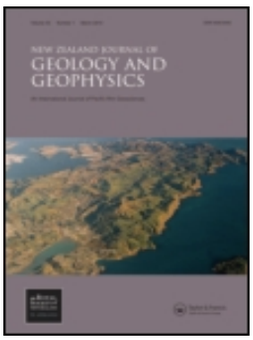

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THE ANCIENT DRAINAGE OF THE MARLBOROUGH SOUNDS

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Cotton (1955, Footnote 10, pp. 70–1) states, when discussing subsidence and submergence in the Marlborough Sounds, "This makes no allowance for a probable north-easterly tilt of the whole Marlborough Sounds block of country. . . . First a tectonic subsidence took place with down-warping or tilting of the whole block towards the north-east, deeply drowning a mountainous landscape (Plate VII, Fig. 1) so that ridges and spurs taper to points and plunge beneath Cook Strait. This movement was followed, perhaps considerably later, by the submergence due to post-glacial eustatic rise of ocean level, causing drowning to about 300 feet and producing the intricate shoreline pattern".

If, as Cotton (1955, Footnote 10) states, a mountainous landscape were drowned in (say) the Queen Charlotte Sound area then it is possible that the tilting may have caused a reversal in the drainage pattern of rivers which originally flowed to the south. However, Cotton (1942, p. 442) gives Queen Charlotte Sound as an example of a ria which broadens towards the coast.

Examination from the air and of topographical maps of the Marlborough Sounds area shows that the tributary arms join the major sounds at acute angles that point to the south (Fig. 1A), and this would seem to indicate that the entrance to Queen Charlotte Sound is not the mouth of an ancient river, but, on the contrary, the drowned head-water of a river system which at one time flowed to the south to drain into the Wairau River perhaps by way of the Tuamarina River or, more likely, by way of the Kaituna River (Fig. 1B). Soundings on the Royal New Zealand Navy chart of Queen Charlotte Sound also indicate an original drainage to the south. The greatest sounding (41 fm) is near the junction of Tory Channel and Queen Charlotte Sound, and in general most major slopes of the sea floor south-west of the entrance to Queen Charlotte Sound are towards this point. In particular, in Tory Channel there is a relatively rapid increase in depth from the entrance to the junction with Queen Charlotte Sound. These facts are consistent with tilting of the Marlborough Sounds block to the north-east but imply a much greater downward movement than would be necessary if the drainage were not reversed. To the north of Queen Charlotte Sound it is probable that the ancient drainage near the entrance of Pelorus Sound was towards the north (Cotton 1955, p. 73).

The southern boundary of the Marlborough Sounds block was probably the Wairau Fault which strikes east-north-east along the Wairau Valley. The western boundary to the block is not well defined but it may have been one of the north-east trending faults which cut Te Anau and Maitai Group rocks to the west of Tennyson Inlet (Beck, 1964). To the north-east it is

