figure 3.1. York Region population trends and land use



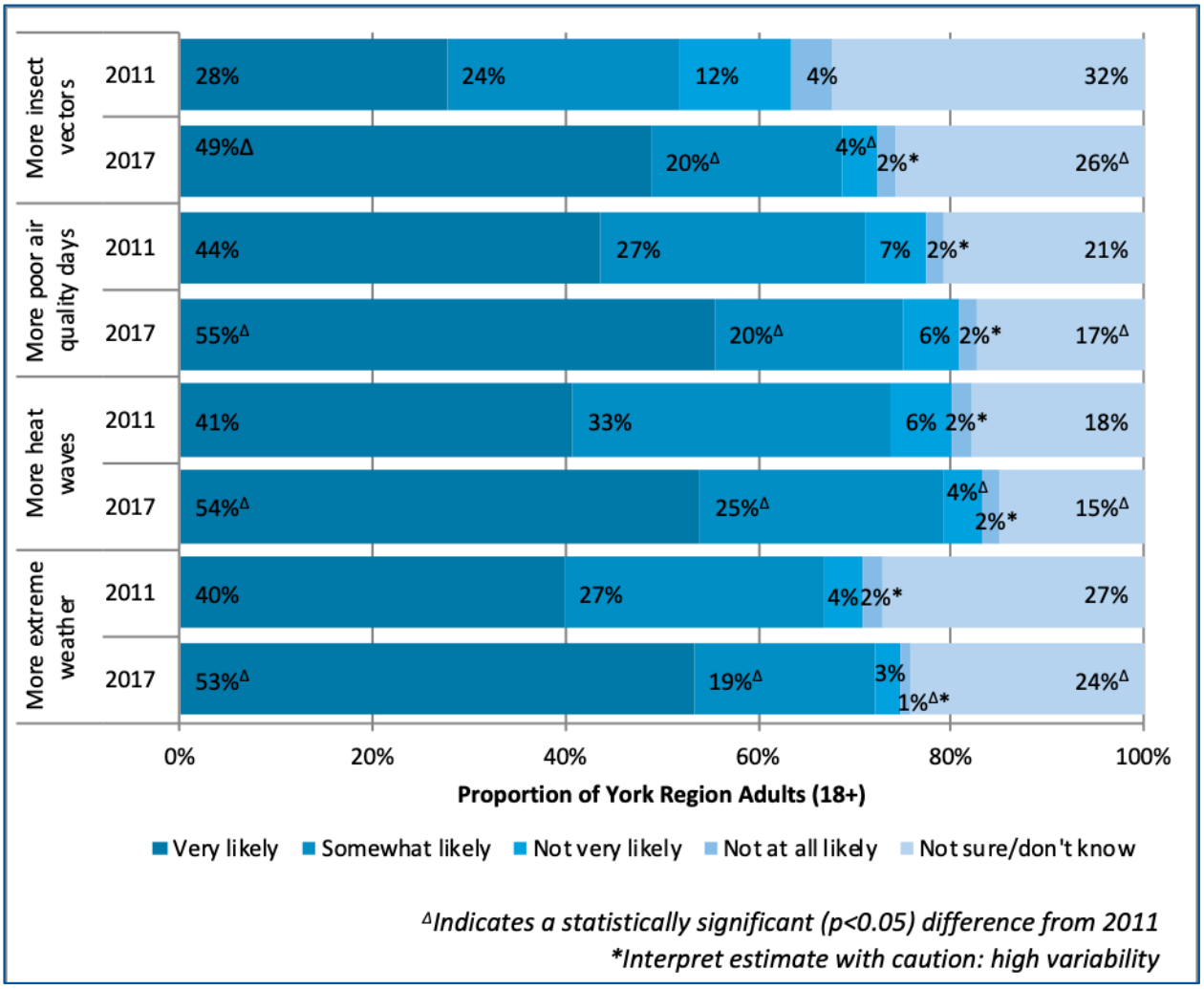
Sources: Regional Official Plan (link); 2041 population and employment forecasts (link); York Region Seniors Strategy (link); and New Permanent Residents in York Region, 2010-2014 (link)"

