

water birds, grebes, ducks, and rails nested in immense numbers, and with stony islets in the lake populated by nesting gulls, tern, pelicans, and cormorants. Today this description, and outline are hardly recognizable. The water has fallen from eight to ten feet from its old level, as indicated by the old shore line still visible and the outline and conditions are greatly changed. The Narrows are now high, dry hay fields and the creek channel is a dry ditch winding its way across two miles of open prairie cutting the lake into two separate bodies of water having no communication with one another. The surrounding marshes have disappeared and in their place are broad reaches white with alkali crystals. The islets, deserted by their original tenants, are of considerable extent and with long sand and stone shoals reaching toward each other or toward the shore. Of the luxuriant growth of reeds nothing remains but the root tops in the mud, prevented probably by increasing salinity from following the water in its retreat from the old shore-line. Of the vast numbers of birds that once treaded the mazes of the marsh practically none remain but the few that are restricted to the borders of the rapidly disappearing pools back from the shores.

A tradition from aboriginal sources asserts that the lake rises and falls regularly with a period of about fifteen years. Mr. Seton informs me that "the waters of Shoal Lake, in common with all in Manitoba, have a fashion of rising and falling in periods of about seven years". However regular this rise and fall may be and what the period is, Shoal Lake was high in 1867 when visited by Gunn, also in 1901 when Chapman and Seton were there. The Wards arrived on its shores about 1889 and Ward, Sr., declared that at that time the lake was low. It is evident from the reports of Arnold and Raine that the water was fairly high in 1894 and the Wards say that it reached its maximum about 1899. It rises faster than it falls we are told. Whether the water will ever come back again to its old level remains for the future to show. Should it do so it will offer a remarkable interesting ecological study in investigating the effects of the change from highly alkaline to practically fresh water upon the contained and surrounding life. Before this change takes place it is most desirable that a comprehensive study should be made of the present biological conditions as a basis of contrast with higher stages of water.

The lake has no important inlet and no outlet. The level is probably governed by the variation in annual rainfall extending over a series of years. The geological strata in which the lake lies is obviously porous and fissured with underground channels, as evidenced by changes in the water of near-by wells, but I have heard nothing of corre-

sponding variations in level of the great lakes on either hand, so the local conditions are probably independent of them.

The surrounding country is prairie, liberally sprinkled with small clumps of bush. These clumps, called "bluffs" throughout the prairie provinces, range from mere spots of one or two low growing bushes to several acres of woodland and are occasionally a mile or more in their longest direction. They are usually very dense and sometimes all but impassable owing to underbrush, felled tops, or burnt trunks criss-crossed on the ground like jack straws. The edges, however, are sharply defined and between them runs the clear prairie, winding in and out, narrowing here to grassy lanes and widening there to green glades or broad meadows of varying extent. All the woodland has suffered severely from fire. Grazing is the principal industry and the practice of burning the dead grass to induce a vigorous growth has not only tended to check the natural spread of the bluffs but has devastated many of them and groups of black skeleton trunks offend the eye more often than is desirable.

Most of the timber composing the bluffs is poplar with willow and other smaller shrubbery about the edges. In the largest bit of woodland in the neighbourhood of our camp is a small stand of bur-oak and on Maple Island, some five miles up the lake—an island no longer—is a little maple (Sp.?) from which sugar used to be made. At the head of the upper lake, we are informed, considerable spruce or evergreen exists, but there is none in the parts visited by us. Poplar is the principal timber and that upon which the residents rely for general uses and for fuel. Viewed by eyes accustomed to eastern woodlands none of the growth is large—a ten-inch trunk is the maximum now seen, though occasional rotting stumps indicate that larger trees were more common before they fell to the axe of the early settlers. Now most of the growth is little more than pole size and rarely exceeds a height of 40 feet.

Here and there, where the level of the land is lower, there have been marshes and the so-called red-root bogs are common and muskeg occurs locally. Now, however, owing to the lowering of the water-line these are mostly dry except in spring and represented by damp areas with a few reed-like water grasses growing about the occasional watery spots which still persist. On my return in September I found that most of these hydrophytic evidences were obliterated and the usual hay grass was growing where in the spring cat tails and reeds had flourished. Occasional ponds had remained through the summer's drought, but few of these promised to last long.

The spring of 1917 was late and as we passed