

1937, during which period the junior writer mapped, by plane table supplemented by stadia traverses on a scale of 8 in. to the mile, that part of the reserve embodied in the accompanying plan, in all an area of five square miles. Throughout the survey intersections on minor trigs established by theodolite were taken for control.

The senior writer was in the field for a total period of three weeks at the beginning and end of the field-work.

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Previous Observers.—In 1877 Robert Denniston published his "Detailed Notes on the Buller Coal Field" in the "Reports of Geological Explorations during 1874-76," No. 9 of the reports of the old Geological Survey. He described several sections containing coal within the Blackburn Reserve; some of these cannot be accurately located.

In the same volume S. Herbert Cox published his "Report on the Survey of the Buller Coal Field." He referred especially to the area here considered on p. 116 as the "Upper Orikaka Country," and one of the geologic sections accompanying the report that he described as "Section through Orikaka Valley N.S." is a section through the Blackburn.

The most detailed and comprehensive account of the area is that by P. G. Morgan and J. A. Bartrum in "The Geology and Mineral Resources of the Buller-Mohikini Subdivision, Westport Division," *N.Z.G.S. Bulletin* No. 17 (New Series). This publication makes several references to the Blackburn area, and pages 150-152 deal particularly with it. Reference is made to these publications in the following report.

GENERAL DESCRIPTION OF THE RESERVE.

The greater portion of the reserve consists of monotonous broadly terraced land at elevations of from 900 ft. to 1,400 ft., relieved by the northern end of the Mount Berners ridge (2,390 ft.) and the low hills of the divide between the Ngakawau and Mackley rivers. There are two prominent remnants of erosion, Island Hill (1,330 ft.) and Isolated Hill (1,280 ft.), toward the western boundary of the reserve, which includes in addition the lower slopes of the elevated Mount William block to the west. Some 900 acres bordering the Upper Blackburn is poorly drained, swampy, pakihi land up to 20 ft. above stream level, but with the exception of another 150 acres of pakihi between the Blackburn Stream and the Ngakawau, 120 chains south-east of Trig. AS, the remainder of the reserve is covered with beech and rain forest and large patches of manuka.

The area is drained entirely by the Ngakawau and its tributary the Blackburn, which south of Island Hill is a sluggish meandering stream entrenched 3 ft. or 4 ft. in an ill-defined flood-plain that merges into the surrounding pakihi. About 15 chains north-west from Island Hill the Blackburn plunges over resistant sandstones and grits in a 50 ft. fall, whence it flows for 29 chains in a maturely graded reach before plunging over another outcrop of the same resistant rocks in a waterfall 36 ft. high. Downstream from here the Blackburn is entrenched 100 ft. or more below the bordering high-level terrace and flows by three maturely graded reaches separated by two short rapids to its junction with the Ngakawau. Each of the two upper of these reaches is controlled by granite masses on which the stream is superposed; the lowest reach is controlled by base level at the Ngakawau junction.

The two waterfalls in the Blackburn are matched by two corresponding falls in its tributary—Mullocky Creek—and as this latter creek is cut entirely in soft Kaiata mudstone, the falls have receded 30 chains farther headward than they have in the Blackburn, which above the confluence is cut in the more resistant basal Kaiata mudstone and Brunner beds.

The headwaters of the Blackburn from a point 60 chains north-west from Island Hill formerly flowed to the Ngakawau by Erin Creek, a tributary of St. Patrick Stream. Remnants of terraces in the Upper Blackburn some 35 ft. to 40 ft. above present stream-level match an extensive river-planed flat with an abandoned stream channel between the Erin and the Blackburn. This latter throughout its course flows over much less granite than does the Erin and has captured its present headwaters from this stream by more rapid headward erosion.

The catchment area of the Blackburn upstream from Island Hill is about two square miles, and in this portion of its course the stream averages 6 ft. across near the south end of the pakihi and 15 ft. across at the north end. It is entrenched from 3 ft. to 6 ft. below much of the pakihi, the surface of which consists of a shallow cover of alluvium resting on a somewhat imperious mudstone, so that during wet weather there is a relatively rapid run-off with consequent flooding of the pakihi adjacent to the stream. As the greater part of the possible coal-bearing area underlies that portion of the pakihi which is only some 20 ft. at most above stream-level, it would seem that under the present system of coal-mining as practised in New Zealand only a small percentage of extraction would be possible without taking a risk of allowing surface water to enter the workings.

The only other river of importance within the reserve is the Ngakawau, which after emerging from the Glasgow Range flows for two miles and a half across the north-east corner of the reserve.

STRUCTURE.

Outline.—The reserve occupies portion of the structural depression between the highlands of the Glasgow Range on the east, and the Papahaua Range (Mounts Rochfort, William, Frederick, Stockton, &c.) on the west. This depression is the northern continuation of what is described in