

away. The flood remained in this state for more than two weeks.

"After an interval of eight years (in 1860) the river again inundated its banks, covering the level prairie, but the overflow was not widespread.

"The following year (1861) there was another flood, when the water rose to within 2 ft. of the level of the flood of 1852, overflowing to the depth of about 18 ins. a very large area of the prairie.

"Since 1861, there has been an immunity from any serious inundation, but on one or two occasions, the water has risen nearly to the prairie level.

"The Bishop of Rupert's Land, in his 'Notes of the Flood of 1852', estimates the breadth of the inundated country at about 12 miles; mentions that houses and barns, furniture and farm implements were swept away. The settlers took refuge on the nearest elevated ground, Stoney Mountain and Bird's Hill. The bishop, with his household, escaped in canoes, and passed down the river until he reached dry land, in the Parish of St. Andrews, some thirteen miles below Fort Garry. From this point northerly he describes the river as being 'confined within narrow limits,' and with a more impetuous current. The bishop mentions that at the Stone Fort the river was 'running at the rate of eight or ten miles an hour.'

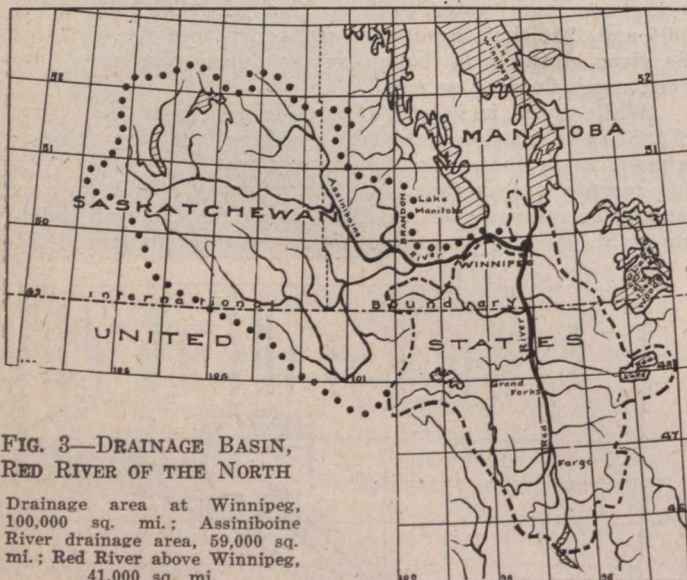


FIG. 3—DRAINAGE BASIN, RED RIVER OF THE NORTH

Drainage area at Winnipeg, 100,000 sq. mi.; Assiniboine River drainage area, 59,000 sq. mi.; Red River above Winnipeg, 41,000 sq. mi.

"In 'The Red River Settlement, its Rise and Progress' (by Alexander Ross), a work written before the inundation of 1852, we find an account of an earlier flood, of which the author was an eye-witness. This occurred in the year 1826. The water rose about 18 ins. higher than in 1852, and submerged a much greater area of the level prairie. It lasted from the 2nd of May until the 15th of June.

"I submit a few extracts from the volume referred to:—

"The winter had been unusually severe, having begun earlier and continued later than usual. The snow averaged 3 ft. deep and in the woods from 4 to 5 ft. The cold was intense, being often 45 degs. below zero; the ice measured 5 ft. 7 ins. in thickness. Notwithstanding all this, the colonists felt no dread till the spring was far advanced, when the flow of water from the melting of the accumulated snow, became really alarming. On the 2nd of May, the day before the ice started, the water rose 9 ft. perpendicularly in the 24 hrs.

"On the 4th, the water overflowed the banks of the river and now spread so fast that almost before the people were aware of the danger, it had reached their dwellings. Terror was depicted on every countenance, and so level was the country, so rapid the rise of the waters, that on the 5th all the settlers abandoned their homes and sought refuge on higher ground.

"At this crisis, every description of property became a secondary consideration and was involved in one common wreck, or abandoned in despair. The people had to fly from their homes for dear life, some of them saving only the clothes

they had on their backs. The shrieks of children, the lowing of cattle and the howling of dogs, added terror to the scene.

"By this time the country presented the appearance of a vast lake, and the people in the boats had no resource but to break through the roofs of their dwellings and thus save what they could. The ice now drifted in a straight course from point to point, carrying destruction before it, and the trees were bent like willows by the force of the current.

"While the frightened inhabitants were collected in groups on any dry spots that remained visible above the waste of waters, their houses, barns, carriages, furniture, fencing and every description of property might be seen floating along over the wide extended plain, to be engulfed in Lake Winnipeg. Hardly a house or building of any kind was left standing in the colony.

"The water continued rising till the 21st, and extended far over the plains. Where cattle used to graze, boats were now flying under full sail.' It subsided, of course, very gradually. It was on the 15th of June that the settlers, for the first time, drew near the sites of their former habitations."

Cause of the Floods

The cause of these floods has been the subject of much speculation and debate. Mr. Ross states with respect to the flood of 1826, that "the previous year had been unusually wet; the country was thoroughly saturated; the lakes, swamps and rivers at the fall of the year were full of water; a large quantity of snow had fallen in the preceding winter. Then came a late spring, with a sudden burst of warm weather, and a south wind blowing for several days in succession; the snow melted at once, and Red Lake, Otter-Tail Lake, as well as Lake Traverse (source of the Red River), all overflowed their banks."

Bishop Anderson, in his "Notes on the Flood of the Red River in 1852," records:—

"April 25th, Sunday—Large masses of ice passed during the evening and the following day. The winter had been unusually fine until the end of February, but through the whole of March, a great deal of snow had fallen.

"May 5th—Towards night heavy rain commenced, the first since the breaking up of the ice; if it brings warm weather it may do good.

"May 9th—It was the pouring of the water over the plain.

"May 19th—Water stationary.

"June 13th—End of notes."

These causes are sufficient to account for the superabundance of water: A wet fall, followed by a sudden, severe frost to seal up the marshes, lakes and saturated ground until spring; an unusual snow-fall during a prolonged winter; a sudden burst of warm weather, with copious rains in the basin of the Red River.

While these natural agencies, either working separately or in combination, will give rise to these floods, yet there are other factors which enter into the question, and the ones which must be considered if flood control is desired are the physical features of the drainage basin and the river itself.

The drainage area of the Red River at Winnipeg is some 100,000 sq. mi. in extent. Of this huge area, 59,000 sq. mi. is drained into the Red by its tributary, the Assiniboine (see Fig. 3).

This large tributary drainage basin fortunately consists for the greater part of the country having small rainfall and snowfall, with high evaporation. Therefore, it is only in years of unusual precipitation that this river contributes flood-waters that swell the Red to the danger point.

The tributary drainage area of the Red River above its junction with the Assiniboine at Winnipeg, extends through a country which has, in general, comparatively flat slopes, but the tributary streams all have steeper slopes than the main river, and thus by bringing the flood-waters down to the main river faster than it can carry them away, tend to increase the frequency of the floods.

Another important factor in the location of this drainage basin is that it drains to the north. Thus, on the south or upper watershed, the snow thaws and the rivers break up