



Human Population

Overall Assessment

Trend: Increasing

Rationale: The long-term trend (1971 to 2006) of the total population in the Great Lakes region is increasing. Compared to 1971, the population increased by 14.0% in 2006. The short-term trend from 2001 to 2006 indicates that the total population in the Great Lakes region has increased by 1.8%.

Lake-by-Lake Assessment

Lake Superior

Trend: Decreasing

Rationale: Human population around Lake Superior has decreased by 5.0% over the long-term. The short-term trend indicates a continued decline; more specifically, from 2001 to 2006, Lake Superior's population decreased 1.3%.

Lake Michigan

Trend: Increasing

Rationale: Human population around Lake Michigan has been increasing over the years. The long-term trend indicates a growth of 11.3%, and a short-term trend from 2001 to 2006 shows continued growth of 0.7%.

Lake Huron

Trend: Increasing

Rationale: From 1971 to 2006, human population around Lake Huron has consistently been increasing. Since 1971, the long-term trend indicates a substantial growth of 24.1%. Likewise, the short-term trend shows a continual increase of 2.7% from 2001 to 2006.

Lake Erie

Trend: Increasing

Rationale: Both long-term and short-term trends in Lake Erie indicate that human population is increasing. From 1971 to 2006, human population increased by 3.1%. From 2001 to 2006, human population increased by 0.4%.

Lake Ontario

Trend: Increasing

Rationale: Human population around Lake Ontario has consistently been increasing. The long-term trend since 1971 indicates that population has increased by 29.8%. Similarly, the short-term trend from 2001 to 2006 indicates a continued increase of 5.0%.

Purpose

- To assess the current human population trend in the Great Lakes region
- The human population indicator is used in the Great Lakes indicator suite as a Driving Force indicator in the Economic/Social category

Ecosystem Objective

The human population should be living and working with full regard to the purpose of the Great Lakes Water Quality Agreement, to restore and maintain the chemical, physical and biological integrity of the Great Lakes Basin Ecosystem.

Ecological Condition

In this report, the Great Lakes basin is defined as the watershed of the Great Lakes.

Measures

There are different approaches to determine the human population of the Great Lakes basin. A range of population estimates for the Great Lakes basin are often cited by different organizations and reports (Table 1). In this report, it was initially a challenge to properly compare the Canadian and American population datasets because the U.S. population numbers in the Great Lakes are not available by watershed. In addressing the issue, one potential approach was to identify and include every county that falls fully or partially in the Great Lakes basin. However, the problem with this approach was that whether the county was 1.0% or 100% in the Great Lakes basin, the entire population number would be included in the estimate. Consequently, this resulted in an overestimate of the U.S. population in the Great Lakes region. Another challenge in this approach was the fact that there are many counties that fall in more than one lake basin; in which case, the analysis required to accurately portray the lake-by-lake estimates is difficult.

A ratio approach uses GIS analysis to calculate that if only 1.0% of a county's boundary falls in the Great Lakes Basin, then only 1.0% of the county's population would be included. This ratio approach does have a number of limitations. For example it assumes that each county has an evenly distributed population. That is not always the case and the ratio approach can underestimate human population where a county falls only partially in the Great Lakes basin but has a population centre(s) within the basin. This approach also does not accurately reflect the significant population in Illinois that resides outside the Great Lakes basin but is serviced by Lake Michigan's drinking water.

The adjusted-ratio approach, used in this report, reflects a review of the population identified for each U.S. county. Every county with a population over 100,000 people (and 40,000 people for the Lake Superior Basin) was examined to ensure the population calculated in the ratio approach accurately reflected the distribution of the county's population. In the end, the population ratio of eight counties were adjusted to accurately reflect the population centers and in the Chicago area four counties were selected and adjusted to represent the total population of Illinois serviced with drinking water.(Table 2).

Total Populations in the Great Lakes Region (Ontario and Eight Great Lakes States)

The total population in the Great Lake basin in 2006 has increased to 38,968,987 (Table 3). As seen in Figure 1, the population growth from 1971 to 1986 was small. From 1986 to 1991, however, the region experienced its largest population growth of 5.7%. Since then, the region's population numbers continued to grow steadily and from 1996 to 2001, the region had its second largest population growth of 4.3%. In examining the long-term trend, the region's population increased 14.2% since 1971 (Figure 2). In the short-term trend, from 2001 to 2006, the Great Lakes region experienced a small increase of 1.8% (Figure 3).

