APPLIED ECOLOGICAL STUDIES OF SHORELINE VEGETATION AT LAKES MANAPOURI AND TE ANAU, FIORDLAND

GENERAL INTRODUCTION

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Lake Te Anau and Lake Manapouri, the two largest lakes in Fiordland National Park, are connected by the Upper Waiau River (Fig. 1). They have been the centre of a decade-long controversy involving the harnessing of their large hydro-electric potential—primarily to smelt bauxite brought from Weipa in Queensland, Australia to the smelter at Bluff.

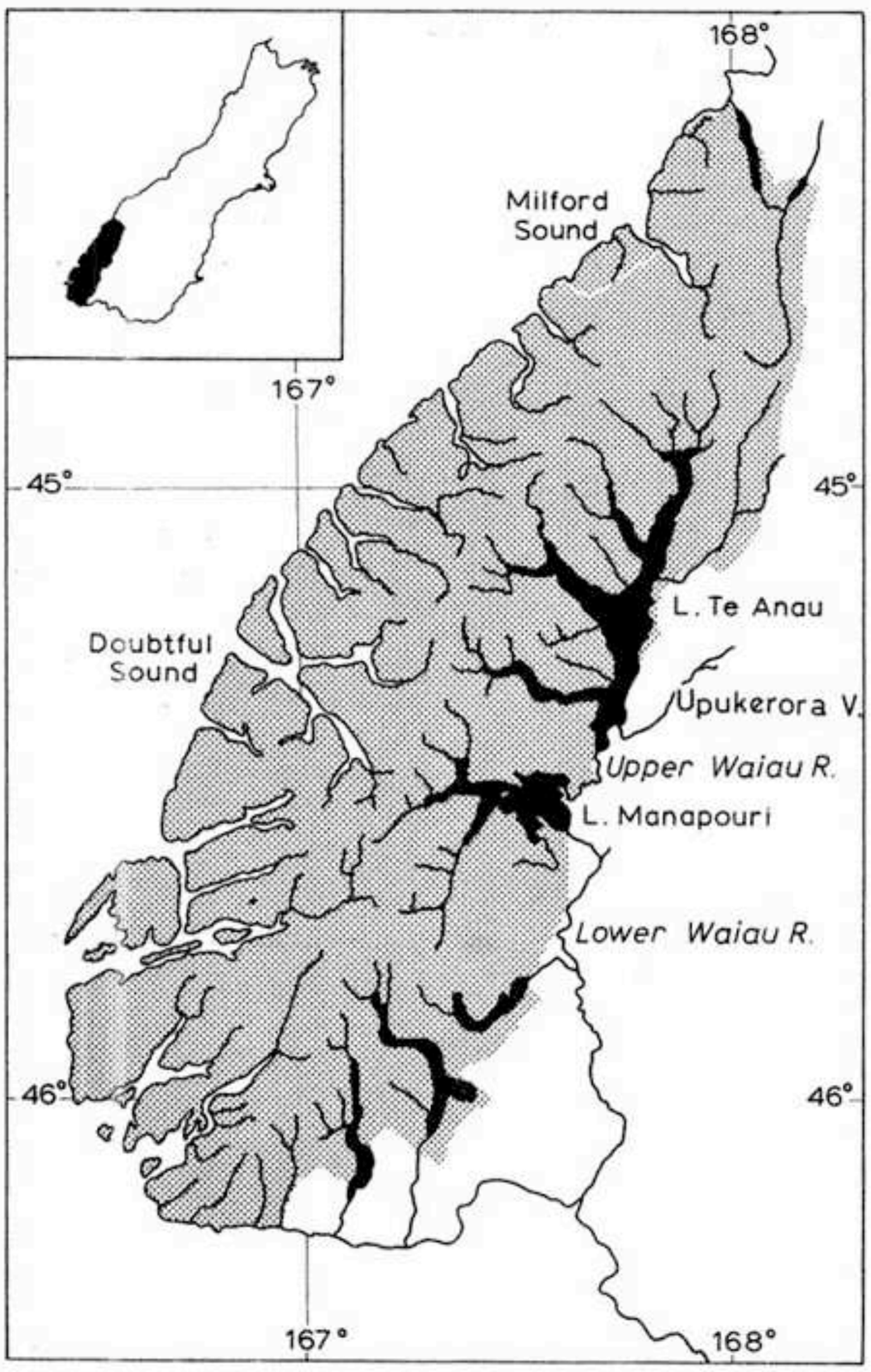

FIGURE 1. *Map of Fiordland National Park.*

In the Manapouri-Te Anau Development Act of 1960 the New Zealand Government granted to Consolidated Zinc Pty Ltd (or its assign) the exclusive right to harness the potential of these two lakes and their associated rivers. Under this agreement the proposal was to raise the level of Lake Manapouri about 90ft (27.4m) to slightly exceed the natural maximum level of Lake Te Anau, thereby creating one large lake. Electricity was to be generated at an underground power station near sea level beneath Lake Manapouri's West Arm, with a tailrace tunnel to the sea at Deep Cove in Doubtful Sound.

The long and involved history of the controversy cannot be documented here, but it was certainly unfolding by 1963 when Comalco, as Consolidated Zinc's assign, unable to raise finance for the hydro-electric project, exchanged its right in a new agreement with the New Zealand Government. The 1963 Agreement entitled the Company to receive a specified amount of continuous power from the Crown which thereby undertook to develop the project with the proviso that some of the power would be available to the national grid. Government took over the scheme at this time but neglected an opportunity to limit its commitment to a simple guarantee of power to Comalco. Instead it inherited the legal obligation to raise the levels of both lakes.

In 1966 Government announced that the likely level for Lake Manapouri would be 27.5ft (8.38m) above its present mean level, the figure on which the controversy then focussed. A structure on the Upper Waiau River to control the

level of Lake Te Anau was then suggested and proposals for this lake, envisaged now as vital storage for the scheme, became a separate issue.

The Manapouri-Te Anau Development Act of 1963 authorises the Minister of Electricity to vary the level of Lake Te Anau up to a maximum value of 676.6ft (206.2m). Subsequent proposals indicated that the lake was to be controlled at its maximum natural level of 670ft (204.2m) and would be permitted to fall to 653.6ft (199.2m), i.e. 5.4ft (1.8m) below its natural minimum. Computer runs using hydrological data collected since 1932 suggested that a level of 670ft would probably be maintained for up to eight months at a time and also that the lake would exceed this level during periods of flood. However, the Manapouri Commission of Inquiry (1970) recommended that the control level of Lake Te Anau should be no higher than 668ft (203.6m) and this value has now been accepted by Government.

