

Physical Features of Great Lakes

The Great Lakes are a group of five large freshwater lakes in central North America, interconnected by natural and artificial channels. From west to east they are Lake Superior, Lake Michigan, Lake Huron, Lake Erie, and Lake Ontario. Lake Michigan lies entirely within the United States; the others form part of the border between the United States and Canada. The combined surface area of the lakes is 244,100 sq km (94,250 sq mi). Together the lakes drain a total of about 750,000 sq km (about 290,000 sq mi) in Canada and the United States. The primary outlet of the system is the St. Lawrence River; a portion is diverted from Lake Michigan to the Chicago River. The lakes are bordered by the Canadian province of Ontario and by eight U.S. states: New York, Pennsylvania, Ohio, Indiana, Michigan, Illinois, Minnesota, and Wisconsin.

The Great Lakes are a natural resource of tremendous significance in North America, serving as the focus of the industrial heartland of the continent. Together they hold about 20 percent of the world's fresh surface water. Four of the 20 largest cities in North America (Chicago, Detroit, Toronto, and Cleveland) lie on the shores of the Great Lakes system and owe much of their wealth to commerce attracted to the lakes. The lakes also form an important recreational resource with about 17,000 km (about 10,500 mi) of shoreline, rich sport fisheries, and numerous beaches and marinas.

The beaches of the Great Lakes are some of the best in the world and add considerably to the recreational attraction of the state. Inland from the beaches, there are often beautiful sand dunes, a distinctive feature of the topography of Michigan, particularly along the eastern shore of Lake Michigan. Recently, a problem has developed in the level of the water in the western Great Lakes surrounding the state of Michigan. The level fluctuates from 1 to 2 m over a period of years because of the amount of precipitation and runoff received. In the 1970s, a near all-time high of nearly a meter above the mean level was reached by Lakes Huron and Michigan, and considerable lakeshore damage occurred as a result.

Although individual owners as well as certain cities and villages along the shore are developing piers, breakwaters, groins, and seawalls of various kinds to protect the shore, high-water erosion and flood damage still threaten the shoreline. The erosive power of a fall or spring storm on Lake Michigan, Lake Superior, or Lake Huron is awesome. The Army Corps of Engineers is studying the problem of fluctuating lake levels, but there are no easy solutions. One possible remedy is to allow more water to go out through the southern end of Lake Michigan (i.e., be diverted from the basin), via the Chicago River, and on into the Mississippi River. However, it is estimated that this action would have only a minor effect on the problem. Another suggestion has been made that the outlet near the St. Clair and Detroit Rivers--and further, the Niagara River, which is the outlet of Lake Ontario--be lowered so that the volume of water that can flow out through the St. Lawrence River would be increased. This may be more effective solution, but it would take a great deal of coordination between the different states involved, as well as the cooperation of Canada.

Physical Features	Lake Superior	Lake Michigan	Lake Huron	Lake Erie	Lake Ontario	Total
Elevation (feet) (meters)	600 183	577 176	577 176	569 173	243 74	
Length (miles) (km)	350 563	307 494	206 332	241 388	193 311	
Breadth (miles) (km)	160 257	118 190	183 245	57 92	53 85	
Ave. depth (feet) (meters)	483 147	279 85	195 59	62 19	283 86	
Max. depth (feet) (meters)	1,332 406	925 282	750 229	210 64	802 244	
Volume (miles ³) (km ³)	2,900 12,100	1,180 4,920	850 3,540	116 1,640	393 22	5,439 22,684
Water area (miles ²) (km ²)	31,700 82,100	22,300 57,800	23,000 59,600	9,910 25,700	7,340 18,960	94,250 244,160
Watershed (miles ²) (km ²)	49,300 127,700	45,600 118,000	51,700 134,100	30,140 78,062	24,720 64,030	201,460 521,830
Total area (miles ²) (km ²)	81,000 209,800	67,900 175,800	74,700 193,700	40,050 103,700	32,060 82,990	295,710 765,990
Retention Time (yrs)	191	99	22	2.6	6	
Outlet	St. Marys River	Straits of Mackinac	St. Clair River	Niagara River/ Welland Canal	St. Lawrence River	

Lake Superior, the largest in area of the Great Lakes at 82,100 sq km (31,700 sq mi), is the largest freshwater lake in the world. Of the Great Lakes, Lake Superior is the highest above sea level, at 183 m (600 ft), the farthest north, and the coldest. Its outlet is the Saint Marys River, which enters Lake Huron after falling about 7 m (about 21 ft) over a

series of rapids between the twin cities of Sault Sainte Marie, in Ontario and Michigan.

Lake elevations decrease to the south and east. Lake Huron and Lake Michigan lie at the same elevation, 176 m (577 ft), separated by the Straits of Mackinac, where water flows from Lake Michigan to Lake Huron. Huron is the larger of the two in area, at 59,600 sq km (23,000 sq mi); Michigan is deeper, 85 m (279 ft) on average, and contains more water. Both Michigan and Huron have numerous islands, the largest of which are contained in the Manitoulin Islands chain in Lake Huron. At its southern end, Lake Huron drains into the Saint Clair River, which falls about 3 m (about 9 ft) between Lake Huron and the small, shallow basin of Lake Saint Clair.

The Detroit River connects Lake Saint Clair with Lake Erie. At its northeast end, Lake Erie empties into the Niagara River, which drops 99 m (325 ft) as it flows north to Lake Ontario. Lake Ontario, the smallest of the Great Lakes at 19,010 sq km (7340 sq mi), is the 14th largest lake in the world. The outlet of Lake Ontario is the St. Lawrence River.

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