In 2006, 33.2% of Canadians lived in the Great Lakes Basin, and 9.4% of Americans lived in the Great Lakes Basin.

Within the entire Great Lakes region, Ontario experienced the largest population increase. From 1971 to 2006, Ontario's population increased by 37.4% (Figure 4). The short-term trend from 2001 to 2006 indicated Ontario's population had grown by 6.5% (Figure 5, Table 3). Five U.S. Great Lakes States also experienced population growth, although their growth was not as evident as Ontario's. Indiana had the highest population growth amongst the eight states with 17.4%, following by Wisconsin with 11.7%, Michigan with 11.0%, Pennsylvania with 4.0% and Illinois with 3.3% (Figure 4). Minnesota, New York and Ohio, on the other hand, experienced decreases in their

population . In particular, Minnesota decreased the most with a 8.2% decline, followed by Ohio with a decline of 4.8% and New York with 4.0% decline (Figure 4).

Each of the Great Lakes

The total population around each Great Lake and associated watersheds between 1971 to 2006 has fluctuated over time (Table 4).

Around Lake Superior, the human population has decreased by 5.0% from 1971 to 2006 (Figure 6). With the exception of 1971-1976 and 1991-1996 where the population increased slightly, Lake Superior has consistently experienced a declining population. In 1981 to 1986, Lake Superior had its largest population decline of 5.6% (Figure 6). The short-term trend from 2001 to 2006 indicates that the population continues to decline; the population has decreased by 1.3%. In proportion to the entire Great Lake Basin, only 1.5% of the total human population in the Great Lakes Basin lives around the Lake Superior basin, and this percentage has decreased by 0.4% since 1971 (Figure 7 & 8).

Around Lake Michigan, the human population has increased by 11.3% from 1971 to 2006 (Figure 6). With the exception of 1991-1996, Lake Michigan has consistently had an increasing population. In particular, from 1996 to 2001, the population growth was 6.0% (Figure 8). The short-term trend from 2001 to 2006 indicates an increase of 0.7% (Figure 8). In proportion to the entire Great Lake basin, 34.7% of the total human population lived around Lake Michigan in 1971 (Figure 7). As of 2006, Lake Michigan's total population portion in the basin dropped slightly to 33.6% (Figure 8). In both 1971 and 2006, Lake Michigan had the largest population percentage in the basin.

Around Lake Huron, the human population has consistently been growing. The long-term trend indicates that Lake Huron's human population has increased by 24.1% since 1971 (Figure 6). From 1986 to 1991, Lake Huron had its largest population increase of 8.5% (Figure 6). The short-term trend shows a continued growth and from 2001 to 2006, the population increased by 2.7%. Lake Huron basin's human population was 7.3% of the total population in the Great Lake Basin in 1971 (Figure 7). As of 2006, Lake Huron contained 8.0% of the total population in the basin (Figure 8).

Around Lake Erie, the human population has increased by 3.1% over the long term (Figure 6). However, unlike other Great Lakes where their human population has either been increasing or decreasing relatively consistently, Lake Erie's population trend has fluctuated greatly. From 1971 to 1986, the population decreased steadily. From 1986 to 1991, the population increased significantly by 3.6%. In 1996 the population decreased once again and since then, the population has grown again. The short-term trend in Lake Erie indicates an increase of 0.4% from 1996 to 2000. In proportion to the entire Great Lake region, Lake Erie and Lake Michigan used to have the greatest share of population within the basin. In 1971, Lake Erie held 35.4% of the entire population for the Great Lake Basin (Figure 7). In 2006, however, the population had declined by 4.1% to 31.4% of the Great Lake Basin population (Figure 8).

Around Lake Ontario, human population has consistently increased. The long-term trend indicates an increase of 29.8% since 1971, the largest long-term population growth among the Great Lake basins. Lake Ontario experienced its largest population increase from 1986 to 1991 with 7.7% (Figure 6). The short-term trend, from 2001 to 2006, indicates continued growth of 5.0% (Figure 6). In proportion to the entire Great Lake basin, as of 2006, 25.2% of the total human population in the fell within Lake Ontario's basin. In comparison to its 1971 proportion to the other Great Lake basins, human population in Lake Ontario's basin increased by 4.6% (Figure 7 and 8).