An early criticism of the entire scheme, and one repeatedly and forcefully stated in reports of the Nature Conservation Council, was the need to overcome the complete lack of any scientific studies in the planning stages to assess the impact of the engineers' proposals on the shoreline environment.

Belated reconnaissance surveys of both lakes were made by Government scientists and these will be referred to later. The studies described in the following three papers resulted from two separate projects, both financed largely by grants from the New Zealand Electricity Department which are gratefully acknowledged.

Lake Manapouri was studied during the 1969-70 summer and Lake Te Anau during a 10-day period in May, 1971 with a larger team. The authors wish to thank Professor G. T. S. Baylis, Misses K. M. Cooper, J. E. Ferguson and N. M. Quaife and Messrs B. T. Bulloch, A. J. Easte and C. L. Powell for their assistance with the Te Anau study, the Surveying Dept, University of Otago for use of surveying equipment and the Ministry of Works for supplying lake level data. We are also grateful for boat transport provided by the Fiordland National Park Board, Messrs L. Hutchins, B. Murrell, J. Murrell and T. H. Moss of Manapouri and by Mr B. Campbell of Te Anau.

The scope of our studies was dictated largely by the respective proposals for each lake but in each case we have attempted to apply the ecological information in deriving an operating regime that would allow the maximum exploitation of the water resources while yet conserving the natural features of their forested shorelines.

Our findings are presented in four parts. The first deals with the Lake Manapouri shoreline vegetation. Part two provides a floristic list for both lake shores with additional information on community relationships and values for maximum tolerance to both submergence and emergence of shoreline species in both areas. Part three deals with Lake Te Anau, giving special emphasis to the possible effects of a water table maintained at high levels for artificially prolonged periods. Our results have been applied in Part four as recommendations which will allow maximum usage of water potential of each lake commensurate with conserving the national park quality of the shoreline environments.

REFERENCE

Report of Commission to inquire into the proposal to raise the level of Lake Manapouri for the purpose of generating electricity. 1970. 66pp. Government Printer, Wellington.