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any part of the lake the water is piled up above the mean level, since the head of water thus raised forces a portion of the water back as an undercurrent. They are also frequently formed when there is a change in wind direction following the development of a strong longshore current. The momentum acquired by the water will often maintain a strong undercurrent a little way off shore, for a long period after the direction of the longshore currents on the surface has changed.

Waves.—The same wind that generates a surface drift which becomes a longshore current where it impinges on the shore also develops waves. At a few points the water of a wave may roll up on the beach at the shoreline and run directly back again, but only at those points where the shoreline is parallel to the wave front. On the shores of the Great Lakes, where the shorelines sweep in great open curves with chords often from 4 to 8 miles in length, the wave front very frequently advances at such an angle to the shoreline that the waves roll up the beach obliquely. Where this happens the water never returns by the same path that it came, but runs off obliquely; so that material on the beach when moved by the waves tends to travel along the shore by a zig-zag path, the angle at which the wave strikes the shore determining the angle between any two limbs of this path of travel.

Inter-relations, Waves and Currents:—Along a stretch of lake shore where the waves are impinging obliquely and where a number are always breaking at once, the tendency will be for the waves themselves to generate a longshore current flowing in the direction in which the bisector of the acute angle between the wave front and the shoreline points. This wave-generated current is always accordant with the longshore drift current caused by the same wind, and as they operate together in shore transportation they may be referred to simply as the longshore current.

After the wind which has started the waves and currents has ceased to blow, the swells still continue for some time, and even after the swells have ceased to be perceptible the longshore wind current remains quite strong, the momentum which the water acquired during the period of storm not being expended for some time after the storm has ceased. It not infrequently happens that a new wind from a different quarter may spring up and start to generate a current in an opposite direction. This affects the surface water first, while the lower water still retains the motion in the original direction, also the water immediately along the shore is affected to