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Linkages

Humans are a key driving force in the overall impact on the environment. Emphasis should be placed on ensuring humans are working, playing and living sustainably. Further analysis in population trends, consumption rate and population density are areas that can help understand and calculate the different impacts humans have on the environment.

Comments from the author(s)

For future reports, US population on a watershed scale should be used if/when released.

Assessing Data Quality

Insert "x" under the statement that best corresponds with each data characteristic

Data Characteristics	Strongly Agree	Agree	Neutral or Unknown	Disagree	Strongly Disagree	Not Applicable
1. Data are documented, validated, or quality-assured by a recognized agency or organization	X					
2. Data are traceable to original sources	X					
3. The source of the data is a known, reliable and respected generator of data	X					
4. Geographic coverage and scale of data are appropriate to the Great Lakes basin	X					
5. Data obtained from sources within the U.S. are comparable to those from Canada		X				
6. Uncertainty and variability in the data are documented and within acceptable limits for this indicator report	X					
Clarifying Notes:						

Acknowledgments

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Information Sources

National Inventory Report. *National Inventory Report 1990-2008: Greenhouse Gas Sources.*

<http://www.ec.gc.ca/Publications/default.asp?lang=En&xml=492D914C-2EAB-47AB-A045-C62B2CDACC29>

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Last Updated

State of the Lakes Ecosystem Conference (SOLEC) 2011

Approach	Estimates
Great Lakes and St. Lawrence River Region. (Whole of Ontario, Quebec and Eight Great Lakes States)	Total: 103,359,687
	Ontario: 12,665,330
	Quebec: 7,631,600
	Eight Great Lakes States: 83,062,787
Great Lakes Region (Whole of Ontario and Eight Great Lakes States)	Total: 95,718,087
	Ontario: 12,665,330
	Eight Great Lakes States: 83,062,787
Great Lakes Basin (All U.S. counties that are fully or partially located in the basin - overestimate approach)	Total: 42 868 987
	Ontario: 10,879,768
	Eight Great Lakes States: 31,989,219
Great Lakes Basin (Ratio of U.S. county within the basin = ratio of population attributed to the basin - underestimate approach, especially due to Chicago area)	Total: 32 629 828
	Ontario: 10,879,768
	Eight Great Lakes States: 21,750,060
Great Lakes Basin (U.S. county adjusted ratio approach used in this report)	Total: 38,968,987
	Ontario: 10,879,768
	Eight Great Lakes States: 28,089,219

Table 1. Population Estimate Approaches (Year: 2006)

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County	Adjustment Rationale
Cook County, DuPage County, Will County and Lake County, Illinois	These ratios were adjusted to account for the approximate 6.4 million people in Illinois that receive drinking water from Lake Michigan in 2010, according to the Chicago Metropolitan Agency for Planning
La Porte County, Indiana	Accounting for Michigan City
St. Joseph County, Indiana	Accounting for South Bend and surrounding area
Marquette County Michigan	Accounting for Marquette
St. Louis County, Minnesota	Accounting for Duluth, and some iron-range communities (e.g. Hoyt Lakes)
Erie County, Pennsylvania	Accounting for City of Erie, and coastal townships from Springfield to Northeast
Douglas County, Wisconsin	Accounting for City of Superior and surrounding area
Kenosha County, Wisconsin	Accounting for City of Kenosha
Racine County, Wisconsin	Accounting for City of Racine and surrounding area

Table 2. Counties Adjustment

	Years							
	1971	1976	1981	1986	1991	1996	2001	2006
Illinois	6,021,260	5,938,855	5,829,213	5,831,514	6,014,380	5,917,302	6,268,708	6,226,965
Indiana	945,833	961,748	975,880	981,281	1,071,477	1,033,124	1,116,641	1,145,015
Michigan	8,988,758	9,135,800	9,228,640	9,146,124	9,844,548	9,547,821	10,019,923	10,100,700
Minnesota	222,844	223,376	223,587	204,558	200,190	203,282	207,846	204,577
New York	3,570,221	3,541,288	3,457,816	3,420,398	3,444,814	3,511,654	3,476,534	3,428,569
Ohio	4,242,702	4,160,853	4,105,531	4,036,441	4,069,454	4,066,331	4,101,553	4,037,445
Pennsylvania	224,262	234,963	234,483	231,536	232,468	233,111	235,324	233,669
Wisconsin	2,396,147	2,408,192	2,410,832	2,418,094	2,562,540	2,529,981	2,658,063	2,712,278
Ontario	6,813,337	7,317,524	7,650,414	8,064,667	8,950,267	9,555,896	10,168,222	10,879,768
Total Population	33,425,364	33,922,599	34,116,395	34,334,613	36,390,138	36,598,502	38,252,815	38,968,987

