

base being determined by the Richardson Mountains, Mount Alfred, and the truncated spurs of Mount Earnslaw respectively. At the base of the eastern flank of Mount Alfred lie two small shallow lakes which discharge into the Rees—namely, Diamond Lake (21 acres) and Reed Lake (2½ acres). Near the north-east corner of the triangular area is a small schist *roche moutonnée*, Camp Hill, rising to a height of some 200 ft. above the valley-floor. The Rees River impinges on its eastern side and on the west. There is a strong development of gravel terraces rising in two stages to the 170 ft. level. The major part of the 170 ft. terrace occupies the area between Camp Hill and Lovers' Leap and serves as Earnslaw airplane-landing field. Earnslaw Burn flows along the western margin of these terraces to discharge into Diamond Lake.

On the western boundary of the area Mount Alfred forms a most conspicuous landmark, being a vast pyramidal shaped *roche moutonnée*, rising to a height of 4,548 ft. It is entirely surrounded by the delta gravels of the Rees and Dart except for the low saddle at Paradise connecting Mount Alfred to the high, precipitous western ridge of Mount Earnslaw. Into this ridge the Jordan Stream has cut deeply and has, with the assistance of other minor streams, formed a large steep gravel fan at the northern end of Diamond Lake.

The upper Rees Valley, extending from Lovers' Leap back to its headwaters in the Forbes Range passes through gorge for the first few miles to Muddy Creek, then opens out into a wide alluviated valley which extends to the source.

The Earnslaw Burn flows parallel to the Rees and has its source in the great cirque on the southern flank of Mount Earnslaw. For two miles this stream flows along a U-shaped valley, possessing minor terraces and great piles of moranic material; it then enters the narrower part of its valley, down which it flows for a distance of five miles to the gravel flats of the lower Rees Valley.

Along the whole length of the western slopes of the Richardson Mountains the major streams—Stone Creek, Buckler Burn, Temple Creek, and Twelve-mile Creek—have cut deep, narrow gorges back into the mountains. There has also been an extensive delta development by these streams, the remnants of which can still be seen as large 170 ft. terraces at the mouth of the Buckler Burn—the large, flat terrace, locally known as “The Bible,” and at the mouths of Temple and Twelve-mile creeks.

East of Glenorchy and lying between Buckler Burn and Temple Creek is a low, rounded ridge about 1,000 ft. above the lake, and separated from the main hillslopes by a gravel-filled valley some two miles long—Chinaman Flat. A continuation of this ridge can be traced south along Trig. G ridge to Pigeon Island and Pig Island about four miles from the head of the lake; northward topographic features suggest linking it with Camp Hill.

At the southern end of Mount Alfred the delta of the Rees unites with that of Dart River, a much larger stream, and forms flats, some two miles wide and three miles long, which cover the entire head of Lake Wakatipu. Both rivers are at present actively engaged in building out their common delta at quite an appreciable rate, as is shown by the Railways Department having to shift the Glenorchy Wharf some 15 chains down the lake to enable the lake steamers to berth.

The main ranges and ridges of the district all terminate in the Forbes Range in the north, which rises to its highest points, Mount Earnslaw (9,250 ft.) and the East Peak (9,165 ft.) in the extreme north-west of the Earnslaw Survey District.

GLACIATION.

Throughout the whole subdivision the topography shows strong and distinct evidence of intense glaciation. The westward flank of the Richardson Mountains has been smoothed, and in many places longitudinal parallel ridges have been cut by the ice. These ridges, which can be seen to advantage on the slopes between Temple and Twelve-mile creeks at an elevation of some 3,000 ft. above sea-level, may owe their origin to variations in the dip of the schist on the original surface, for where the ice truncated the dip of schists it cut somewhat deeper than where the dip-slope and surface are parallel. Such grooves, however, cannot be altogether regarded as a result of varying hardness of the rock, for in the area in question the schists show little or no variations. Rising above the glaciated slopes, which extend to a height of nearly 5,000 ft., the topography becomes much more rugged and the slopes steeper. This marked change is noticeable along the whole length of the Richardson Mountains and the main ridges of Mount Earnslaw. West of the head of the lake on the Humboldt Range between Elfin Bay and Kinloch the change is particularly apparent. Mount Alfred, 4,548 ft., has a well-rounded and smoothed appearance that strongly suggests having been overridden by the ice. The ridge of Trig. D that lies east of the township is distinctly rounded, and in a similar manner the continuation south of this ridge to Trig. G, Pigeon and Pig islands shows evidence of having been subject to intense ice-action. Pig Island is particularly striking, having been planed practically flat, rising to a low point some 110 ft. above the present lake-level. Pigeon Island has more of the typical *roche moutonnée* appearance with a gently sloping and smooth northern flank and rough steeper southern face. Camp Hill, at the head of the Lower Rees Valley, is another *roche moutonnée* showing evidence of its having been subjected to the action of ice moving from the north and north-west. Again at the head of the Lower Rees Valley the action of the ice in “plucking” back the ends of the spurs is most apparent at Lovers' Leap, a large imposing schist bluff rising nearly 3,000 ft. above the flats. Similar cliffs can be followed from the Earnslaw Burn to Jordan Stream at Paradise.

Along the western side of the main valleys the ice has truncated the schistosity planes, thus enabling the plucking action to go ahead apace, with the result that to-day these valley-sides are steep and rugged with numerous cliffs 200 ft. to 300 ft. running parallel to the direction of the valley for considerable distances. On the eastern sides of the valleys, however, the ice has moved over