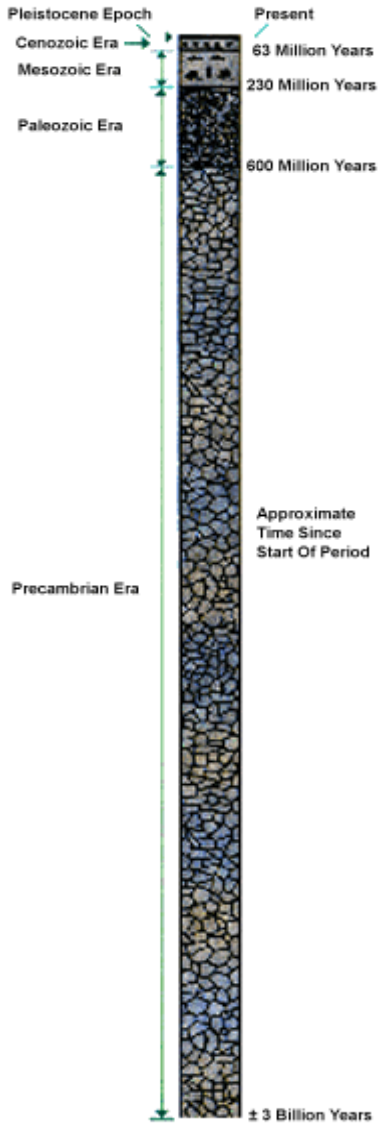
The foundation for the present Great Lakes basin was set about 3 billion years ago, during the Precambrian Era. This era occupies about five-sixths of all geological time and was a period of great volcanic activity and tremendous stresses, which formed great mountain systems. Early sedimentary and volcanic rocks were folded and heated into complex structures. These were later eroded and, today, appear as the gently rolling hills and small mountain remnants of the Canadian Shield, which forms the northern and northwestern portions of the Great Lakes basin. Granitic rocks of the shield extend southward beneath the Paleozoic, sedimentary rocks where they form the 'basement' structure of the southern and eastern portions of the basin.

With the coming of the Paleozoic Era, most of central North America was flooded again and again by marine seas, which were inhabited by a multitude of life forms, including corals, crinoids, brachiopods and mollusks. The seas deposited lime silts, clays, sand and salts, which eventually consolidated into limestone, shales, sandstone, halite and gypsum.

During the Pleistocene Epoch, the continental glaciers repeatedly advanced over the Great Lakes region from the north. The first glacier began to advance more than a million years ago. As they inched forward, the glaciers, up to 2,000 metres (6,500 feet) thick, scoured the surface of the earth, leveled hills, and altered forever the previous ecosystem. Valleys created by the river systems of the previous era were deepened and enlarged to form the basins for the Great Lakes. Thousands of years later, the climate began to warm, melting and slowly shrinking the glacier. This was followed by an interglacial period during which vegetation and wildlife returned. The whole cycle was repeated several times.



Sand, silt, clay and boulders deposited by the glaciers occur in various mixtures and forms. These deposits are collectively referred to as 'glacial drift' and include features such as moraines, which are linear mounds of poorly sorted material or 'till', flat till plains, till drumlins, and eskers formed of well-sorted sands and gravels deposited from meltwater. Areas having substantial deposits of well-sorted sands and gravels (eskers, kames and outwash) are usually significant groundwater storage and transmission areas called 'aquifers'. These also serve as excellent sources of sand and gravel for commercial extraction.

As the glacier retreated, large volumes of meltwater occurred along the front of the ice. Because the land was greatly depressed at this time from the weight of the glacier, large glacial lakes formed. These lakes were much larger than the present Great Lakes. Their legacy can still be seen in the form of beach ridges, eroded bluffs and flat plains located hundreds of metres above present lake levels. Glacial lake plains known as 'lacustrine plains' occur around Saginaw Bay and west and north of Lake Erie.

As the glacier receded, the land began to rise. This uplift (at times relatively rapid) and the shifting ice fronts caused dramatic changes in the depth, size and drainage patterns of the glacial lakes. Drainage from the lakes occurred variously

through the Illinois River Valley (towards the Mississippi River), the Hudson River Valley, the Kawartha Lakes (Trent River) and the Ottawa River Valley before entering their present outlet through the St. Lawrence River Valley. Although the uplift has slowed considerably, it is still occurring in the northern portion of the basin. This, along with changing long-term weather patterns, suggests that the lakes are not static and will continue to evolve.