Table 3. Total Population in the Great Lakes States and Ontario from 1971 to 2006

	1971	1976	1981	1986	1991	1996	2001	2006
Superior	621,342	636,166	634,723	599,218	597,198	604,314	597,908	590,295
Michigan	11,612,395	11,704,666	11,747,052	11,780,684	12,509,795	12,220,287	12,999,125	13,095,085
Huron	2,454,075	2,616,270	2,711,185	2,721,926	2,973,575	2,998,756	3,147,612	3,233,157
Erie	11,836,856	11,743,266	11,592,423	11,465,682	11,894,835	11,879,720	12,169,921	12,217,235
Ontario	6,900,696	7,222,230	7,431,013	7,767,104	8,414,735	8,895,424	9,338,248	9,833,214
Total for All	33,425,364	33,922,599	34,116,395	34,334,613	36,390,138	36,598,502	38,252,815	38,968,987

Table 4. Total Population around each Great Lake and associated watersheds from both Ontario and Great Lake States from 1971 to 2006

Figure 1: Total Population in the Great Lakes Region from 1971 to 2006

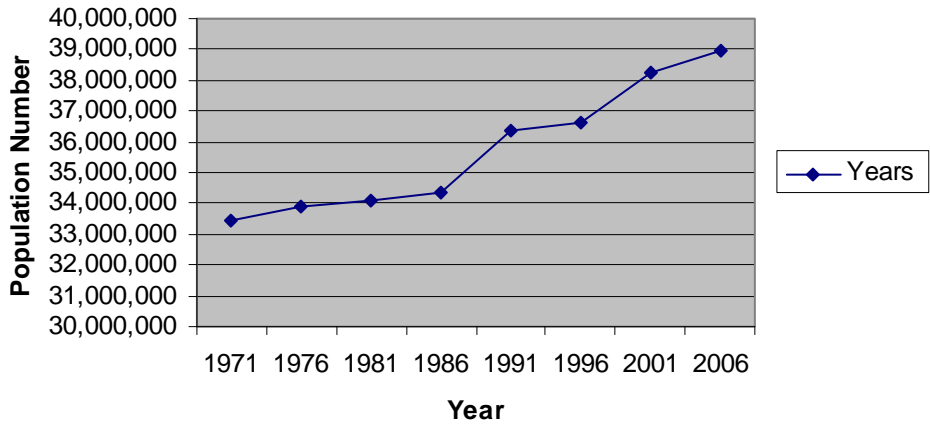
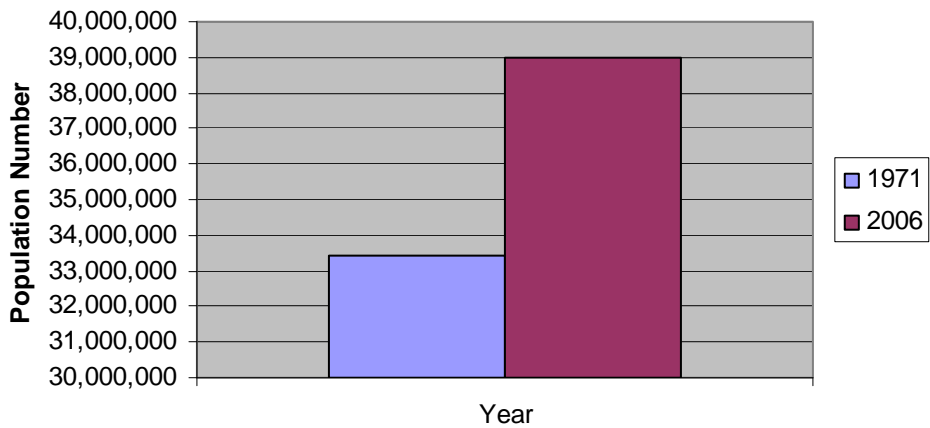


Figure 2: Long-Term Trend Comparison of the Great Lakes Region between 1971 and 2006



