pectively, above Lakes Manitoba and Winnipeg. The length of Lake Agassiz is estimated to have been nearly 700 miles, and its area not less than 110,000 square miles, exceeding the combined areas of the five great lakes tributary to the St. Lawrence.

After the ice border was so far melted back as to give outlets northeastward lower than the River Warren, numerous other beaches marking these lower levels of the glacial lake were formed, and finally, by the full departure of the ice, Lake Agassiz was drained away to its present representative, Lake Winnipeg.

While the outflow passed southward, seventeen successive shore lines, marked by distinct beach ridges, were made by the gradually falling northern part of this lake; but all these, when traced southward, are united into the five beaches before noted for the southern part of the lake. During its stages of northeastern outflow, a lower series of fourteen shore lines were made. Thus Lake Agassiz had, in total, thirty-one successive stages of gradual decline in height and decrease in area.

The earliest Herman beach has a northward ascent of about a foot per mile, but the lowest and latest beaches differ only very slightly from perfect horizontality. It is thus known that a moderate uplift of this area, increasing in amount from south to north, was in progress and was nearly or quite completed while the ice-sheet was melting away. Before the Glacial period, all the northern half of our continent had been greatly elevated, producing at last the cold and snowy climate and the thick ice-sheet; in a late part of that period the land was depressed under the weight of the ice, which in consequence melted away; and latest, at the same time with the departure of the ice-sheet, the unburdened land rose a few hundred feet, the uplift having a gradual increase toward the central part of the country formerly ice-covered.

In comparison with the immensely long and ancient geologic periods that had preceded, the final melting of the ice-sheet, the deposition of its marginal moraines and other drift formations, its fringing glacial lakes, and the attendant uplifting of the land, occupied little time and were very recent. The entire duration of Lake Agassiz, estimated from the amount of its wave action in erosion and in the accumulation of beach gravel and sand, appears to have been only about 1,000 years, and the time of its existence is thought to have been somewhere between 6,000 and 10,000 years ago.

BEACHES AND DELTA IN THIS COUNTY.

The south line of Polk County crosses the highest beach near the middle of the south side of Garfield Township, about two and a half miles southeast of Fertile. In the past edge of the southeast quarter of section 28 and the west edge of the northwest quarter of section 27, Garfield, this beach is a typical ridge of gravel and sand, with its crest 1,166 to 1,173 feet above the sea. There is a gradual descent toward the west. The depression on the east is a sixth to a fourth of a mile wide, sinking 6 to 10 feet below the beach. Farther eastward the land is moderately undulating glacial drift, rising 20 to 30 feet above the beach and bearing frequent groves of small poplars, bur oak, and canoe birch.

When Lake Agassiz stood at its greatest height, the Sand Hill River brought into its margin a delta six miles long from south to north and three miles wide, reaching from the upper beach to the west side of Garfield and continuing south through the northwest part of Sundal in Norman County. The surface of this delta deposit of stratified gravel and sand descends slowly westward and is crossed by the lower Herman and Norcross shores, though these lake levels are not there generally traceable. The Tintah shores pass along its western margin, which in some portions was worn away to a low escarpment, steeper than its original frontal slope, while the eroded sand and gravel, after being carried some distance southward, but not wholly beyond the delta, were deposited in beach ridges. Upon the delta plain many dunes of small and large size, seen from a distance of ten or twelve miles across the lower expanse at the west, have been heaped up by the winds, probably mostly before vege-