In the western portion of Ontario the Departments of the Interior and Public Works have established one gauge on Rainy Lake and five on Rainy River. Next summer five of them will be replaced by self-reading gauges. In connection with the investigation of the water-levels of the Lake of the Woods, the International Joint Commission will establish others on the upper waters of the Rainy River.

So far as work by provincial governments is concerned, Ontario is much the most advanced. Its Hydro-Electric Power Commission has established gauging stations on a great many of the streams of the province and is carrying on the work of stream-gauging in a thorough and systematic manner; possibly the only improvement in this connection would be the establishment of additional stations until all the streams of importance are included in the work.

The powers conferred upon the Commission in this connection may be described as follows:

"It is duly authorized to investigate and report to the Lieutenant-Governor-in-Council upon any and all hydraulic, hydro-electric and other power undertakings, whether developed or undeveloped, throughout the Province."

In connection with the waterpowers of the Winnipeg River, the Water Powers Branch of the Department of the Interior has investigated the water resources of the Lake of the Woods drainage basin. In conjunction with the Department of Public Works, gauging stations have been established on Rainy River and certain important streams falling into Rainy Lake and a study has been made of the outflow from the Lake of the Woods.

While in the Maritime Provinces, Quebec, Ontario and British Columbia, except the Railway Belt and Peace River Block, the water powers are disposed of and are under provincial jurisdiction, in the Prairie Provinces, Manitoba, Saskatchewan and Alberta, they are under the control of the Dominion Government. This right was reserved when the provinces were created with a view of better conserving their waters as a whole and for this purpose a large forest area on the eastern slope of the Rocky Mountains has, recently, been segregated by the Dominion.

In Manitoba, the Water Powers Branch of the Department of the Interior has established stations on the more important rivers where information is required in connection with waterpowers, drainage, navigation, etc. The work is being gradually extended over the whole province to meet the economic conditions.

The Dominion Government has, for some time past, made investigations of the flow of streams in the latter provinces and, although these investigations were more particularly for irrigation purposes, they also have an indirect bearing on waterpowers. The following is an extract from one of the reports on this work:

"The records of stream flow published by the Irrigation Surveys give a fair approximation of the discharge of the principal streams in Southern Alberta and Saskatchewan at the different stages, but do not give the duration of the periods of high and flood discharge. As the water supply in some of the larger streams is apparently almost all recorded, the necessity of carrying on a systematic observance of daily discharge is evident.

"The chief features of the hydrographic work are the collection of data relating to the flow of the surface waters and the conditions affecting this flow. Information is also collected concerning the river profiles, duration and magnitude of floods, waterpower, etc., which may be of use in hydrographic studies."

"In organizing the Hydrographic Surveys it was realized that with the funds available, it would be impossible to make complete investigations of the whole of the water supply in the irrigation tract, but an effort was made to include all the more important streams. Gauging stations had already been established, by the Irrigation Surveys, on a number of the more important streams, and it was important that the observations at these should be continued without interruption. There were, however, many streams of considerable importance upon which there were no gauging stations. It therefore became the policy of the survey to continue the investigations at the stations already established and to establish other stations as soon as possible."

Unfortunately, as the work is being pursued in connection with irrigation, it does not include any figures for the winter season, which additional data would be of great value from a waterpower standpoint; this is recognized in the following quotation also from the report above cited:

"On streams where power is likely to be developed, special attention should be given to the low water flow, which in most cases occurs during the winter. For this reason it is very important that stream measurements should be continued during the winter on a number of the more important streams."

In British Columbia, the Water Powers Branch has a permanent organization known as the Railway Belt Survey. Gauging stations have been established on the important water-power rivers in the Railway Belt and special attention has been given to the streams in the so-called "Dry Belt."

During 1911 and 1912, the Commission of Conservation made reconnaissance surveys of water-powers in southern and central British Columbia and this work will be continued. In 1912, the Department of Lands of British Columbia, recognising the value of this work, appropriated nearly $2,500.00 in addition to the amount expended by the Commission of Conservation and will, this year, make a grant of $5,000.00. This work, however, is only in the nature of a reconnaissance and, wherever the development of the country indicates that the water will be economically usable, it should be followed up by such measurements as the Water Powers Branch of the Department of the Interior is now carrying on.

The great importance of systematic stream gauging in Canada cannot be over estimated. On the information furnished by the Government will depend to a great extent the development of water-power. Very often, before designing a development, the hydraulic engineer has to spend a year or more in making observations which in many cases are practically useless, because they do not cover a sufficiently long period, and the result is that the possible development is either much over-estimated or, in other cases, much under-estimated.

Although most of the waters of Canada are under provincial control, this matter of stream gauging is not only important to the different provinces but it is of national importance, and the Federal authorities should undertake the gauging of Interprovincial and International rivers to collect this all-important data in a systematic and uniform manner.

The Provincial Governments could make a beginning by devoting their attention altogether to the establishment of stations where the water levels only would be read, leaving, if necessary, for future years the systematic observations required to convert these water heights to discharges. It was in this manner that it has been possible to calculate the different discharges of the Ottawa River since 1844; water-levels only had been kept since that date by the lockmasters of the canal at Ottawa and it was only comparatively recently that observations were taken to convert these water-levels into actual discharges.

For the present, of course, it would be out of the question to have these stations on all of our streams, but a start might be made on the more accessible ones or those on which storage and conservation will become a necessity or a natural outcome at some future date. At present, there are very few streams in Canada on which artificial storage or conservation is being practised, because it has not yet become commercially economical or necessary to do so. When the power possibilities of a stream under natural flow have been exhausted at one site, other sites, nearby, on the same or other streams have been found and developed, this requiring less outlay per h.p. than would have been required to conserve the flow of the stream. But this cannot go on forever, and a time will come when the last site within an economical radius will have been secured and the conservation of the stream will have to be resorted to in order to satisfy the increasing demand for power. When this time comes, in order to develop a conservation scheme on any stream intelligently, it will be necessary to possess a complete history of the flow of the stream under consideration for a period of at least from ten to fifteen years previous, and, unless a beginning is made now on the history of flow of some of these streams, when the time comes to conserve them the data at

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