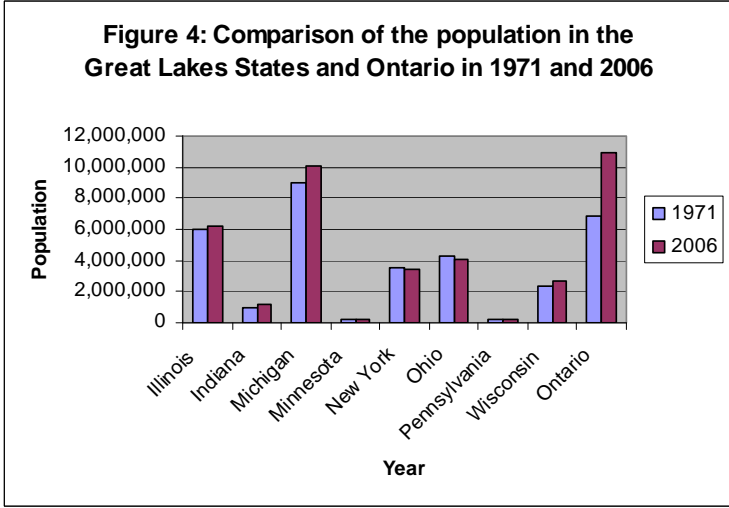
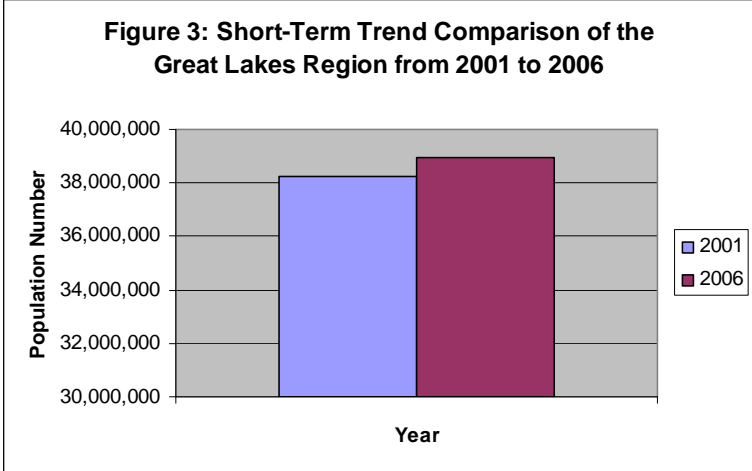


Figure 5: Comparison of the Population in the Great Lakes States and Ontario in 2001 and 2006

