Diverting all the low-water flow from any wide shingle river by a weir and draw-off chambers on the banks would, in any case up to 500 ft. or 600 ft., be fairly troublesome; when the width reaches a mile the problem is too serious to consider, for there would be many risks. A dam across the Wilberforce is feasible, but too costly.

Rakaia.

A proposal has been made to utilise the water from the Rakaia by building dams near the road—one over the main river and another over the overflow-channel at the gorge above Methven. The drainage-area of the river above this point is about 1,020 square miles. The various branches of the river drain a length of forty miles of the Southern Alps, as against about twenty-seven miles drained by the Waimakariri, the distances being measured on the straight in both cases. Allowing for the extra length of the Alps drained by the Rakaia, until the low-water flow is determined by reliable measurements and observation, I do not put the low-water flow of the Rakaia at more than 2,600 cubic feet per second.

The lowest point of the road approaching the bridges is 45 ft. above low-water level. After making adequate provision for the flood-water passing over the dams or otherwise, it would not be possible to raise the low-water level of the river by more than about 30 ft. If a power-station were placed near the bridge, after deducting back-water due to flood, there would not be more than 5,000 or 6,000 b.h.p. at the most obtainable from a scheme such as this. The cost of two dams would be about £50,000, or more if the depth to the rock in the river-bed is great, and there would be other accessory works.

If the Rakaia were to be utilised by damming, the rock gorge just above the bridges would be suitable. A greater height would be obtainable, but the cost would be very large.

Lake Heron.

This lake lies in the Rakaia Valley, at an elevation of 2,267 ft. above sea-level. Its drainage-area is sixty-six square miles, and it is partly fed by a glacier-stream. The flow from the lake was found to be about 300 cubic feet per second. By taking a race to the Rakaia River about 200 ft. fall would be obtainable. The length of race would be about twelve miles. The lake-stream would be utilised for about four miles, leaving eight miles of race to construct. Somewhat over 8,000 b.h.p. continuous working would be obtained by utilising Lake Heron. The area of the lake is about five square miles. Its level could cheaply be raised by 10 ft. The high elevation is objectionable, as likely to engender trouble from frost. There are no streams that could be diverted into Lake Heron to increase the power.

Ashburton.

Both the south and north branches of the Ashburton River were examined. The south branch has a drainage-area of 205 square miles, and its flow at the time of inspection was over 300 cubic feet per second. The north branch is rather smaller than the south branch. Dams to store water could not be constructed, and without these any scheme to utilise either stream would only be a small one, and, in the absence of storage, uncertain. Further survey to give fuller information might, however, show that a scheme of fair size could be got.

Rangitata.

There is a site for a dam or weir on the Rangitata, in the gorge twenty-three miles above Geraldine. The sides of the gorge are of rock for a height of 200 ft. or more, and probably rock foundations would be got in the river-bed at a reasonable depth, but this has not yet been tested. The drainage-area of the Rangitata above this point is about 608 square miles, and the watershed drains a length of about thirteen miles of the Alps. Its low-water flow for the present may be taken at 1,100 cubic feet per second, until reliable data are obtained from observations extending over a sufficiently long period.

Two schemes are possible for utilising the water from the river at this place. One is to build dams and use the water at a power-station near the dam. A dam 150 ft. high would probably cost £250,000, and give about 14,000 b.h.p. A dam 200 ft. high would cost £500,000, and give 19,000 b.h.p., the power in both cases being computed on the assumed flow of 1,100 cubic feet per second. As the gorge is narrow above the proposed dam no storage could be got to modify these results, except that perhaps storage for twelve-hours-a-day schemes might be got.

With a dam, say 100 ft. high, costing perhaps £140,000, and a race to carry the water to a point seven miles down the river, an effective fall of, say, 250 ft. might be got. The amount of power obtainable would be about 25,000 b.h.p.

These Rangitata schemes would be relatively expensive.

Opihi.

The Opihi gorge begins about three miles below Fairlie, and is about three miles long. There is a fall of about 300 ft. in the gorge, and a further fall of about 100 ft. to the junction of the Opihi and Opuha. It is probable that some of this 100 ft. could be utilised by armoured concrete or steel pipes extending beyond the end of the gorge. The drainage-area of the Opihi above the gorge is 150 square miles. A flow of about 200 cubic feet per second was observed last winter. No minimum summer flow has been observed. It is an easy matter to reinforce the Opihi by running into it the low-water flow of the two Opuhas, with a drainage-area of 140 square miles; also, the Tengawai Stream, with a drainage-area of sixty square miles, could be diverted into the Opihi. All four streams drain mountainous country, with peaks 2,100 ft. to 7,600 ft. high. About two hundred square miles out of the 350 may be classed as mountain-area, and should give a good flow of water. It is probable that some storage could be got by building a dam at the upper end of the gorge, but no data have been got as yet on this point, and the reservoir would likely silt up in a short time. The sides of the Opihi gorge are