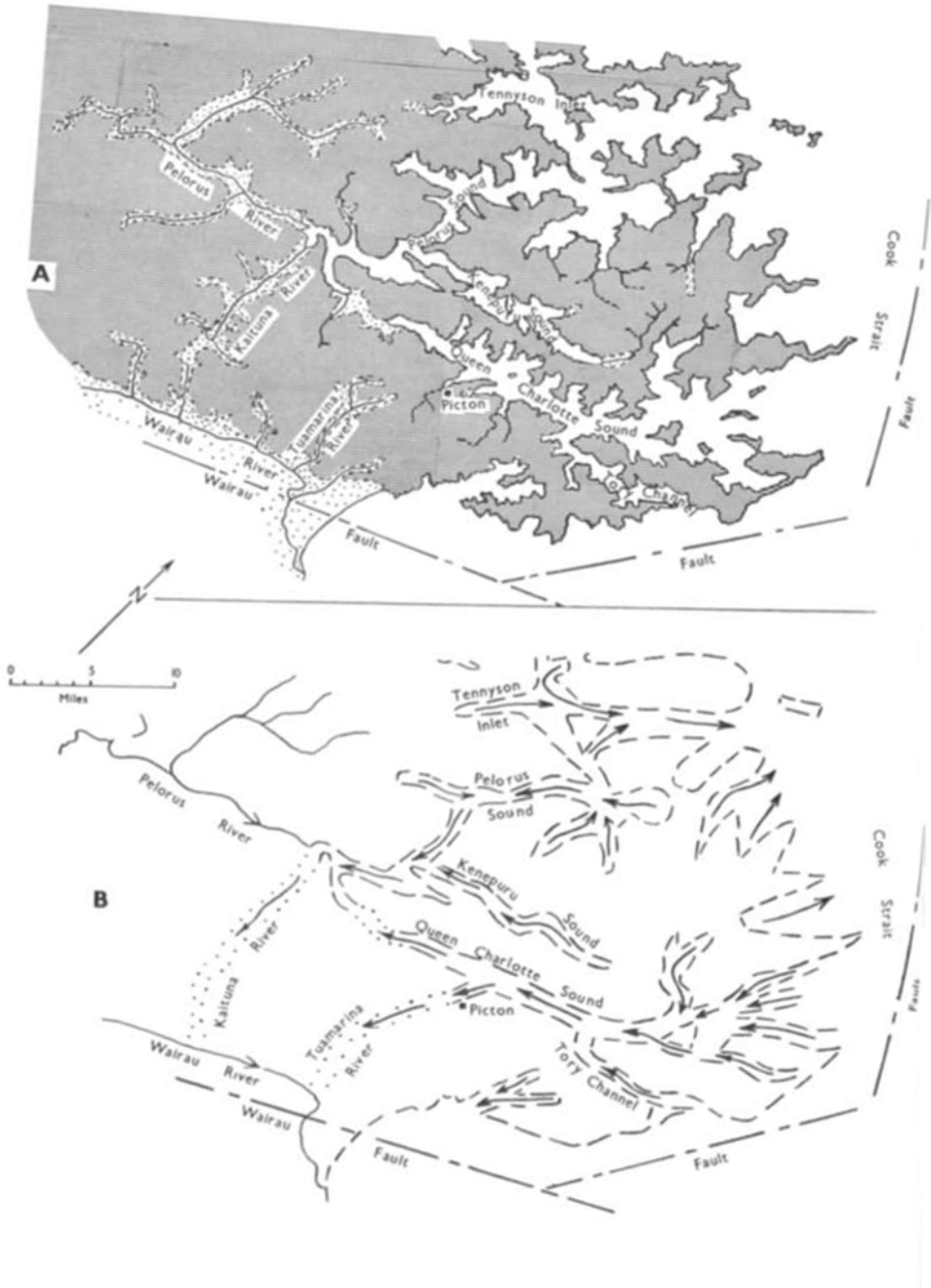

FIG. 1—Maps of the Marlborough Sounds area showing A. The present drainage in the Marlborough Sounds area. Alluvium stippled. B. A possible ancient drainage pattern (arrows). Dashed lines are drawn between headlands on either side of the sounds and along the coast. Dots indicate margins of low-lying areas on land that may have been part of the ancient drainage pattern. Solid lines are present-day rivers.

apparent that a large fault is present in Cook Strait (Cope and Reed 1967, fig. 1). This fault has a north-west strike and is probably close to the Marlborough coast. The existence of the fault is supported by submarine topography. To the east there is probably also a fault off the Marlborough coast as indicated by the alignment of submarine contours.

It might be thought that such marked tilting would reverse the direction of slope of the beds of ancient streams such as Tory Channel. However, the Marlborough Sounds block is about 40 miles wide, as measured in a south-west direction from the entrance of Queen Charlotte Sound to the Wairau Fault. Thus an excessive subsidence of, say 5,000 ft would require a tilt of about 2° only. Such a tilt would not be sufficient to alter slopes significantly, either on the sea bed or on land.

The age of this large scale north-east tilting in the Cook Strait area is difficult to determine precisely, but the absence of sea cliffs or marine benches in the sounds (Cotton 1955, p. 71) would indicate that the movement was Recent.

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