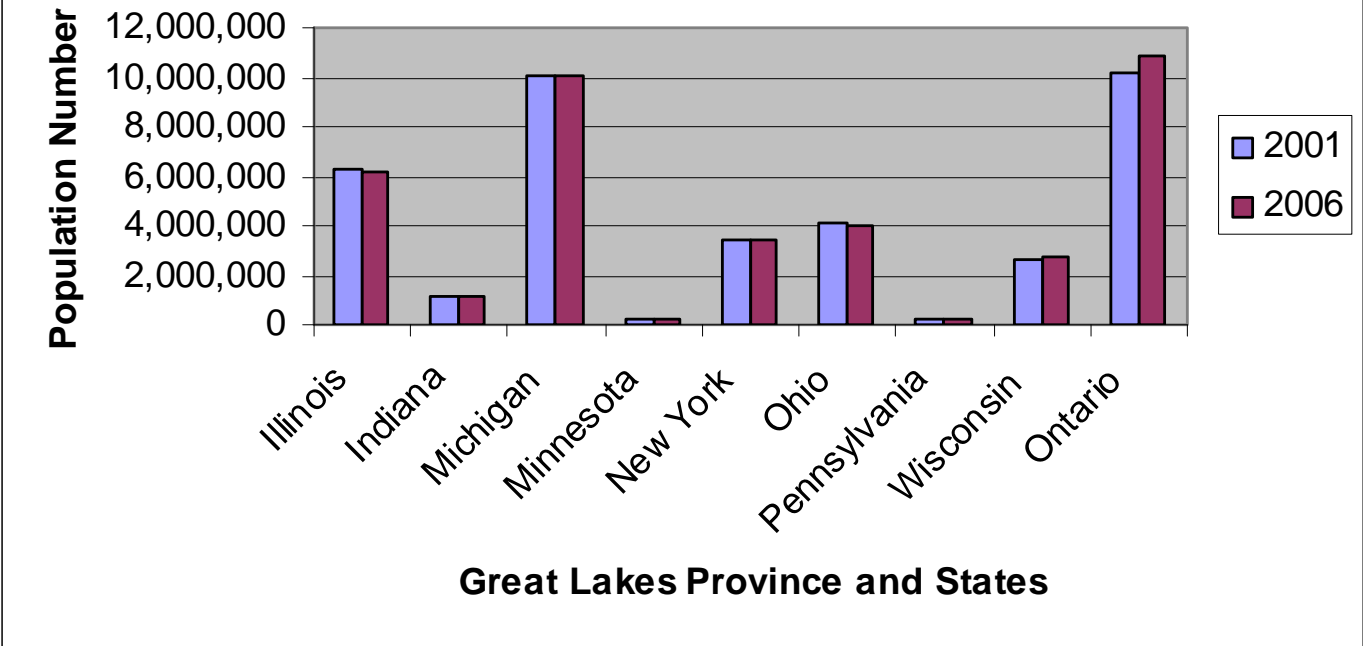


Figure 6: Total Population around each Great Lake and Associated Watersheds from both Ontario and the Great Lakes States in 1971 to 2006

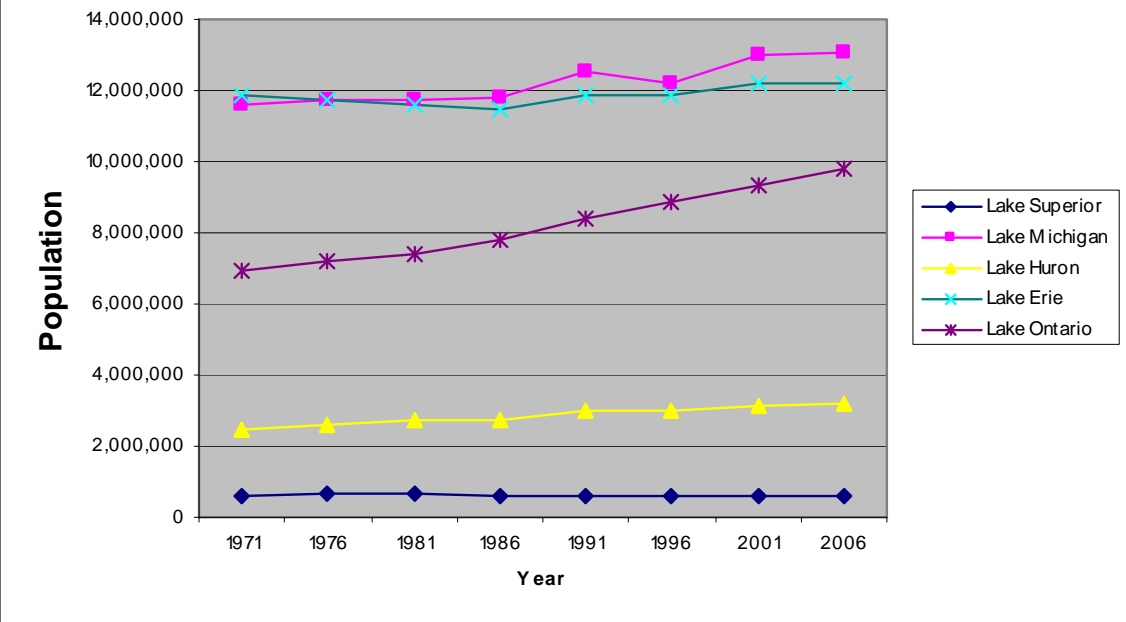


Figure 7: Percentage of the Human Population Found in Each Great Lake and Associated Watershed in the Great Lakes Region in 1971

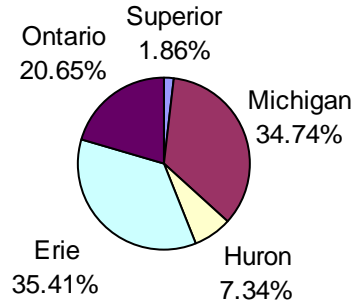


Figure 8: Percentage of the Human Population Found in Each Great Lake and Associated Watershed in the United States in 2006

