

up to above high water line, not only to keep out floating timber, but to serve as diagonal bracing as well.

Where banks begin to wash away, it has been found that fine brush is generally the best and cheapest remedy. It should be secured by stakes or stone, or both, as the case may warrant.

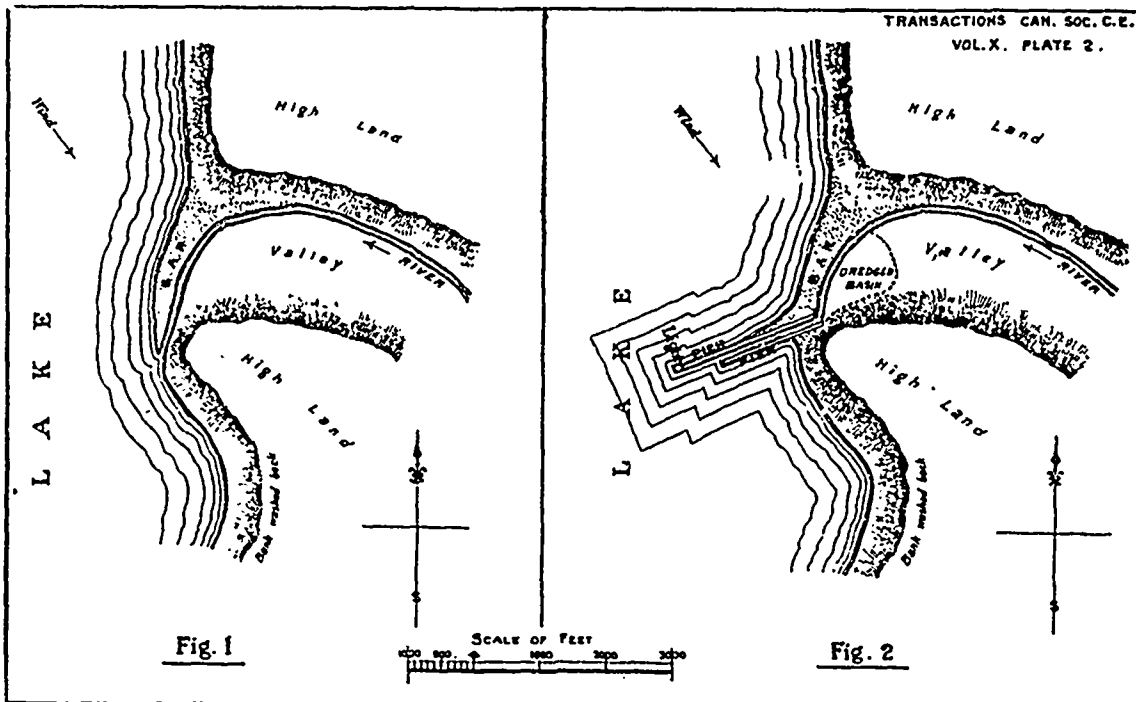
In Lakes Huron and Erie the shore currents point down the lakes, in the direction of the natural flow of the water. This, it is thought, is a mere coincidence, as there is not enough of flow of water to make any appreciable current. The prevailing winds are no doubt the cause of the more constant currents along the shores.

In Fig. 1, we have a very fair illustration of the mouths of the Rivers Saugeen, North Sables, Pentangore, Pine River, Maitland, Bayfield, South Sables, and other rivers. By turning the same diagram as indicated by the dotted north point, it fairly represents Kettle Creek, Big Otter Creek, Little Otter Creek, Catfish Creek, and other rivers and streams flowing into Lake Erie. Long Point too bears down the lake.

In Fig. 2 we see how some of these basins have been made to answer as harbors, after a fashion, as they could not always be entered during storms, though, as a general rule, any vessel making the lee side of the longer pier could in the stiller water move along into the harbor or tie up to the pier. In case of very rough weather on Lakes Huron and Erie, vessels make for the large rivers at either end of such lakes, or seek the shelter of an island if near to one. Failing these, they anchor and endeavor to ride out the gale.

It is here submitted that the plan, Fig. 2, is the best that can be adopted in utilizing at a moderate cost the mouths of rivers entering lakes. Where such works have not proved sufficient, it would be much the best and cheapest way to continue such works out into deeper water.

In no case is it advisable to close up the old channel and form a new one by cutting through the bar or beach. In Fig. 3 we have an illustration of the effects of changing the channel of a river. Lake Burwell, with its neighbor Lake Smith, formerly portions of Lake



It will be noticed that sand bars are formed across the ends of the river valleys, as the results of the opposing currents of rivers and lakes meeting, sometimes fairly and squarely, but generally at an angle, when they coalesce and form one current, the direction of which is determined by their relative forces after the manner of the polygon of forces.

These sand bars begin at the windward side of the valley, and extend quite across, being crowded out into the lake water at the end, by the river current prevailing over the lake current at that point. The river too is crowded against its leeward bank, which is often very steep from being washed away at the base. As a result of such crowding of the bar and river, the channel is often narrow and deep where it passes the bar. The bar or bank on the windward side is strengthened and reinforced by the wash of lake silt up against it. On the river side of the basin, the bar is strengthened by the silt of the river constantly being deposited. The river bank, or rather the lake bank, on the leeward side, is generally washed away. This is particularly noticeable at Port Burwell and Port Stanley, where large areas of high table land have been washed away within the last 50 years.

Huron, but in comparatively recent times cut off from that body of water, but not yet filled up by sand dunes, have for their outlet the South Sables river. The sand dunes extend from the old shore of Lake Huron to its present shore, the distance between such old and new shores being at Fort Franks, about four miles. The river reached the lake by a very circuitous route. Lakes Burwell and Smith being first cut off by the dunes, the river flowed out northerly, the dunes about said lakes becoming higher and extending northerly by the action of Lake Huron, crowded the river up against the edge of the higher land. Thus was the line of the dunes extended northerly—and with it, the channel of the river, till the nature of the shore of the Great Bend turned the river nearly due west. There the current of the lake opposed it from the north-west, and then a bar or beach began to form between the river and lake, crowding the river close up and along the base of the dunes already formed. The beach extended several miles, as shown in the sketch. Had the river not been interfered with, the beach would in time doubtless have reached Kettle Point, where, from the nature of the bottom, the formation of the beach and of the dunes must have ceased.