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Geological Sciences

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BATHYMETRIC MAP OF LAKE MICHIGAN

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(Abstract)

The deep sea fathometer soundings recently made by the United States Lake Survey have provided means of making complete and accurate contours of the bottoms of the Great Lakes. Lake Michigan is the only one completely covered by the survey as none of the others lie entirely within the territory of the United States. Depths of less than about twenty fathoms were not covered by the fathometer survey so it was necessary to map the shallower areas from soundings taken from the Great Lake Charts number seven and seventy.

The purpose in making the map was: First, to obtain if possible some further evidence as to the origin of the lake basin. Second, to prove the presence or absence of subaqueous terraces.

Six east-west cross sections were drawn at about equal intervals as an aid in studying the shape of the basin. The north-south axis of the basin lies parallel with the strike of the Silurian, Devonian, and Mississippian rocks that dip eastward toward the Michigan basin. The rocks consist largely of limestones and shales some of which contain considerable quantities of salt and gypsum. The basin is assymetrical in cross section with the deeper part considerably nearer the east than the west shore. This is suggestive of stream adjustment to structure. The inequalities of the lake bottom are also somewhat indicative of stream work but might easily be due to glacial erosion and deposition. A considerable area of the lake bottom, about 2,400 square miles, is below sea

level. This can not be explained as due to stream erosion unless the whole area was formerly considerably higher than at present. Also no old stream valleys beneath the glacial drift have yet been found deep enough to serve as an outlet for such a basin. To the north the deep basin of the lake ends westward of the Beaver Islands. East and north of the Manitowoc and the Beavers the lake seems to have had a somewhat different history.

In a body of water the size of Lake Michigan a well developed sub-aqueous terrace is to be expected. The contours and cross sections give some indication of such a terrace out to a depth of twenty to forty fathoms. It has been thought by Andrews and Fenneman that a terrace exists extending out to a depth of sixty feet. Andrews believed he established the existence of such a shelf between Manitowoc and Chicago but thought it would be better indicated on the east side of the lake. His data were insufficient as he based his conclusions on only nine lines of soundings between Manitowoc and Chicago. In an attempt to check his findings soundings were plotted at five mile intervals from Manitowoc and Chicago. Evidence that might indicate the presence of such a shelf was found in fifteen cases and evidence against it in seventeen cases. On the east side of the lake between Frankfort and Michigan City plotting at ten mile intervals gave evidence of a shelf in five cases and evidence of no shelf in eighteen cases.

That terraces were formed in past times when the lake had a greater extent than at present shown by the fossil terraces of lakes Chicago, Nipissing, and Algonquin. It is possible that the present level of the lake has not been maintained long enough to completely develop a terrace as in addition to the three higher levels mentioned it is believed following both the Algonquin and Nipissing levels the lake stood for a time at least fifty feet lower than at present. It is quite probable that there is now forming along the shores a terrace that as yet does not extend out to a very great depth. Since the Great Lake charts are made primarily for navigation purposes the soundings of the shallow water near shore are not sufficiently numerous to prove the presence or absence of such a shelf.