York Region residents increasingly recognize the impacts of climate change on communities and health. In a survey of 809 York Region residents conducted by Environics Research, 35% of respondents believe climate change is negatively affecting their community

now,[15] while 56% of respondents believe climate change is not currently affecting their community, but will in the future. [15]

Additional surveys have also been done on the impacts of climate change and human health risk. Telephone surveys were conducted in 2011 and 2017 asking residents which climate change health impacts were more likely to occur in York Region (Figure 3.2). Comparing survey results from 2011 and 2017, there was a substantial increase in the perception that climate change is very likely to impact the health risk within their community. The largest increase was for residents who believe insect vectors are very likely to increase due to climate change from 28% in 2011 to 49% in 2017. Only 51% of respondents believe York Region is somewhat prepared to deal with climate change.[16]

Figure 3.2. York Region residents' perception of the likelihood of climate change impacting their local community through increases in insect vectors, poor air quality days, heat waves and extreme weather in 2011 and 2017.



Data source: Rapid Risk Factor Surveillance System (RRFSS), 2011 & 2017. Regional Municipality of York, Community and Health Services.

3.1 HOW CLIMATE CHANGE WILL IMPACT YORK REGION

"Canada's climate has warmed and will warm further in the future, driven by human influence."[17]

Canada's Changing Climate Report, 2019

York Region is located in the Lake Simcoe-Rideau Ecoregion, which is characterized by a mild and moist climate.[18] This Ecoregion has a mean annual temperature range of 4.9°C to 7.8°C, a growing season of 205 to 230 days, mean annual precipitation of 759 to 1,087 mm, and mean summer rainfall of 198 to 281 mm.[19,20]

In recent decades, York Region has experienced increases in average temperature and precipitation. From 1948 to 2016, there was an increase of approximately 1°C and 2°C in the mean daily temperature for summer months and winter months respectively. Total precipitation increased by approximately 10% between 1948 and 2012.[21]

York Region has also experienced climate extremes and adverse impacts from extreme weather events. This includes ice storms, record-breaking mild temperatures in winter, record-breaking snowfall, very hot summers and intense rainfall events leading to flooding and drought.[10]

CLIMATE CHANGE FORECASTS IN YORK REGION

Climate change is expected to impact York Region in multiple ways (Figure 4.1). In 2016, the Ontario Climate Consortium completed a Historical and Future Climate Trends in York Region report. It used a Representative Concentration Pathway (RCP) 8.5[e] scenario and involved multiple projection models.[10] The following projections were noted in the Fausto et al. report for impacts into the 2050s:[10]

- **Annual and seasonal temperatures are very likely (90 to 100% probability) to increase in York Region.** During the summer months, extreme temperatures will increase significantly. Fausto et al. predict the mean annual temperature in York Region of 7°C will increase by 3.3°C in the 2050s. This will contribute to a substantial increase in the frequency of warmer daytime temperatures and tropical nights. The most pronounced average temperature increases are expected during the summer and winter, increasing by 3.6 to 4.0°C, and by 3.7 to 3.9°C, respectively. Warmer winter temperatures will also increase the amount of precipitation as rainfall during the winter season.
- **Cold temperatures are very likely (90 to 100% probability) to decrease but existing models do not account for shifts in the polar jet stream.** The number of days below -5°C is expected to decrease by 31 to 37 days per year from the baseline of 84 days by

[e] RCP 8.5 is the greenhouse gas concentration scenario created by the IPCC, based on the assumption that emissions continue as usual. RCP 8.5 shows growing emissions continuing until the end of the twenty-first century.

the 2050s. Projections for the number of days below -20˚C suggest a decrease of 0.5 to 4.9 days from the historical annual average of eight days.

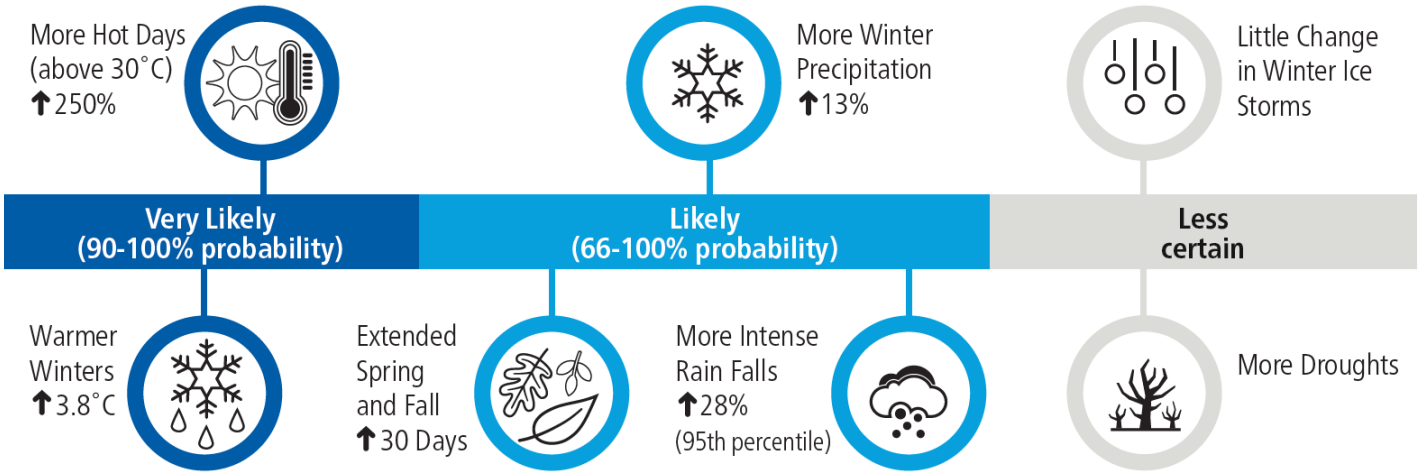
- **Precipitation levels will likely increase (66 to 100% probability) annually but levels in summer and fall are not expected to change significantly.** Annual precipitation levels in York Region are expected to increase an additional 48 to 70 mm[f] by the 2050s. This rise will be driven by increased total precipitation in the winter and spring. Precipitation levels for summer and fall are projected to remain similar to historical values.
- **Extreme precipitation events[g] are likely to increase in frequency and magnitude, particularly during the summer months (66 to 100% probability).** While it is unclear if the intensity[h] of extreme precipitation events will increase in the future, projected increases in temperature and moisture in the atmosphere could lead to an increased number of extreme precipitation events, particularly during the summer.
- **The growing season will likely be extended by approximately 30 days per year (66 to 100% probability).** In the past, the growing season in York Region generally occurred from May 17 to October 15. In the future, warming temperatures are expected to lead the growing season to begin potentially in early April and last into late November.
- **Drought conditions may become more common due to unchanging summer precipitation levels and increasing summer temperatures.** However, as drought conditions depend on multiple weather conditions, there are challenges in predicting future drought with high accuracy.
- **Winter ice storm potential will remain similar based on model projections.** However, there were limitations in the available data and modelling to accurately predict ice storm events in York Region.

[f] Based on Ministry of the Environment, Conservation and Parks CCDP Model projections

[g] Extreme precipitation events were modelled based on days of precipitation above 10 mm and 20 mm.

[h] Intensity is measured by the simple daily intensity index, which is calculated by the ratio of total precipitation amount with total number of wet days (days with greater than 1 mm precipitation) during the same time period.

Figure 4.1. Climate change impacts expected in York Region.



Source: Fausto E et al. Historical and Future Climate Trends in York Region. Toronto: Ontario Climate Consortium; 2015. Fig.4.1, Climate change impacts projected for York Region by the 2050s. Adapted and modified with permission from the copyright holder.

Adaptation planning will need to plan for a wide range of future conditions. Fausto et al.[10] explained that it is important to characterize the uncertainty associated with all variables presented in the report. It recommended not only the average future condition, but that a range of future conditions be considered for decision-making. It is important to note that trends will vary depending on the temporal scale examined (e.g., monthly temperature trends can differ from annual temperature trends) and the specific climate driver (e.g., temperature trends can differ from precipitation trends) as a result of atmospheric processes responding to climate change.

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